DIE VERENIGING VAN MUNISIPALE ELEKTRISITEITSONDERNEMINGS VAN SUID-AFRIKA

45ste

Konvensie Verrigtinge

OOS-LONDEN

MEI — MAY

1977

THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTH AFRICA

45th

Convention Proceedings

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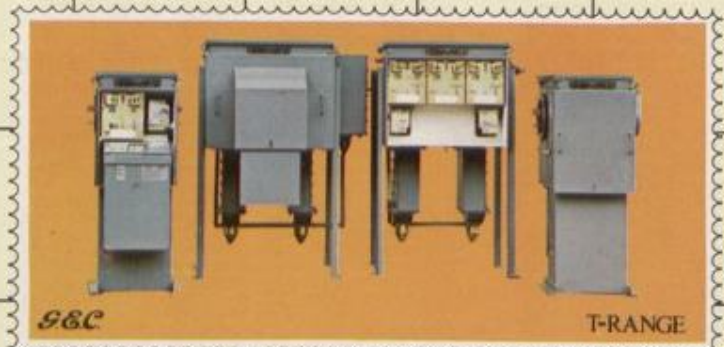

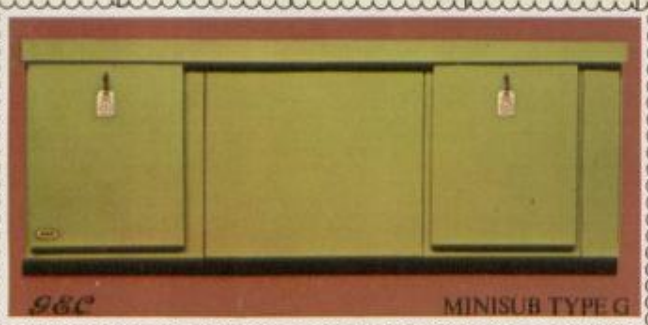

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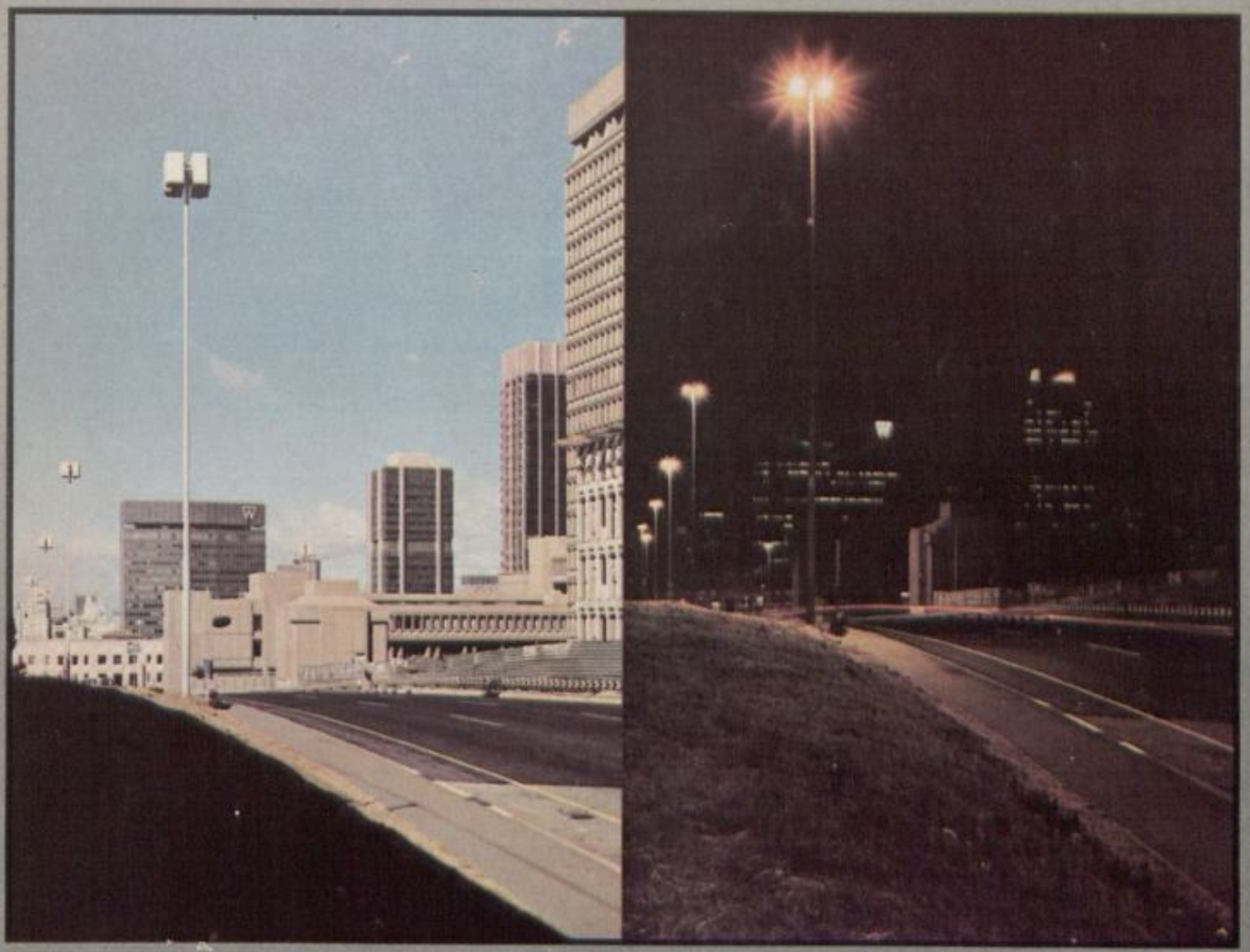

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AMPTELIKE OPENING EN VERWELKOMING

Mnr. Eugene Pretorius, uittredende President verwelkom die aanwesiges by die 45ste Konvensie in Oos-Londen. Right of Mr. Pretorius His Worship CLR. J.A . Yazbek, Mayor of East London, Rev. Father P. Quirk and J. J. Human, Town Clerck of East London.

Links van Mnr. Pretorius sit Sy Edele S. P. Botha, Minister van Arbeid en van Mynwese, K. G. Robson, aangewese President, Bennie van der Walt, Sekretaris en Mnr. J. Whelpton, privaatsekretaris van Minister S. P. Botha.

1977
PROCEEDINGS
45th CONVENTION
23-26 MAY

1977
VERRIGTINGE
45ste KONVENSIE
23-26 MEI

THE REVEREND FATHER P. QUIRK OPENED THE CONVENTION PROCEEDINGS WITH SCRIPTURE READING AND PRAYER

TABLE OF ATTENDANCE — TABEL VAN BYWONING

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MNR. E. DE C. PRETOROUS (President):

Sy Edele, Minister Botha, sy Edelagbare die Burgemeester, Raadslid Yazbek, gaste, dames en here,

Dit is vir my aangenaam om u almal baie hartlik welkom te heet by hierdie 45ste Konvensie van die Vereniging van Munisipale Elektrisiteitsondernemings van Suid-Afrika in die 62ste jaar van sy bestaan. Ek wil in besonder welkom heet ons geagte Minister Botha wat te midde van al sy werksaamhede nog die tyd kon afknyp om ons te vereer met sy teenwoordigheid om die openingsrede te lewer.

Dan ons erelede en oud-Presidente wat vanoggend hier teenwoordig is en ek versoek hulle om op te staan wanneer ek hulle name noem.

I request these people, the Past Presidents and Honorary Members to please stand up when I mention their names:-

Mr. Bert Kipling	— Honorary Member;
Mr. A. Foden	— Past President, Honorary Member and one of the former City Electrical Engineers of East London;
Mr. Percy Giles	— Former City Electrical Engineer of East London, Past President and Honorary Member;
Mr. Rannie Simpson	— Honorary Member and also Past President;
Mnr. Hawie Theron	— Voormalige President;
Mnr. Jules von Ahlften	— Voormalige President;
Mr. Jack Waddy	— Past President;
Mr. Bob Barton	— Past President.

Dan wil ek baie welkom heet ons twee gassprekers, gasreferente, dr. Henry Olivier en mnr. B. H. L. Leach en ook die voorsitter van Evkom, dr. R. L. Straszacker, een van my gewaardeerde leermeesters op Universiteit. Ek is baie geëerd dat hy vanoggend hier is.

Last but by no means the least, the delegates from the country of the stalwart Ian Smith — the delegates from Rhodesia. Dames en here ek vertrou en is daarvan oortuig dat hierdie Konvensie net so aangenaam en leersaam sal wees as die beste wat ons vantevore gehad het, indien nie meer nie. In die verband hou ons sakelys groot belofte in.

May I call on His Worship the Mayor, Councillor J. A. Yazbek, to open the Convention.

HIS WORSHIP THE MAYOR OF EAST LONDON

COUNCILLOR J. A. YAZBEK

welcoming the delegates.

SPEECH OF WELCOME BY HIS WORSHIP THE MAYOR OF EAST LONDON

COUNCILLOR J. A. YAZBEK

Mr. President, the Honourable the Minister of Labour and Mines, distinguished guests, ladies and gentlemen. It is my privilege on behalf of the City Councillors and citizens of East London to welcome you as delegates to the 45th Convention of the Association of Municipal Electrical Undertakings of South Africa. A special welcome is extended to you, Mr. Minister, and we thank you for having left your demanding duties in the House of Assembly to be with us this morning to deliver the opening address. You will no doubt recall that, as Minister of Water Affairs and Forestry, your last official visit to the city was in August, 1970, on the occasion of the opening by yourself of the Bridle Drift Dam.

Our city is indeed honoured to host this Convention and I am reminded that it is fifteen years since last you gathered here. It is pleasing to note that about forty delegates and their wives who attended that Convention are with us again today.

Since the inception of your Association, this City's contribution has been one of continuous involvement in its affairs. Each City Electrical Engineer of East London has in turn held the office of President. The late Mr. J. Mordy Lambe was the eighth and held office from 1927-1929; Mr. Arthur Foden, 1948/1949; Mr. Percy Giles, 1962/1963 (happily both are present in the hall) and this morning we will witness the induction of our present City Electrical Engineer, Mr. Ken Robson.

As your deliberations over the next few days will be on electricity supply and matters associated therewith, allow me to sketch briefly the history of the East London Municipal Electricity Undertaking.

It was founded in October, 1899, and is one of seven undertakings established in South Africa before the nineteenth century passed into history.

The late Mr. J. Mordy Lambe became East London's fifth Town Electrical Engineer on August 1st, 1905 — four different men held the position in the four years from April 5th, 1900, to July 31st, 1905 — and then only another four throughout the next seventy-two years. Times do not really change much because in the first report Mr. Lambe submitted to the Town Council he warned of the overloading of the generating plant!

The distribution system was overhauled and improved, but it was obvious that the plant was not capable of taking the load demanded and so negotiations were started for the acquisition from the Government of the West Bank Power Station, the original station having been erected on the East Bank of the Buffalo River where the Princess Elizabeth Graving Dock now stands. In 1909 the negotiations ended in an agreement under which the Municipality secured a twenty-three year lease on the property, which included not only the power station and buildings, but also railway sidings and certain cables across the Buffalo River.

On February 28th, 1911, the old power station was closed down and the entire generation of the town's electricity supply was transferred across the river to the station which had been re-equipped after the Government agreed to lease it to the Municipality.

Towards the end of 1946, the City Council agreed to the generation and supply of electricity for East London being taken over by the Electricity Supply Commission and an agreement was signed effective from January 1st, 1947. Thus the city's partnership with Escom has remained unbroken for thirty years.

Of interest to you will be some snippets of the earliest history of a city and surrounding area shrouded in mystery. So far as records go, nothing was known of it or of the river on which is now a great port before 1868 when two white men, members of survivors from the Dutch East India Company's ship, Stavenisse, were discovered to be living in this district with the natives.

In 1752 Ensign Beutler explored the country to the east of the Cape boundaries and, having crossed the Keiskama and Chalumna rivers, he arrived at the Buffalo. In a report of his exploration he refers to the river as the "Konka" or "Buffels" River, the name given it by the natives of the district. In 1853 Colonel Harry Smith, Chief of Staff to the Governor, Sir Benjamin D'Urban, led a special expedition of 600 men to the Buffalo Mouth to investigate the possibility of founding a port there. Captain John Bailie, one of the men who accompanied him became enthusiastic about the possibilities of the place and in November, 1836, he crossed the river from the west bank and hoisted the Union Jack on the summit of Signal Hill thus claiming the future port for Great Britain.

On January 14th, 1848, the Governor of the Cape, Sir Harry Smith, issued a proclamation annexing the river mouth and the territory for two miles all round, to the Cape Colony. He named the place East London, but it was not until 1873 that it was proclaimed a Municipality.

Mr. President, the AMEU Convention is one of the largest municipal congresses held in South Africa and the importance and standing of your Association is demonstrated by the representation of so many bodies and organisations involved in the electricity supply industry.

I am pleased to acknowledge the value of its work and influence. I have no doubt that your discussions will be worthwhile.

To you, Eugene, as President, greetings on behalf of the city. You come from a town with a proud history — the first to be established North of the Vaal River in 1838 and the first to be governed by a local authority.

I have decided not to give a discourse on electricity this morning but I cannot let this opportunity pass without mentioning the painful subject of its cost! Councillors know only too well the opinions of the many consumers on this thorny topical issue! Perhaps you will appreciate one consumer's opinion so feelingly expressed in verse:-

He stood before the Pearly Gates,
His face was scarred and old.
He meekly asked the Man of Fate
Admission to the fold.
"What have you done," St. Peter said,
"To gain admission here?"
"I was a consumer of Escom, Sir,
"For many and many a year".
The Pearly Gates swung open wide
St. Peter touched the bell.
"Come in," he said, "and choose your harp,
"You've had your share of hell".

As I look up at the gallery I am aware of the special aura of charm the ladies give to this distinguished gathering. It is a privilege for me to extend to you a sincere welcome and to tell you my wife, Bertha, is looking forward to meeting and entertaining you tomorrow.

In conclusion, I wish to say to all of you that although your sojourn in our city will be of short duration, we sincerely hope it will be pleasant and when you return to your home towns and cities you will decide as a result of this visit that you will soon come back again.

East London is happy to have you here during this week and I wish you well in your working and playing together in this lovely part of our land. Mr. President, for the honour of being able to welcome you all, I thank you.

MR. E. de C. PRETORIUS: Thank you very much, your Worship, for your hearty welcome en ek moet sommer nou, voor ek vergeet, sê baie dankie dat u nou uiteindelik gesê het Potchefstroom is die oudste gemeenskap in die Transvaal, want die Klerksdorpers dink mos hulle is die oudste gemeenskap.

It is a wonderful experience to be back in East London for a Convention after fifteen years. There are still a number of us present today who have very vivid memories of that Convention and of that illustrious figure who at that time was the City Electrical Engineer and the President, Mr. Percy Giles, and is now one of our members, How fortunate you East Londoners are to have had such distinguished City Electrical Engineers. Mr. Mayor, I have often wondered what makes East London tick, besides industries and harbour and of course Ken Robson, and at last I found the answer in the March 1977 SABS Bulletin — Ticks.

Now if you don't believe me you can read the article on page 137 in this bulletin. The delightful photograph on this page shows the Director-General of the SABS, Mr. Teichman, in shirt sleeves, turning the first sod on the sites for the testing of tick insecticides whilst you, Mr. Mayor, are looking on with a broad or should I say an amused smile, presumably because it is very rare to find the SABS top brass doing any hard work. This is just a bit of leg pulling, Mr. Deputy Director-General, if he's here, and Mr. Pat Middlecote.

Mr. Mayor, we are looking forward to a most enjoyable stay in your beautiful city and on behalf of all the delegates and their wives, I thank you in anticipation for your, your Council's, and your City's kind hospitality.

Thank you, Mr. Mayor.

Openingsrede deur Sy Edele S. P. Botha, L.V., Minister van Arbeid en van Mynwese

Meneer die President, dames en here, dit is vir my inderdaad 'n besondere voorreg om vandag saam met u hier te verkeer. Ek dank u, Mnr. die President, vir die eer wat u my aangedoen het om hierdie vyf-en-veertigste konvensie van u Vereniging te open. Wees verseker dat u vriendelike gebaar hoog op prys gestel word en dat dit vir my 'n aangename voorreg is om aan u vriendelike uitnodiging te kan voldoen.

Mindful of the fact that you represent important suppliers of energy and are thus in a position to influence many facets of our society I would like to touch on a number of aspects which are relevant to your activities and on which I think the exchanging of views can be fruitful.

The consumption of electricity is frequently used to gauge the degree of development of a country and the standard of living of its peoples. The amount of electricity available to the general public is an indication of the standard of living enjoyed by the private citizen because this ever-willing servant is available day and night to serve at a flick of a switch. South Africa's per capita consumption of electricity is said to be only 21 years behind that of the United States of America with its powerful economy, which speaks volumes for the proud record of our country in the field of electricity generation.

The man in the street may not be aware of the tremendous role electricity plays on the national scene but he does know what electricity means to him personally — this genie whom he may call upon to perform countless tasks in and around the home, creating comfort and leisure time, two things which are considered to be the unalienable right of present day mankind.

It stands beyond reason that this facility must be extended to raise the standard of living of all our peoples, and this in the not too distant future. This effort is going to make enormous demands on the national economy and the services which the members of your association will be called upon to render. Already the municipalities consume approximately 24% of all the power generated in the Republic and as the full benefits of the use of electricity are extended to the less privileged population groups you are going to enjoy an even larger slice of the electricity pie.

Gedagtig hieraan en die feit dat munisipale elektrisiteitsondernemings 'n regstreekse diens aan die publiek lewer, is dit duidelik welke dure verpligting daar op die lede van u Vereniging rus om te verseker dat hierdie noodsaaklike diens op die mees doeltreffende en ekonomiese wyse moet geskied.

THE HON. S. P. BOTHA, M.P.,
Minister of Labour and of Mines

STEPHANUS PETRUS BOTHA was born at Lusaka in Northern Rhodesia on May 5, 1922. In 1937 he went to Paarl High School where he matriculated in 1939. Twice a year he returned home to spend the winter and summer holidays with his parents in the Lusaka district.

In 1940 Mr. Botha entered the University of Stellenbosch, first enrolling for a law degree and thereafter for a degree in economics and commerce.

After completing his studies in 1945, he joined the organisation of Dr. A. E. Rupert who had just then floated the Technical and Industrial Investment Group of Companies, destined to become the managing group of the future Rembrandt organisation. As financial organiser, Mr. Botha subsequently played a key role in the founding of the Rembrandt organisation.

In 1955 he transferred his interests to farming and settled in Louis Trichardt where he devoted much of his energy to public life.

In 1958 he was elected Member of Parliament for the Soutpansberg constituency and is still its representative. In Parliament he has applied himself to Water Affairs, Agriculture, Finance and Inter-racial Relations.

In 1966 he was appointed to the Bantu Affairs Commission.

In February, 1968, he became Deputy Minister of Water Affairs and in August, 1968, Minister of Water Affairs and Forestry.

Minister Botha developed the Department of Water Affairs into an efficient organisation, geared to handle the water situation in accordance with the needs of today and tomorrow, on an increased Budget of R130 million. Water research is being carried out and planned on such a comprehensive scale that South Africa now is one of the leading countries in this field.

To gain public co-operation and fire the imagination of the people of South Africa, Minister Botha proclaimed 1970 as "Water Year". A major campaign was put into action to engender in the entire population a conception and understanding of all forms of water consumption, conservation and protection. It was a resounding success, already noted as one of the most effective promotions ever launched in any country.

As Minister of Forestry he introduced new vision into South Africa's approach to forestry and related industries. With a view to timber supply and production, he has already instituted a comprehensive programme of advanced planning for future needs.

He was appointed Minister of Labour and of Mines in February, 1976.

In hierdie verband is dit so dat plaaslike owerhede nie meer baas op hulle eie plase is nie en dat hulle, in hulle doen en late, rekening moet hou met die diktatuur van die nasionale ekonomie, beplanning en sosio-politieke patroon. Maar dit berus nietemin nog in 'n groot mate by u om binne die bestaande bestel 'n wesenlike bydrae tot sinvolle beplanning en vooruitgang te maak.

Gesamentlik het u ondernemings 'n baie groot aantal ingenieurs, tegnici, ambagslui en arbeiders in diens en rus daar 'n verpligting op u om hierdie werkkragte doeltreffend te benut. Dit kan slegs gedoen word deur elke werknemer se produktiwiteit te probeer verhoog. Verhoogde produktiwiteit beteken nie in die eerste plek langer werksure of die daarstelling van onbereikbare norme nie, maar die inwin van groter kennis en die bereiking van groter vaardigheid deur middel van die beskikbaarstelling aan die werknemer van meer gesofistikeerde middele en, gepaardgaande daarmee, 'n motivering tot groter arbeidsaamheid en pligsbesef.

Die aanvraag na elektrisiteit toon nog geen afname nie. Inteendeel, daar is 'n steeds stygende aanvraag na hierdie kommoditeit wat die verskaffers uit die aard van die saak onder druk plaas aangesien dit 'n uitbreiding van opwekkingskapasiteit en die aanlê van verspreidingstelsels ten gevolg het. U weet self wat u onderneming se begroting verlede jaar was en wat dit die volgende jaar gaan wees. Ek kan egter noem dat Evkom in 1975, R426 miljoen aan kapitaal bestee het. Hierdie reuse bedrag sal waarskynlik jaar na jaar vermeerder veral as die uitwerking van inflasie wat 'n wêreldwye verskynsel is, in gedagte gehou word. Omdat Suid-Afrika nog nie op alle gebiede selfversorgend is nie, is dit nodig dat baie van ons toerusting en benodighede nog in die buiteland aangekoop moet word. Ons weet dat pryse nog voortdurend besig is om te styg en transaksies van hierdie aard kos baie geld waarvoor buitelandse valuta nodig is en wat dus ons handelsbalans nadelig beïnvloed.

Omdat u in regstreekse kontak met die huishoudelike verbruiker is, moet u dus van u kant af geen steen onaangeroer laat om die verbruikerspubliek op alle moontlike maniere aan te moedig om spaarsaam met elektrisiteit te werk nie. Omdat elektriese krag in die verlede betreklik goedkoop was, het ons mense ongelukkig baie min ontsag en waardering daarvoor en die hele benadering van die deursnee persoon kom neer op 'n aanname dat elektrisiteit maar iets is wat altyd daar was en dus te alle tye daar moet wees.

Daar was 'n tyd toe mense vir geldige ekonomiese redes aangemoedig was om meer elektriese krag te gebruik maar tye en omstandighede het verander en die huidige benadering is een van besparing en die oordeelkundige gebruik van elektrisiteit. 'n Moontlike hulpmiddel in hierdie verband is om die tariefstruktuur so te hersien dat die verbruikspatroon van elektrisiteit op so 'n wyse daardeur beïnvloed word dat spitsvragte afgestomp word en vermorsing van energie dus vermy word.

Dan kan daar na my mening ook met vrug meer aandag aan sekere tegniese aspekte van ons huisboukonstruksie gegee word.

Om maar net een voorbeeld te noem dink 'n mens aan die groot persentasie van die totale verbruik wat binnenshuise verwarming gedurende die wintermaande tot die spitsverbruik van krag maak en ontstaan die vraag waarom daar nie gepoog word om 'n meer gevorderde isolasiemetode te ontwikkel sodat minder krag nodig is om dieselfde mate van gerief te skep as wat tans die geval is nie.

In sy Jaarsverslag sê Evkom dat daar in 1975 nie minder nie as 34 231 miljoen metrieke ton steenkool deur hom met die oog op die opwekking van krag verbrand is. Dis byna onmoontlik om 'n begrip van hierdie enorme hoeveelheid steenkool te vorm, maar indien 'n mens jou sou voorstel dat al hierdie steenkool op een slag per spoor vervoer moes word, dan sal die trein uit ongeveer een miljoen trokke bestaan en 14 000 kilometer lank wees — meer as een derde van die aarde se omtrek.

Suid-Afrika se bevoorregte posisie sover dit steenkoolvoorrade aangaan is in die jongste tyd by herhaling beklemtoon. Ons is inderdaad bevoorreg om sulke groot voorrade op Suid-Afrikaanse bodem beskikbaar te hê maar hierdie bronne is nie onuitputlik nie en moet omsigtig aangewend word. Ons steenkoolvoorraad is nie net 'n energiebron vir huishoudelike gebruik nie maar is ook 'n waardevolle handelsmiddel waarmee ons vir ons noodsaaklike invoergoedere kan betaal.

In the first report "Limits of Growth" to the Club of Rome it is stressed that the world's reserves of natural fuels, at the present rate of exponential consumption, will be exhausted early in the next century and spells out the dire consequences to mankind of such an eventuality.

It is therefore obvious that long before this catastrophic moment arrives the absence or the presence of reserves of natural fuel will become factors of great economic and political import to nations.

The validity of this statement is being proved every day. America is building the much criticised Alaskan pipeline in order to unshackle itself from Middle East petroleum supplies; England (or shall I say Scotland) is feverishly developing the North Sea oil fields in order to prop up a shaky economy and exploration companies are drilling for oil all over the world on behalf of countries who find themselves at the mercy of the oil Sheiks; South Africa being one of them.

It is in this type of situation, where economic considerations create political pressures, that the coal reserves of South Africa are taking on greater significance for us all, and this is all the more reason that we should nurse our coal resources instead of wasting it on all sorts of trivialities.

It is under these circumstances that I appeal to you on the local government level to economise as much as possible.

The use of nuclear energy for generation of electricity is of course an alternative and the possibility of exhausting the natural fuel supplies is often talked down by optimists who maintain that nuclear stations will simply take over. It is so that nuclear energy will become a very important factor in the world's energy needs and it is comforting to think that South Africa will derive great benefits from this fact, but it is not the final answer.

The second report "Mankind at the Turning Point" to the Club of Rome predicts that in the absence of natural fuel reserves, no less than four nuclear power stations will have to be commissioned each week in order to satisfy the world's energy hunger — a feat which will in all probability be impossible technologically and economically.

The prophets of doom are not necessarily right but these predictions are made on the strength of information now available and we would be foolish not to heed the warnings because it is clear that whatever solutions technology produces there will not be energy to waste.

By die volvoering van ons taak en by die aanwending van die middel tot ons beskikking, hetsy in die vorm van mensemateriaal, grondstowwe of geldelik, is dit na my mening noodsaaklik dat verbruik bedwing moet word sonder om ontwikkeling te stuit; dat besuinig moet word sonder om vooruitgang te strem of te verhinder; dat ons altyd bewus moet wees van tekorte en oorvloed en dit wat ons tot stand wil bring laat rym met die natuur en die behoeftes van die mens. Met ander woorde daar moet altoos 'n gesonde en aanneemlike balans gehandhaaf word.

Mnr. die President, die lede van u Vereniging het 'n trotse rekord van dienslewering. Die Vereniging bied 'n forum waarop tegniese, administratiewe en finansiële probleme van u ondernemings bespreek kan word wat, soos duidelik uit u gepubliseerde verslae blyk, ook gedoen word. Ek wil dus die hoop uitspreek dat die referate wat op hierdie konvensie gelewer gaan word van groot nut sal wees en dat elkeen van u 'n bietjie ryker in kennis huiswaarts sal keer. Mag ek ook die wens uitspreek dat u sal poog om in u besprekings nie plaaslike belange die nasionale belange te laat oorheers nie.

Dit is nou my voorreg om hierdie kongres geopen te verklaar en u alle sukses met die verdere verloop van die verrigtinge toe te wens.

MNR. E. de C. PRETORIUS: Mnr. die Minister, ek dink dit is 'n geval dat u — dis soos die Predikant sê hulle preek altyd vir die verkeerde mense. Ek hoop dat hierdie toespraak van u baie wye publisiteit in ons dagbladpers sal kry want dit is baie belangrik dat wat u vandag hier gesê het, aan die breë publiek bekend gemaak word. As ons ingenieurs iets sê dan wil mense dit nie glo nie maar ek dink as 'n Minister dit gesê het dan sal hulle dit seker glo. Toe u genader is, mnr. die Minister, om hierdie openingsrede te lewer, toe was u nog die Minister van Waterwese en Bosbou. Die motief is klaarblyklik want u het 'n baie belangrike rol gespeel in die ontwikkeling van hidro-elektriese kragopwekking in die Republiek, 'n aspek wat ook deeglik onder die soeklig gaan kom by hierdie Konvensie. Min het ons toe geweet dat u die belangrike portefeulje van Arbeid gaan oorneem, 'n Departement waarmee ons as elektrisiteitsondernemings seker die meeste gemoeid is. Dink maar net aan die Fabriekswet, die Wet op Elektrotegniese Draadwerkers en Aannemers en die Wet op Vakleerlinge. Mnr. die Minister, toe u so lekker praat — u weet, ek het altyd gedink u kom van Moorreesburg af, toe hoor ek vandag u kom van Lusaka af, u is in Lusaka gebore. U weet my bors as oud-Matie het heerlik geswel. U weet daar word gesê dat ons oud-Maties en Maties kampioene is as dit kom by „brag'.' Ons het mos 'n groot „brag" by intervarsity en sulke dinge. Ja ek kom by daardie punt maar ons het natuurlik rede om te „brag". Apart van die feit dat ons die Tukkies onlangs 'n les geleer het en eergister die Ikeys behoorlik vermorsel het op die rugbyveld — behalwe dit wil ek net noem dat, behalwe mnr. Botha, is ons Eerste Minister en ses ander Ministers en twee Adjunk Ministers oud-Maties. Ek wil net noem dat — dit sal u miskien interesseer dat mnr. Jules von Ahlften, die Elektrotegniese Stadsingenieur van Springs, die eerste oud-Matie is wat President geword het van hierdie Vereniging van ons, en wel in 1971. Ek is die tweede en dis feitlik seker dat die derde oud-Matie in 1979 President gaan word. Mnr. Botha, ons sê vir u nogmaals baie dankie. Ek is seker die gehoor wil weereens hul dank en waardering aan u betuig op die gewone manier.

Mnr. Botha net as 'n blykie van waardering en ons dank wil ons net 'n geskenkie in die vorm van twee dasse wat die wapen van ons Vereniging op het, aan u oorhandig.

SY EDELE MINISTER S. P. BOTHA: Ek wil baie hartlik dank sê vir die twee dasse en ook aan die Burgemeester vir sy das. Ek het nog nooit drie dasse op een dag present gekry nie. Vir 'n baie lang tyd sal my vrou nie vir my hoef dasse te koop nie. Baie dankie.

VERKIESING VAN PRESIDENT — INDUCTION OF PRESIDENT

MNR. E. de C. PRETORIUS, President: Dames en here, ons wil ook graag aan sy edelagbare die Burgemeester twee dasse oorhandig as 'n blykie van waardering vir wat hy vir ons gedoen het en nog gaan doen.

Ladies and gentlemen I still have one more task to perform before I relinquish the office of President of the AMEU. It is indeed a most pleasant task and that is to induct the new President.

Ek wil net sê baie dankie. Dankie aan een en almal wat hierdie twee jaar wat ek President was, vir my so onvergeetlik aangenaam en maklik gemaak het. Ek het die voorreg gehad om die voorsitter te kon gewees het van 'n uitvoerende raad, seker die beste en hardwerkendste uitvoerende raad wat ons vereniging nog ooit gehad het; 'n uitvoerende raad wat my tekortkominge — en daar is legio — nie uitgebuit het nie, iets wat so baie maklik gedoen kon gewees het. Dit het alleenlik geskied omdat die gesindheid so pragtig mooi was. Ek sê baie dankie aan my intieme vriende in die Uitvoerende Raad — hulle weet wie hulle is — asook ons sekretaris, Bennie van der Walt, wat my deurentyd onderskraag het met raad en daad.

Ek wil ook my eie Stadsraad bedank omdat hulle dit ook vir my finansieël moontlik gemaak het om my pligte as President na te kom.

To the President Elect, Mr. Ken Robson, I owe my deepfelt and sincerest gratitude for his support and assistance, not only at the meetings of the Executive Council and of the Standing Committee, but right through my period of office.

In terms of our Constitution the President Elect automatically becomes the President at the Convention following means that Mr. Ken Robson, Professional Engineer, City Electrical Engineer of the City of East London, is now to become President of your Association. Mr. Robson's praises were very ably sung by Mr. Bob Barton when he proposed him as President Elect at the 1975 Convention in Durban, and I have very little to add to what was said on that occasion, also by Mr. Bert Kipling who seconded the proposal, but I wish to reiterate Mr. Barton's words — I think possibly his most important attribute is summed up in the words of Abraham Lincoln: "With malice to none, with charity for all". Ken Robson is a man of many outstanding qualities and he reminds me of some famous film stars of yesteryear. He has the stature of Walter Pidgeon, the charm of Charles Boyer, the eloquence of Sir Lawrence Olivier, the sonorous voice of Richard Burton, the sense of humour of Bob Hope and he also reminds me of Jimmy Durante.

Mr. Robson, will you please rise and allow me to transfer this chain of office to you, by which token you will become the President of the AMEU for the ensuing two years and be in charge of this Convention. I wish you the best of luck.

MR. K. G. ROBSON, President: Mr. Minister, Mr. Mayor, distinguished guests, ladies and gentlemen, I console myself sometimes with this reference to Jimmy Durante — I do console myself with the quotation — I hope it's true — from Napoleon. He said at some time or other: "All things being equal, give me the man with the nose".

Mnr. die Minister, mnr. die Burgemeester, dames en here, ek wil u in alle opregtheid baie hartlik bedank vir die besondere eer wat u my aangedoen het om my as President van die VMEO in te stel.

Mag ek van hierdie geleentheid gebruik maak om my waardering aan my eie Raad oor te dra vir hulle steun en samewerking wat my in staat gestel het om die verantwoordelikhede van die Presidentskap te aanvaar.

Ek is veral bly dat hierdie eer my te beurt geval het hier in Oos-Londen — die heerlike stad wat byna elf jaar gelede die tuiste van die Robson-gesin geword het.

Aan die voormalige President, mnr. Eugene Pretorius, my dank en waardering vir sy ruimhartige en goedgunstige woorde vanoggend en vir sy vriendskap gedurende die baie jare van ons noue samewerking in die VMEO.

I acknowledge with gratitude the many influences in my life and career — contributed by my parents, my wife and children; my church, NOSA, Toc H, a number of outstanding teachers and lecturers, some grand artisan craftsmen, my friends and my colleagues.

I remember, too, that gentle and kindly man, Ian Barratt, of Queenstown, with whom I was associated for 14 years. I am honoured by the presence here this morning of three friends who have been associated with my work here in East London — all distinguished Honorary Members of the AMEU. They are Arthur Foden, Perry Giles (my past chief) and Bert Kipling.

One could not possibly accept a position such as this without the loyalty and assistance of one's own staff — and I thank them. In particular, I would mention my Deputies here in East London — Stan Hawkeswood (now of Richards Bay), and Holden Beck who is now here with me. My appreciation to all Councillors and Heads of Departments for their support and trust over many years; and finally to my friends and colleagues on the Executive Council — Councillors, Engineers and the Secretary, Bennie van der Walt — and to the whole membership of the AMEU.

Thank you again for the great honour you have done me this day.

Dit is vir my 'n voorreg, namens die VMEO, om my innige dank aan u, Eugene oor te dra vir u bekwame leierskap gedurende die twee jaar van u ampstermyn as President.

U het ongetwyfeld met u eie persoonlike eienskappe van waardigheid en begrip, voortgebou op die lang en uitstekende tradisie van die Presidentskap.

Iets wat altyd my bewondering afgedwing het, was u deeglike voorbereiding vir die groot verskeidenheid aangeleenthede op die talle agendas vir Bestuurs- en Tegniese vergaderings asook vir die Konvensies. U het altyd bewys gelewer van u bekwaamhede ten opsigte van doeltreffende en oortuigende voorsitterskap.

Dit was vir my 'n besondere voorreg om vir twee vrugbare en bevredigende jare in die geskiedenis van die VMEO onder u te dien. Ons, die lede, huldig u vir u dienste en prestasies.

As 'n blyk van waardering vir u bydrae tot die werk en invloed van die Vereniging, is dit vir my 'n genoeë om namens die VMEO hierdie welverdiende adres aan u te oorhandig, en hierdie adres lui:-

> Mnr. E. de C. Pretorius was President van die Vereniging van Munisipale Elektrisiteitsondernemings van Suid-Afrika vir die periode 1975 tot 1977 en hierdie sertifikaat is 'n aandenking vir die waardering van sy besondere en getroue dienste gedurende sy ampstermyn en ter bevordering van die doelstellings van die Vereniging.

Mr. K. G. Robson, newly inducted President, presents the immediate Past President, Mr. Eugene Pretorius, with a Certificate of Merit.

The Hon. S. P. Botha, Minister of Labour and of Mines congratulate Mr. K. G. Robson with his induction as President of the A.M.E.U.

MR. E. de C. PRETORIUS: Ken, baie dankie vir die wapen en hierdie pragtige sertifikaat wat ek ontvang het. Dames en here, soos u kan sien dit is 'n kunswerk — u weet dit is die „brainkind" van ons Sekretaris, Bennie van der Walt. Hierdie twee, die wapentjie en hierdie sertifikaat sal twee van my waardevolste besittings word, ek kan u dit verseker. Baie dankie.

VERKIESING VAN DIE AANGEWESE PRESIDENT
deur MR. J. K. VON AHLFTEN, SPRINGS:

Mr. President, before I proceed with what I am actually supposed to do this morning, may I, on behalf of all your colleagues present today, congratulate you on your election as President of this Association and wish you a very successful convention and a happy term of office.

Meneer, die President, dames en here, ek het vanoggend een van die aangenaamste take wat ek nog tydens 'n Konvensie moes verrig en dit is naamlik om my goeie vriend en kollega Piet Botes as aangewese President vir 1977/79 aan u bekend te stel. Ek beskou dit as 'n besondere voorreg om hierdie taak te kan verrig vernaamlik gesien in die lig dat Piet die derde Oud-Matie is wat hierdie eer te beurt sal val. Die eerste een was ek self en die tweede was ons pas uitgetrede President, Eugene Pretorius. Meneer, die President, voor ek by die eintlike taak kom om Piet as aangewese President voor te stel laat ons eers kyk waar kom hy nou eintlik vandaan.

Piet is gebore op 30 Mei 1929 in Standerton, Transvaal (amper op Republiekdag wat moontlik verklarend kan wees van sy uitgesprokenheid). Hy het opgegroei op die plaas Suuringbank naby Ascent, distrik Vrede in die Vrystaat. Hy het sy Hoërskoolopleiding ontvang by die Vrede Hoërskool waarna hy aan die Universiteit van Stellenbosch die B.Sc. Graad in swaarstroom elektriese ingenieurswese in 1951 verwerf het. Daarna het hy die bevoegdheidssertifikaat as Elektriese en Werktuigkundige Ingenieur verwerf en is geregistreer as 'n Professionele Ingenieur. Hy is 'n genoot van die S.A. Instituut van Elektrotegniese Ingenieurs en glo dit as u wil, beskik hy ook oor 'n O & M Diploma.

Wat Piet se praktiese opleiding betref het hy 'n tweejarige leerlingkursus by Evkom deurloop en daarna vir 'n tydperk by die Elektrisiteitsdepartement in Johannesburg gewerk (dit behoort hom eintlik vanoggend te diskwalifiseer tensy Wessel Barnard ons anders kan oortuig!). Hier was Piet betrokke met die beplanning van dienste aan die Suidelike voorstede en vir Soweto.

In Oktober 1956 is hy in Roodepoort aangestel as Assistent S.E.I. en in Augustus 1961 as S.E.I. en sedert 1969 as SEMI. Piet dien op die U.R. van ons Vereeniging sedert 1971 waar hy hom in besonder onderskei het as die VMEO se koördinerende verteenwoordiger op die SABS waar hy steeds uitstekende werk lewer. Natuurlik, Piet is getroud, en ek dink Ertny het baie daarmee te doen dat Piet so vêr in sy loopbaan kon gevorder het. In sy vrye tyd is Piet 'n geesdriftige hengelaar en het Transvaal in 1961 op die nasionale kampioenskappe verteenwoordig.

Meneer, die President, nou weet ons watter persoon Piet Botes werklik is. Ek persoonlik ken Piet al sedert 1964 en ek het hom leer ken as 'n man wat nie sal skroom om te sê hoe hy oor 'n saak voel nie en ek dink dit is juis hierin waarin Piet hom as aangewese President van ons Vereeniging sal onderskei en dat die belange van ons Vereeniging in baie bekwame hande geplaas sal word, wat beide ons huidige President en aangewese President betref.

Mr. President, ladies and gentlemen, I think it is fairly obvious to all of us that Piet Botes is more than suitably qualified to assume the important office of President Elect of our Association and it therefore gives me great pleasure to formally propose Mr. Botes as President Elect for 1977/79.

Thank you, Mr. President.

RAADSLID H. J. HUGO, ROODEPOORT:

Mnr. die President, Sy Edele die Minister, agbare Burgemeester, dames en here, wanneer iemand praat van 'n Universiteit dan dink ek altyd aan die storie, ek weet nou nie of dit 'n Van der Merwe-storie is nie, maar Oom Piet van der Merwe in die Vrystaat het 'n seun Danie gehad en die seun Danie was op Stellenbosch Universiteit. Lank het Dominee ek wonder of jy nie by Stellenbosch kan aangaan en net kyk hoe gaan dit met Danie nie — ek hoor nie van hom nie. Toe sê die Dominee, ja sekerlik Oom Piet, ek sal. Hy het toe gegaan, hy kom terug en hy sê vir Oom Piet, ek was in Stellenbosch en ek het jou seun gesien, lank met hom gepraat en hy sê, ek het slegte nuus vir jou. Dit lyk vir my of Danie oorhel na links. Toe sê Oom Piet, Ag nee, Dominee, moenie bekommerd daaroor wees nie, een van die dae, as dit oestyd is, dan kom hy terug en ek sê vir jou net 'n week in die mielielande dan hel ek hom weer oor na regs.

Mnr. die President, ek is dankbaar om te kan sê dat Piet Botes, wat ook hier uit die Vrystaat uit kom, was ook Stellenbosch toe gestuur, hy het daarheen gegaan en sy BA-graad gekry en sy Elektrotegniese Ingenieurs- en ook sy Meganiese Ingenieursertifikaat gekry, maar ek is dankbaar om te sê hy het nie na links oorgehel nie en ook nie na regs nie. Piet Botes se pad loop reguit in hierdie lewe en as daar een ding is wat mens hom nou, en ek praat nou nie as elektrotegniese ingenieur van Roodepoort van hom nie, maar as mens, en as mens is ek dankbaar om te sê dat sy eerste liefde is sy huis, hy is 'n man vir sy familie. Sy vrou en sy kinders is nommer een in sy lewe.

In his spare time, Mr. President — you wouldn't believe it — he is a great fancier of birds. In his backyard there are a number of aviaries where Piet keeps a variety of foreign and South African birds. He is an expert on birds, so much so that he is a judge of birds, which shows you that he is an all-round type of man. Furthermore, he is a very brave man, too; he is a keen, deep-sea fisherman and holds the colours of Transvaal for this sport. I don't think that every Engineer has the guts to go deep-sea fishing. He is also a freshwater fisherman and usually takes his family with him when he goes fishing.

Mr. President, on behalf of my Council and on behalf of the staff of our Municipality, we thank the Institute of the AMEU for honouring Piet Botes this morning. We trust that he will be a worthwhile President Elect and that he will be of great assistance to you and the Association. I thank you.

MR. K. G. ROBSON, President: And more nominations . . .

Dan is dit vir my 'n voorreg om mnr. P. J. Botes as Aangewese President van die VMEO te verklaar. Baie hartlik geluk, Piet.

MR. P. J. BOTES, PRESIDENT ELECT:

Mr. Minister, Mr. President, allow me to congratulate you on your election to the high office of President of this Association.

Furthermore, I wish you and your good lady a happy and successful two years of office. In my capacity as President Elect I wish to assure you, Mr. President, of my support during the next two years. However, in the light of the arrangements made and of what is in store for us, I do not think you need any assistance. May I, Mr. President, at this early stage, congratulate you on the arrangements and I have no doubt that this will be a memorable Convention.

Mnr. die President, dames en here, in die verlede was dit nooit moeilik vir my om my hand uit te steek na 'n mikrofoon nie, maar vir die eerste keer lyk die mikrofoon baie na 'n slang.

Mnr. die President, dames en here, dit is vir my 'n groot eer dat ek verkies is as Aangewese President van hierdie Vereniging, meer so vir die eer wat dan ook aan my stad hierdeur bewys word. Dit is die eerste keer dat 'n ingenieur van Roodepoort aangewys word tot so 'n hoë amp van hierdie Vereniging.

Ek wil dan my dank en waardering uitspreek teenoor al die lede van die Vereniging vir hierdie groot eer wat aan my betoon is. Veral wil ek my voorsteller, mnr. Von Ahlften, bedank vir mooi woorde wat hy aan my adres gerig het.

My innige dank ook aan Raadslid Hugo wat al die jare feitlik ononderbroke hierdie Konvensie en tegniese vergaderings saam met my bygewoon het. Dit dien gemeld te word dat Raadslid Hugo vanjaar vir die 20ste keer die Konvensie bywoon. Graag wil ek ook die lede van die Uitvoerende Raad bedank vir die ondersteuming wat ek van hulle ontvang het.

Roodepoort is behoorlik 'n miernes, alles word verander, maar gelukkig nog nie die Elektrotegniese Stadsingenieur nie. Ons is byvoorbeeld besig om:-

1. Binnekort stad te word;
2. Op soek na 'n oorkoepelende naam vir die stad;
3. Die aanbou van 'n Burgersentrum;
4. Aanbou van 'n hotel.

Hierdie fasiliteite sal nie voltooid wees in 1979 nie en gevolglik kan ons nie die Konvensie in Roodepoort aanbied nie.

Mnr. die President, ek is diep bewus van die hoë eise verbonde aan hierdie pos en vertrou dat ek met al my tekortkominge die diens sal kan lewer wat u van my verwag.

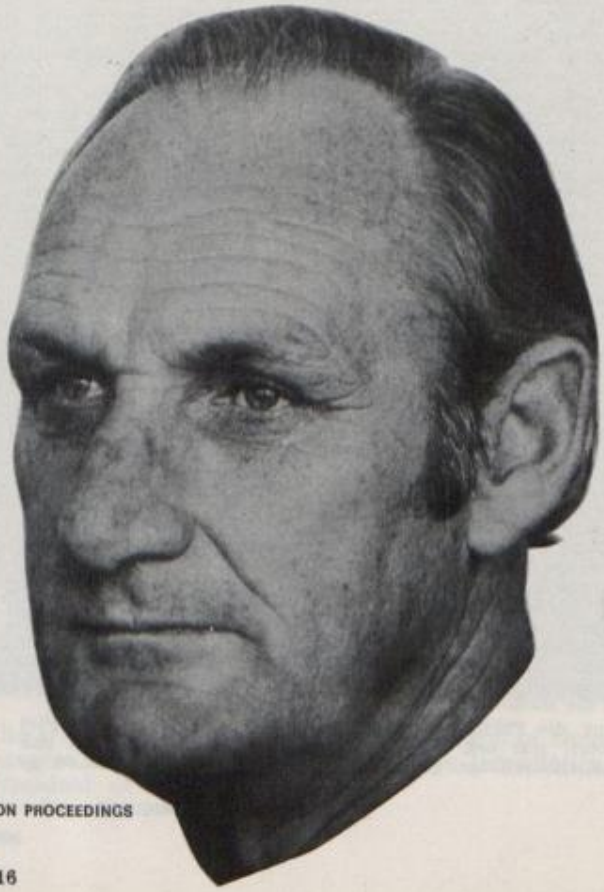
MNR. K. G. ROBSON, President:

Ek vra mnr. Botes om nou die voorsitstoel in te neem vir die Presidentsrede.

MNR. P. J. BOTES, Aangewese President:

Dames en here, dit is vir my 'n groot genoeë dat ek my vriend Ken Robson formeel as President van hierdie Vereniging aan u voorstel. Ken is a very competent speaker and we are looking forward to hearing what he has to say to us. Ladies and gentlemen, I now hand over to Ken Robson.

Sy Edele S. P. Botha, Minister van Arbeid wens Mnr. P. J. Botes geluk met sy verkiesing tot aangewese President, terwyl die President, Mnr. K. G. Robson en die Sekretaris Mnr. Bennie van der Walt toe kyk.



K. G. ROBSON, Pr. Eng.
City Electrical Engineer, East London.

Newly elected President
of the A.M.E.U.

PRESIDENTSREDE

Deur

K. G. ROBSON, Pr. Ing.
Elektrotegniese Stadsingenieur, Oos-Londen.

PRESIDENTIAL ADDRESS

By

K. G. ROBSON, Pr. Eng.
City Electrical Engineer, East London.

"The dogmas of the quiet past are
inadequate for the stormy present.
We must think anew, we must act anew,
We must disenthral ourselves".

— Abraham Lincoln.

INLEIDING

By die lewering van my Presidentsrede aan die 45ste Konvensie van die Vereniging van Munisipale Elektrisiteitsondernemings van Suid-Afrika, is ek in die besonder bewus van die sonderlinge eer wat die lede van die VMEO aan die Stad Oos-Londen en sy elektrotegniese ingenieur bewys het.

Ek staan vandag voor u as die vierde opeenvolgende elektrotegniese ingenieur van die stad wat tot hierdie hoë amp verkies is. Omstandighede het my in 'n onafgebroke opvolgingslyn geplaas en ek is dankbaar vir die geleentheid om die bydraes ten opsigte van leierskap en diens van 'n lang reeks uitstekende voorgangers en presidente te kan erken.

Dramatiese veranderings wat elke sektor van ons nasionale lewe — staatkundig, ekonomies, sosiologies en natuurlik munisipaal — geraak het, het gedurende die afgelope twee jaar in Suid-Afrika plaasgevind. Die verhoging van oliebrandstofpryse sedert die einde van 1973, die gepaardgaande inflasie wat onmoontlik blyk te bekamp, die daling van die goudprys, die uitputting van ons buitelandse reserwes en die verminderde vloei van oorsese kapitaal het ons land tot 'n toestand gebring wat agterna onmoontlik sou geblyk het toe die Konvensie twee jaar gelede vergader het.

Die geweld wat uitgebreek het en nog steeds voortduur aan ons noordgrense en die onlangse konfrontasies in die Swart- en Kleurlingdorpsgebiede van baie van ons stedelike komplekse, het 'n klimaat van vrees en onsekerheid geskep.

Tradisionele politieke beleide en sjibbolette en, wat te betreur is, spirituele waarhede word bevraagteken, teengestaan en verwerp soos miskien nog nooit tevore in ons landsgeskiedenis gebeur het nie. Ons onstuimige gemeenskaplike lewe is siedend van die aspirasies, verwagtinge, oortuigings en eise van 'n verskeidenheid volkere.

'n Groot mate van die druk van ons tyd en situasie word gevoel deur die handels- en nywerheidsektore van die ekonomie met noodwendige uitwerkings op die geweldige arbeidskragte wie se lewensbestaan hulle voorsien.

Menings is gelug, tereg of ten onregte, dat ons huidige verswakte ekonomiese toestand die slegste is sedert die depressie van die dertigerjare. Vooruitsigte vir die boubedryf is donker en miskien die mees verontrustende verwikkeling is die verlaagde tempo waarteen behuising vir die minder gegoede groepe opgerig word. Werkloosheidsyfers neem steeds toe terwyl werksgeleenthede afneem.

In 1976 het die owerhede onwillig geblyk te wees om die ekonomiese toedrag van sake openbaar te maak.

Maar of dit nou 'n tydelike ekonomiese daling, 'n resessie of 'n depressie is, die feit bly staan dat die ekonomiese situasie versleg het en daar is jammer genoeg baie min bewyse van bestendiging of vermindering van die pryse van materiale en goedere.

Een belangrike faktor vir ons as elektrisiteitsvoorsieningsingenieurs is dat daar in geen ander tydperk in die ekonomiese geskiedenis van ons land 'n resessie was waar ons geweldige groot handels-, nywerheids- en mynbousektore so geheel en al van elektrisiteit as the primêre energiebron vir al hulle werksaamhede afhanklik was nie.

Nog 'n faktor van geskiedkundige belang was die totstandkoming op 26 Oktober 1976 van Transkei, die eerste onafhanklike Swart Staat in Suid-Afrika en afgevaardigdes sal bewus wees van die unieke posisie van die stad met betrekking tot sowel die Ciskei as die Transkei.

Oos-Londen, met sy strategiese ligging as rivierhawe, met spoor- en lugdiensgeriewe en as die middelpunt van 'n nuwe metropolitaanse kompleks wat op handels- en nywerheidsgebied ontwikkel, is lewensbelangrik vir hulle vooruitgang en groei.

Wat vir ons van spesiale belang behoort te wees, is die ontwikkelingspatroon wat beplan moet word vir 'n ekonomies- en tegnies-betroubare elektrisiteitsvoorsieningstelsel waar-

INTRODUCTION

In presenting my Presidential Address to this the 45th Convention of the Association of Municipal Electricity Undertakings of South Africa I am especially conscious of the singular honour which the members of the AMEU have conferred on the City of East London and its electrical engineer.

I stand before you today as the fourth successive electrical engineer of the city to have been honoured by election to this high office. Circumstance has placed me in the line of a continuing succession and I am grateful to be able to acknowledge the contributions in leadership and service of a long line of eminent predecessors and presidents.

Dramatic changes have taken place in South Africa during the past two years affecting every sector of our national life — political, economic, sociological and of course municipal. The increase in oil fuel prices since the end of 1973, the concomitant inflation which seems impossible to curb, the drop in the price of gold, the depletion of our foreign reserves and the reduced flow of external capital has brought our country to a position that appears in retrospect impossible to have imagined when the Convention assembled two years ago.

The violence which erupted and is continuing on our northern borders and the recent confrontations in the Black and Coloured townships of many of our urban complexes have created a climate of fear and uncertainty.

Traditional political policies and shibboleths and sadly, spiritual realities are being questioned, challenged and rejected perhaps as never before in the history of our country. Our turbulent common life is seething with the aspirations, hopes, convictions and demands of a diversity of peoples.

Much of the pressure of our time and situation is being felt by the commercial and industrial sectors of the economy with inevitable effects on the vast labour force whose livelihood they provide.

Opinions have been expressed, rightly or wrongly, that our present deteriorated economic condition is the worst since the depression of the 1930's. Prospects for the building industry are gloomy and perhaps the most disquieting development has been the reduced tempo of housing construction for the less affluent groups. Unemployment figures are rising and new job opportunities decreasing.

There appeared to be reluctance in 1976 in official quarters to declare publicly the state of our economic situation. But whether it be a temporary downturn, a recession or a depression the fact is that the economic situation has deteriorated and regrettably very little evidence exists of stabilisation or reduction in the prices of materials and goods.

One important factor for us as electricity supply engineers is that at no other period in the economic history of this country has there been a recession when our vast commercial, industrial and mining sectors have been so completely dependent on electricity as the primary source of energy for the whole of their operations.

Another factor of historic import was the establishment on 26th October, 1976, of Transkei, the first independent Black state in South Africa and delegates will be conscious of the unique position in which the city stands in relation to both the Ciskei and Transkei.

Strategically situated as it is with its river port, rail and air facilities and as the hub of a new metropolitan complex that is developing commercially and industrially, East London is vital to their progress and development.

What should be of special concern to us is the pattern of development to be devised for an economically and technically sound electricity supply system whose transmission

van die transmissielyne as simbool kan dien van die bande van onderlinge afhanklikheid van buurvolke.

Teen die agtergrond van die vinnig veranderende situasie, is dit jammer dat die VMEO weens konstitusionele beperkings nie in staat is om sy lidmaatskap tot potensiele ondernemings in die buurstate uit te brei nie.

ELEKTRISITEITSVOORSIENINGSKOMMISSIE: ELEKTRISITEITSTARIEWE EN -KOSTE

Die elektrisiteitsvoorsieningsbedryf gaan gebuk onder ongeëwenaarde verhogings van die koste van brandstof, geld, masjinerie, toerusting en arbeid. Die kostestruktuur van die bedryf het byna oornag verander en die uitwerking op die finansies van dié rade wat elektriese energie van die Elektrisiteitsvoorsieningskommissie aankoop, is uiters ernstig.

Byvoorbeeld, in die Grensonderneming wat die stad Oos-Londen voorsien, het die koste van gekoopte elektriese energie vir die tydperk vanaf die einde van 1967 tot 1971 met net 10,3 persent gestyg, vanaf die einde van 1971 tot die einde van 1974 met 22,6 persent, terwyl die koste tussen 1 April 1976 en 1 Januarie 1977 met 65,0 persent verhoog is. Vanaf die einde van 1974 tot die einde van 1977 sal dit na verwagting, gebaseer op huidige pryse, met 101,3 persent gestyg het.

Die geraamde uitgawe vir 1977 vir die Oos-Londense Elektrisiteitsonderneming toon 'n verhoging van 129 persent bo dié vir 1974, in vergelyking met die geraamde 20-persentverhoging van elektriese energie (kWh) aangekoop van Evkom. Sodanige stygings skep groot probleme vir munisipale elektrisiteitsondernemings wat voortdurend te kampe het met die probleem om voldoende fondse vir hulle kapitaal- en onderhoudsvereistes te verskaf, terwyl hulle terselfdertyd die algehele koste van elektriese energie wat aan hulle verbruikers verkoop word, moet inperk.

Die uitwerkings van die stygende koste van elektriese energie wat deur Oos-Londen van Evkom aangekoop word, blyk uit die uitgawe-tabel in die 1977-begroting van die elektrisiteitsfonds:-

Administrasie	1,94%
Benetting	2,48%
Kapitaalgelde	8,49%
Elektriese Energie Aangekoop	87,09%
	100,00%

Die volgende beknopte uittreksels uit Evkom se Jaarverslag vir 1975 is gepas:-

„Evkom se totale elektrisiteitsverkope vir die jaar 1975 het 57 869 miljoen kW.h beloop; dit is 10,0 persent meer as die totale verkope vir 1974. Die ooreenstemmende groeikoers vir 1974 was 12,9 persent. Die jaar 1975 was die sewende agtereenvolgende jaar waarin die hoeveelheid elektrisiteit verkoop, met meer as 9 persent toegeneem het. Teen die einde van die jaar het 'n algemene verslapping in die groeikoers egter merkbaar geword.

Die aanvraag op die gëintegreerde Evkom stelsel het op 24 Julie 1975 'n spits van 9 185 MW bereik. Die totale uitstuurvermoë van Evkom se kragstasies wat op daardie datum in handelsbedryf was, was 10 192 MW".

„Teenoor 'n totale inkomste van R460 miljoen het Evkom se koste R487 miljoen beloop wat 'n tekort van R27 miljoen gelaat het".

„Elektrisiteitsverkope aan . . . die mynbouklas wat in 1974 die verkope oorheers het, in 1975 deur sowel nywerheidsverbruikers as grootmaatverkope aan munisipaliteite oortref is. In die mynbouklas het die persentasie toename in 1975 afgeneem tot byna die helfte van die toename in die vorige jaar".

Ek het uit Evkom se Jaarverslae vanaf 1966 uittreksels geneem van die besonderhede van die persentasieverkoop van elektrisiteit aan Evkom se drie hoofverbruikersklasse en dit word hieronder in tabelvorm uiteengesit. 'n Belangrike gevolgtrekking is dat munisipaliteite in tien jaar met 9,0 persent gestyg het en die Jaarverslag vir 1976 sal heelwaarskynlik aandui dat die munisipale verbruikersklas Evkom se grootste verbruiker geword het.

lines could symbolise the bonds of the inter-dependence of neighbouring peoples.

In the context of the rapidly changing situation it is unfortunate that because of constitutional restrictions the AMEU is unable to extend its membership to potential undertakings in the neighbour states.

ELECTRICITY SUPPLY COMMISSION: ELECTRICITY TARIFFS AND COSTS

The electricity supply industry has been bludgeoned by unprecedented increases in the costs of fuel, money, plant and equipment and labour. The cost structure of the industry has changed almost overnight and the effect on the finances of those councils that purchase electrical energy from the Electricity Supply Commission has been extremely serious.

For example in the Border Undertaking which supplies the City of East London, for the period from the end of 1967 to 1971 the cost of electrical energy purchased increased by only 10,3 per cent, from the end of 1971 to the end of 1974 by 22,6 per cent while between April, 1976, and 1st January, 1977, the cost rose by 65,0 per cent. From the end of 1974 to the end of 1977 it is estimated that, based on present prices, it will have increased by 101,3 per cent.

The estimated expenditure for 1977 for the East London Electricity Undertaking shows an increase of 129 per cent over that for 1974, compared with the estimated increase in electrical energy (kWh) purchased from Escom of 20 per cent. Such increases create major problems for municipal electricity undertakings constantly beset by the problem of providing adequate funds for their own capital and maintenance requirements, while at the same time containing the overall cost of electrical energy sold to their consumers.

The effects of the escalating cost of electrical energy purchased from Escom by East London can be seen in the table of expenditure in the 1977 estimates of the Electricity Fund:-

Administration	1,94%
Reticulation	2,48%
Capital Charges	8,49%
Electrical Energy Purchased	87,09%
	100,00%

The following brief extracts from Escom's Annual Report for 1975 are pertinent:-

'Escom's total sales of electricity for the year 1975 reached 57 869 million kWh, an increase of 10,0 per cent over the total sales in 1974. The corresponding growth rate for 1974 was 12,9 per cent. The year 1975 was the seventh successive year in which a growth rate of more than 9 per cent in the number of kWh of electricity sold was recorded. However, towards the end of the year a general easing in the growth ratre became noticeable.

The demand on the integrated Escom system reached a peak of 9 185 MW on 24th July, 1975. The total sent-out capacity of Escom power stations in commercial service at that date was 10 192 MW".

"Against a total revenue of R460 million, Escom incurred costs amounting to R487 million, resulting in a deficit of R27 million".

"The sales of electricity to . . . the mining category, which up to 1974 had dominated the sales picture, was surpassed both by sales to the industrial consumers and by bulk sales to municipalities in 1975. In the mining category, the percentage increase in 1975 dropped almost to half that recorded the previous year".

I haxe extracted from Escom's Annual Reports from 1966 details of the percentage sales of electricity to Escom's three main categories of consumers and these are set out below in tabular form. What is significant in its implications is that in ten years supplies to municipalities increased by 9,0 per cent and it seems probable that the Annual Report for 1976 will show that the municipal category has become Escom's biggest consumer.

ESCOM: SALES OF ELECTRICITY TO CERTAIN CATEGORIES OF CONSUMERS — PERCENTAGE
EVKOM: ELEKTRISITEITSVERKOPE AAN SEKERE VERBRUIKERSKLASSE — PERSENTASIE

Year/Jaar	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Municipal Munisipaal	21,7	22,3	22,9	23,0	23,2	24,3	25,6	27,3	29,0	30,7
Mining Mynbou	44,0	42,9	41,5	40,1	40,0	37,4	34,8	33,9	32,2	30,1
Industrial Nywerhede	24,7	25,2	25,7	27.2	27,6	29,0	30,4	30,1	30,7	31,2

Sedert die laaste Konvensie het die Uitvoerende Raad gepoog om met Evkom te onderhandel oor 'n spesiale tarief vir plaaslike besture. Die onderhandelings het nie vrugte afgewerp nie maar die VMEO behoort voort te gaan met sy vertoë ten einde te verseker dat die toevoerkoste aan munisipaliteite in verhouding tot hulle ander verbruikersklasse, billik en juis toegewys word. Die aanpassings deur Evkom wat gelei het tot verhoogde tariewe vir sy eie huishoudelike verbruikers, is 'n belangrike stap ter bereiking van hierdie oogmerk.

Daar is in die huidige tariefstruktuur geen onderskeid tussen klein en groot verbruikers in die grootkragverbruikersklas nie. Daar blyk voldoende gronde te wees vir 'n spesiale tarief vir groot verbruikers gebaseer op beide spanningsgrootte en aanvraag sonder om in stryd te wees met die fundamentele beginsel van 'n billike en juiste toewysing van toevoerkoste.

Evkom het teen die einde van 1975 5 100 kilometer 400-kV-transmissielyne in bedryf gehad en die 400-kV nasionale roosternetwerk is in omvang 'n indrukwekkende ingenieursprestasie. Dit kon ongetwyfeld nie sonder munisipale deelname en sonder die aansluiting by die nasionale netwerk van die ondernemings van alle stede dwarsdeur die land, tot stand gebring word nie.

Hierdie ontwikkeling het die gees van samewerking tussen en die onderlinge afhanklikheid van die verskillende Evkomondernemings en die munisipale ondernemings versterk. Die elektrisiteitsvoorsieningsbedryf in hierdie gedeelte van Suidelike Afrika het te kampe met gedugte tegniese en ekonomiese probleme en nouer samewerking tussen die ontwikkel/transmissie- en die distribusie-ondernemings beloof veel vir die toekoms. Dit is met genoeë dat ek namens die VMEO ons waardering te boek stel dat Evkom trou gebly het aan die aanvaarde beleid ten opsigte van Evkom se regte as die ontwikkel- en transmissie-gesag en die munisipaliteite as die distribusie-instansies.

Ek wil graag daarop nadruk lê dat wanneer 'n vakature voorkom, oorweging geskenk moet word aan die aanstelling van 'n lid van die Kommissie gekies vir sy kennis en ondervinding van munisipale elektrisiteitstoevoer.

KONTRAKPRYSAANPASSINGS

Die jaar 1976 mag wel bekend staan as die Jaar van die Kontrakprysaanpassings! Vaste tenderpryse het in 'n betreklike kort tydperk heeltemal uit tenderdokumente verdwyn. Sedert die begin van 1976 het bykomende kosprysaanpassings op 'n aantal kontrakte wat deur die Stadsraad van Oos-Londen toegeken is, sowat een en 'n half persent per maand beloop.

Die styging van die pryse van kabels, skakeltuig en transformators het ernstige en verreikende gevolge gehad. Vaste tenderpryse sal grootliks bydra tot die bestendiging van koste en dit is te hope dat die elektrotegniese en verwante bedrywe verantwoordelikheid sal aanvaar vir 'n ondersoek na die hele grondslag waarop prysaanpassings geformuleer en toegepas is.

DIE ELEKTRISITEITSVOORSIENINGSBEDRYF

In 'n artikel in Julie 1976 het professor R. K. Dutkiewicz, Direkteur, Energienavorsingsinstituut, Universiteit van Kaapstad, die voorspellings van mnr. D. Kotze gebruik vir sy raming van Evkom se toekomstige energieproduksie tot die jaar 2000. Gegrond op hierdie voorspellings sal die energieverbruik in 1980 97 863 GWh wees, in 1990 179 943 GWh en in 2000 330 930 GWh.

Die Voorsitter van Evkom, dr. R. L. Straszacker, het geraam dat 'n geïnstalleerde vermoë van 68 000 MW by die wisseling van die eeu benodig sal wees. Evkom het verklaar dat, as gevolg van die probleme verbonde aan die verkryging van buitelandse kapitaal, die deel van die kapitaalbydrae uit inkomste verhoog sal moet word ten einde aan sodanige aanvraag te voldoen. Maar wat van die munisipale elektrisiteitsondernemings wie se rade dit al hoe moeliker vind om die inkomste en kapitaal te bekom om te voldoen aan die onverbiddelike vereistes vir dienste en fasiliteite? Sodanige ondernemings is kapitaalintensiewe ondernemings en rade sal wel moontlik dieselfde besluit moet neem om aansienlike bedrae uit hulle inkomstefondse by te dra vir toekomstige kapitaalontwikkelings.

Dit moet beklemtoon word dat in 'n inflasionistiese ekonomiese klimaat, voorsieningsinstansies die reg het om te verwag, en dit ook moet aanmoedig, dat verbruikers hulle eie werksaamhede moet beheer om toe te sien dat elektriese energie meer doeltreffend benut word en om verkwisting te voorkom. Hulle moet verantwoordelikheid aanvaar vir die verbetering van hul lasfaktore.

Die wysigings wat Evkom onlangs in die fundamentele struktuur van sy tariewe aangebring het deur aansienlik verhoogde aanvraaggelde en verlaagde energieladings is logiese maatreëls wat daarop gemik is om jaarlikse aanvraaggroeikoers te verlaag en die stelsellasfaktor te verbeter. Dit is egter moeilik om te aanvaar dat hierdie beleid

Since the last Convention the Executive Council has endeavoured to negotiate with Escom a special tariff for local authorities. The negotiations have been unsuccessful but the AMEU should continue with its representations to ensure that the cost of supplies to municipalities, relative to their other categories of consumers, is equitably and correctly allocated. The adjustments made by Escom resulting in increased tariffs for its own domestic consumers is an important step towards this end.

There is in the existing tariff structure no differentiation in the large power user category between small and large consumers. There appears to be a strong case for a special tariff for large users based on both magnitude of voltage and demand, without conflicting with the fundamental principle of a fair and correct allocation of costs of supplies.

At the end of 1975 Escom had in service 5 100 kilometres of 400 kV transmision lines and in its extent the 400 kV national grid network is an impressive engineering achievement. Unquestionably this could not have been accomplished without the municipal participation and the connection of the undertakings of all the cities throughout the country to the national grid.

This development has strengthened the spirit of co-operation between and the interdependence of the various Escom undertakings and the municipal undertakings. The electricity supply industry in this part of Southern Africa is facing formidable technical and economic problems and closer association of the generating/transmitting and the distributing undertakings augurs well for its future. I am pleased on behalf of the AMEU to place on record appreciation to Escom for adhering to the accepted policy prescribing the rights of Escom as the generating and transmitting authority and the municipalities as the distributing authorities.

I would urge that when a vacancy occurs consideration be given to the appointment of a Member of the Commission selected for his knowledge and experience in respect of municipal electricity supplies.

CONTRACT PRICE ADJUSTMENTS

The year 1976 may well be known as the Year of the Contract Price Adjustment! In a comparatively short period firm tender prices have completely disappeared from tender documents. Since the beginning of 1976 additional cost price adjustments on a number of contracts placed by the City Council of East London have been of the order of one and one-half per cent per month.

The rises in the prices of cables, switchgear and transformers have had serious and far-reaching consequences. Firm price tendering will contribute significantly to the stabilising of costs and hopefully the electrical and allied industries will accept the responsibility of examining the whole basis on which price adjustments have been formulated and applied.

THE ELECTRICITY SUPPLY INDUSTRY

In an article in July, 1976, Professor R. K. Dutkiewicz, Director, Energy Research Institute, University of Cape Town, used the predictions of Mr. D. Kotze in forecasting Escom's future energy production up to the year 2000. On the basis of these predictions the energy consumption will be 97 863 GWh in 1980, 179 943 GWh in 1990 and 330 930 GWh in 2000.

The Chairman of Escom, Dr. R. L. Straszacker, has estimated that an installed capacity of 68 000 MW will be required at the turn of the Century. Escom has stated that to meet such demand and because of the difficulties associated with the raising of foreign capital, the proportion of the capital contribution ex revenue will have to be increased. But what of the municipal electricity undertakings whose councils are more and more hard pressed in finding the revenue and capital to meet the inexorable demand for services and facilities? Such undertakings are capital intensive operations and councils could very well have to take the same decision to contribute from their revenue funds substantial amounts for future capital developments.

It needs to be emphasised that in an inflationary economic climate, supply authorities have the right to expect and should encourage consumers to conduct their own operations to ensure the more efficient use and the prevention of waste of electrical energy. They must accept the responsibility of improving their load factors.

The revisions made recently by Escom in the fundamental structure of its tariffs by way of substantially increased demand charges and reduced energy charges are logical measures aimed at reducing the annual demand growth rate and improving the system load factor. However it is difficult to accept that this policy will be completely

heeltemaal suksesvol sal wees wanneer die verskil tussen die aanvraaggelde vir groot en klein ondernemings, van toepassing in Januarie 1977, in aanmerking geneem word:-

UNDERTAKING/ONDERNEMING
Border/Grens
Cape Eastern/Oos-Kaapland
Orange River/Oranjerivier
Cape Western/Wes-Kaapland
Natal Southern/Suid-Natal
Natal Central/Sentraal-Natal
Cape Northern/Noord-Kaapland
Eastern Transvaal/Oos-Transvaal
Rand/O.F.S./Rand/O-V.S.

Elektrisiteitstoevoer en -gelde geniet die aandag van die publiek soos nog nooit tevore nie en raadslede en munisipale elektrotegniese ingenieurs is terdeë hiervan bewus gemaak! Die onlangse aankondiging van die Minister van Ekonomiese Sake dat hy die Raad van Handel en Nywerheid versoek het om ondersoek in te stel na en verslag te doen oor die huidige tariefbeleid en -struktuur in elektrisiteitsvoorsiening in Suid-Afrika, word dus verwelkom.

Die eerste vertoë is deur die VMEO se Evkom-komitee aan die Raad voorgelê.

Wat duidelik geword het, is dat daar by die beplanning vir die groei van voorsieningsinstansies in Suid-Afrika, 'n geweldige potensiële mark van Swart verbruikers is.

Die verstommende styging van net onder 300 persent van die koste van oliebrandstof sedert die einde van 1973 en die stygende koste van steenkool beklemtoon die behoefte aan elektrisiteit in Swart dorpe teen die laagste moontlike koste. Dit bied 'n opwindende geleentheid vir die elektrisiteitsvoorsieningsbedryf in hierdie land.

Ek vind dit betreurenswaardig dat geen beleidsbesluit tot dusver geneem is om elektriese installerings te voorsien in 'n deel van die huise wat die Staat in Swart dorpe oprig, sodat die koste van die elektriese installasie deel uitmaak van die totale kapitaaluitgawe nie.

Mdantsane, 'n Swart stad in wording 20 kilometer noord van Oos-Londen, word op 'n agentskapbasis deur die Stadsraad van Oos-Londen vir die Suid-Afrikaanse Bantoetrust ontwikkel. Ingesluit by die dienste wat verskaf word, is die volledige elektrisiteitsbenetting en straatverligtingsnetwerke. In die twaalf jaar-konstruksietydperk is meer as 16 000 huise opgerig waarin geen elektriese installasies aanvanklik voorsien is nie. Baie inwoners is egter nou besig om op eie koste hulle huise te laat bedraad vir elektrisiteit en aan die einde van 1976 was daar 1 219 huishoudelike verbruikers in Mdantsane. Die persentasie-toename in hierdie groep in 1975 en 1976 was onderskeidelik 117 en 59.

Ek is daarvan oortuig dat Swart huisbesitskemas 'n belangrike deel van die toekomstige huishoudelike verbruikersmark sal uitmaak. Die elektrotegniese ingenieur het 'n professionele en maatskaplike verantwoordelikheid en behoort dus toe te sien dat hy ten volle betrokke is in die ander dissiplines in die algemene beplanning van sodanige skemas.

Die ontevredenheid en oproerigheid in die Swart dorpe in 1976 het die dag gevestig op 'n lewensgehalte sonder die noodsaaklike element van die twintigste eeuse lewenswyse wat deur elektrisiteit en straatverligting verskaf word. Dit lyk vir my dat daar op hierdie besondere gebied 'n uitdaging en geleentheid vir konsortiums van ons nywerheids- en finansiële organisasies is om die nodige kapitaal vir so 'n verdienstelike projek te verkry.

Die onlangse besluit om Soweto te elektrifiseer is van allergrootste belang, maar met die oog op die tekort aan kapitaal moet ons ons nasionale prioriteite krities in oënskou neem. My mening is dat elektrisiteit vir Swart dorpe baie hoër voorrang moet geniet as 'n Swart televisiediens wat na raming R102 miljoen sal kos. Ons huidige televisiediens kan tog sekerlik in die tussentyd die kulturele behoeftes en vermaaklikheidsmaak van alle bevolkingsgroepe bevredig.

INGENIEURS IN DIE MUNISIPALE DIENS

Elektrisiteitsondernemings as die munisipaliteite se grootste handelsdepartemente, opvallend verskillend van ander munisipale departemente, en wie se hoofde volgens die wet vereis word om die elektrisiteitsnetwerke en -toerusting in 'n veilige en bevredigende toestand te hou, het te kampe met 'n voortdurende probleem om gekwalifiseerde ingenieurs te lok. Dit is 'n saak van blywende kommer en die beleid van die Staat en die Provinsiale Administrasies wat die vaslegging van die salarisse van alle departementshoofde tot gevolg het, is heelwaarskynlik die belangrikste aanleidende faktor. Mnr. E. de C. Pretorius het dit in sy 1975-presidentsrede beklemtoon.

Sprekers by die Konferensie van die Instituut van Munisipale Ingenieurs van Suidelike Afrika gehou in Oos-Londen

successful when the disparity between the following kVA demand charges for large and small undertakings in force in January, 1977, are taken into account:-

DEMAND CHARGE/AANVRAAGGELD (JANUARY 1977 JANUARIE	
R8,80 −5%	(R8,36)
R4,40 +22,5%	(R5,39)
R4,40 −5%	(R4,18)
R5,60 −5%	(R5,32)
R5,50 −5%	(R5,22)
R5,50 −5%	(R5,22)
R2,30 +75%	(R4,02)
R2,20 +47,5%	(R3,24)
R2,50 +65%	(R4,12)

Electricity supplies and charges are being given public attention as never before and councillors and municipal electrical engineers have been made aware of this with a vengeance! Therefore the recent announcement by the Minister of Economic Affairs that he has asked the Board of Trade and Industries to investigate and report on the present tariff policy and tariff structure in the supply of electricity in South Africa is welcomed.

The first representations have been submitted to the Board by the AMEU's Escom Committee.

What has become evident is that in planning for the growth of supply authorities in South Africa there is a vast potential market of Black consumers.

The staggering rise in the cost of oil fuel since the end of 1973 of just under 300 per cent and the escalating cost of coal highlight the need for electricity in the Black townships at the lowest possible cost. This presents an exciting opportunity for the electricity supply industry in this country.

I find it regrettable that no policy decision has yet been made to provide electrical installations in a proportion of the houses being erected by the Government in new Black townships, so that the cost of the electrical installation forms part of the total capital outlay.

Mdantsane, en embryo Black city, 20 kilometres north of East London, is being developed by the City Council of East London on an agency basis for the South African Bantu Trust. Included in the services provided is the complete electricity reticulation and street lighting networks. In the twelve year period of construction over 16 000 houses have been erected in which no electrical installations were provided initially. However, many residents of the township are now having their houses wired for electricity at their own cost and at the end of 1976 there were 1 219 domestic consumers in Mdantsane. The percentage increases in this group in 1975 and 1976 were 117 and 59 respectively.

I am convinced that Black home ownership schemes will comprise an important part of the future domestic consumer market. The electrical engineer has a professional and social responsibility and thus should ensure that he is fully involved with the other disciplines in the overall planning of such schemes.

The dissatisfaction and unrest in the Black townships in 1976 focused attention on the quality of life without the essential element of twentieth century living which electricity and street lighting provides. It seems to me that in this particular area lie both challenge and opportunity for consortiums of our industrial and financial organisations to raise the necessary capital for this worthwhile project.

The recent decision to electrify Soweto is one of major importance, but faced with the shortage of capital we need to examine critically our national priorities. My view is that electricity for Black townships should be much higher up the list of these priorities than a Black television service estimated to cost R102 million. Surely our present television service can cater for the cultural needs and entertainment tastes of all peoples for an interim period?

ENGINEERS IN THE MUNICIPAL SERVICE

Electricity Undertakings, as the municipalities' largest trading departments, markedly different from other municipal departments and whose heads are required by law to maintain the electricity networks and equipment in a safe and satisfactory condition, are faced with a continuing difficulty in attracting qualified engineers. This is a matter of abiding concern and the policy of the Government and of Provincial Administrations that has the effect of depressing salaries of all departmental heads is probably the most important contributory factor. Mr. E. de C. Pretorius underlines this in his 1975 Presidential Address.

Speakers at the Conference of the Institution of Municipal Engineers of Southern Africa held in East London in May,

in Mei 1976, het die staat van munisipale ingenieurswese en die status van die munisipale ingenieur in Suid-Afrika baie somber voorgestel.

Munisipale elektrotegniese ingenieurswese in Suid-Afrika het 'n indrukwekkende rekord van tegniese prestasies en groei en ook van diens oor 'n lang tydperk van 95 jaar, as die Munisipale Jaarboek korrek is in die optekening van sy oorsprong in Kimberley in 1882. Deur die jare heen het daar 'n sterk bindingskrag van tradisionele trots in hierdie gespesialiseerde terrein van ingenieurswese ontwikkel en ek sy geen twyfel dat die professionele beeld van munisipale elektrotegniese ingenieurs in ons gemeenskappe van 'n hoë standaard bly.

Die destydse president van die Suid-Afrikaanse Instituut van Siviele Ingenieurs, mnr. R. Layburn, het in 1975 opgemerk dat:-

1976, presented a sombre picture of the state of municipal engineering and the status of the municipal engineer in South Africa.

Municipal electrical engineering in South Africa has an impressive record of technical achievement and growth and also of service over a long period of 95 years if the Municipal Yearbook is correct in recording its beginning in Kimberley in 1882. Down the years there has developed a strong binding force of traditional pride in this specialised field of engineering and I am in no doubt that the professional image of municipal electrical engineers in our communities remains of a high standard.

In 1975 the then President of the South African Institution of Civil Engineers, Mr. R. Layburn, remarked that:-

> "It is vital that men of the highest calibre be appointed and retained in Government, Provincial, Municipal and quasi-Government bodies with the responsibilities for planning and decision making".

Hierdie woorde het in die huidige omstandighede 'n aktuele toepaslikheid.

Die VMEO behoort die aandag te vestig op stappe wat geneem kan word om jong gegradueerde elektrotegniese ingenieurs aan te spoor om tot die munisipale diens toe te tree. Dit bied hulle 'n loopbaan wat hulle werklewens op tegniese en bestuursgebied sal stimuleer, verryk en vervul. Ek is vol vertroue dat hierdie geslag van jong manne in Suid-Afrika gehoor sal gee aan die roeping van munisipale ingenieurswese wat nie alleen ingenieursuitdagings bied nie, maar ook geleenthede vir gemeenskapdiens.

Ervare munisipale ingenieurs kan baie uitrig in alle noedanigheid as beleidmakers by hulle verskillende invloedpunte. Wat oorgedra moet word is dat sodanige diens bekwaamheid, toegewydheid en eerbaarheid verg en miskien meer as enigiets anders, 'n aansienlike mate van onbevooroordeelde idealisme.

In the present circumstances these words have a timely relevance.

It behoves the AMEU to direct attention to the steps that should be taken to encourage and inspire young graduate electrical engineers to enter the municipal service. It offers them a career that will stimulate, enrich and fulfil technically and managerially their working lives. I am confident that this generation of young men in South Africa will respond to the call of municipal engineering which presents not only engineering challenges but opportunities for community service.

Much can be done by experienced municipal engineers in their capacity as policy makers at their various points of influence. What is required to be transmitted is that such service demands competence, dedication and integrity and perhaps more than anything else, a goodly measure of openminded idealism.

MUNISIPALE BESTUUR

Wanneer ekonomiese druk toeneem, moet nywerheid, handel en plaaslike bestuur noodwendig ondersoek instel na hulle standaarde van werkverrigting op bemarkingsgebied ten opsigte van opbrengs, diensgehalte, werkkoste, bestuur, opleiding, personeelverhoudings en werksgeleenthede, om van die belangrikste te noem.

Dit is ongelukkig so dat baie mense in ons gemeenskappe vir wie 'n groot verskeidenheid munisipale dienste voorsien word, voortdurend die werkverrigting van munisipale departemente swartsmeer en kritiseer. Natuurlik kan en moet munisipale verrigtinge in baie gebiede meer doeltreffend wees, maar ek is seker dat die algemene werkverrigting van munisipale elektrisiteitsondernemings en baie ander munisipale departemente gunstig afsteek by die private sektor.

Rade behoort die nodige fondse te voorsien vir 'n versnelde program van bestuurs- en leierskapsopleiding waarby die beste moderne tegnieke gebruik moet word.

Plaaslike bestuur is miskien die edelste vorm van regering van gemeenskappe maar ons moet altyd onthou dat dit volgens die praktisyne — raadslede en beamptes — deur die regeerdes beoordeel word.

Dit het agter geraak by nywerheid wat betref die opleiding van Swart middelbestuurders en in ons veranderende situasie is dit gebiedend noodsaaklik dat raadslede en hulle hoofbestuur hulle gesamentlik en persoonlik daarop toelê om hierdie doel te bereik.

Ek is hier in Oos-Londen — soos baie van u ongetwyfeld ook in u eie situasies — bemoedig deur dit wat bereik is deur Swart Skakel- en Veiligheidskomitees wat gedurende die afgelope jare aangestel is, maar hierdie soort opleiding behoort natuurlik uitgebrei te word. Nietemin, wat nie uit die oog verloor moet word nie, is dat eensgesinde en doeltreffende personeelverhoudings vereis dat Blanke bestuursopleiding, veral op die middel en toesighoudende vlak, dieselfde aandag geniet. Personeelverhoudings in 'n rustelose samelewing vereis versigtige en simpatieke hantering en senior bestuurders moet nie afsydig staan van probleme wat dit meebring nie.

MUNICIPAL MANAGEMENT

When economic pressures build up industry, commerce and local government must of necessity examine in detail their standards of performance in the market place in respect of output, quality of service, cost of operation, management, training, staff relationships and job opportunities, to name some of the most important.

It is unfortunate that many people in our communities for whom a diverse range of municipal services is provided continually denigrate and criticise the performance of municipal departments. Obviously in many areas municipal operations can and must be more effective. But I am sure that the overall performance of municipal electricity undertakings and many other municipal departments compares favourably with that of the private sector.

Councils should provide the funds required for an accelerated programme of management and leadership training using the best of the modern techniques.

Local government is perhaps the noblest form of government of communities of people but we should have in mind always that it is by its practitioners — councillors and officials — that it is judged by the governed.

It has lagged behind industry in producing trained Black middle managers and in our changing situation it is imperative that councillors and their top managements make a corporate and personal commitment to this objective.

I have been encouraged in East London — as no doubt many of you have in your own situations — by the achievements of Black Liaison and Safety Committees appointed in recent years, but obviously this type of training needs to be extended and broadened. Nevertheless what must not be overlooked is that harmonious and effective staff relationships require that White management training, particularly at middle and supervisory level, receives the same attention. Staff relationships in a restless society require meticulous and sympathetic handling, and senior managers of goodwill must not remain detached from the problems they present.

TEGNIESE OPLEIDING

Die Natalse Tak van die VMEO het uitstekende werk verrig en sy Komitee vir Tegniese Opleiding het voorstelle ingedien vir 'n skema vir die opleiding van munisipale vakleerlingelektrisiëns. Ek beveel hierdie voorstelle aan vir die aandag van plaaslike besture wat by hierdie Konvensie verteenwoordig word. Dit moet beklemtoon word dat, indien die Departement van Arbeid die gedagte van 'n Nasionale Opleidingskema kan ondersteun, dit slegs goeie vrugte sal afwerp as wetgewing ingestel word om plaaslike

TECHNICAL TRAINING

Outstanding work has been done by the Natal Branch of the AMEU whose Technical Training Committee has submitted proposals for a scheme for the training of municipal apprentice electricians. I commend these proposals to the attention of local authorities represented at this Convention. It should be underlined that if the Department of Labour is able to support the concept of a National Training Scheme, it will succeed only if legislation is introduced to make it obligatory for all local authorities to contribute on

te verplig om op 'n billike grondslag by te dra tot 'n Nasionale Opleidingsfonds.

Die beginsel dat dieselfde diensstandaard ten opsigte van sekuriteit, onafgebrokenheid en herstelling van toevoere in Swart dorpe van toepassing moet wees, kan nie betwis word nie. Dit sal vereis dat voldoende gekwalifiseerde personeel in hierdie dorpe beskikbaar is.

Baie tyd is onherroeplik verspil by die opleiding van Swart vakleerlinge en tegnici wat nodig sal wees om hierdie stelsels en netwerke ooreenkomstig statutêre vereistes in stand te hou en te bedien. Daar is dus 'n dringende behoefte aan meer inrigtings vir die opleiding van ambagskoolonderwysers en -instrukteurs, bykomende hoër- en ambagsskole en tegniese kolleges, en opleidingsentrums vir Swart vakleerling-elektrisiëns op 'n groot spoedkursusskaal.

VERLIESBEHEERBESTUUR

Elektrisiteitsverbruikers het die reg om te verwag dat voorsieningsinstansies, wat diensgeorienteerd is en as alleenhandelaars werk, doeltreffend bestuur moet word. Munisipale ingenieurs moet dus die betreklike nuwe maar groeiende begrip van verliesbeheerbestuur bestudeer. Dit vereis beplande ondersoeke na hoë finansiële verliese wat voortspruit uit beserings opgedoen deur personeel en uit skade aan toerusting en materiale vanweë swak ontwerp, minderwaardige vervaardiging, ondoeltreffende bestuursbeheer, onveilige en onopgeleide praktyke.

Heelwaarskynlik die ernstigste wat betref produksieverlies, verkwiste man-ure en herstel- en vervangingskoste is die beskadiging van munisipale ondergrondse dienste deur siviele ingenieurs- en konstruksiemaatskappye.

Belangrike ondersoekingswerk is onderneem deur 'n komitee van die Oos-Londen Tak van die Suid-Afrikaanse Instituut van Siviele Ingenieurs met die doel om kontraktuele prosedures vir die opsporing, sigbaarstelling en beskerming van belangrike ondergrondse dienste vas te stel.

Uit statistieke beskikbaar gestel deur die Ongevallekommissaris beloop die direkte koste van beserings aan werkers en hulle afhanklikes, mediese onkoste ensovoorts, ongeveer R30-miljoen per jaar terwyl 31-miljoen man-dae volgens skatting jaarlikse verlore gaan as gevolg van beroepsongevalle. Die beseringsvoorkomssyfer, d.w.s. die getal ongevalle per miljoen gewerkte ure, vir die sesmaandetydperk geëindig Junie 1976 vir plaaslike besture (insluitende Evkom-ondernemings) was 11,15. 'n Vermindering van hierdie syfer tot 5,0 kan in drie jaar bereik word indien raadslede en departementshoofde hulle toelê op hierdie oogmerk.

Frank E. Bird, Uitvoerende Direkteur van die International Loss Control Institute in Atlanta en 'n Adjunk-professor, School of Business Administration, Georgia State University, wat erken word as heelwaarskynlik die mees vooraanstaande deskundige op die gebied van verliesbeheerbestuur, het die begrip in hierdie woorde omskryf:-

an equitable basis to a National Training Fund.

The principle that the same standard of service must apply to the consumers in Black townships in respect of security, continuity and restoration of supplies cannot be disputed. This will demand that adequate qualified personnel are available in these townships.

Much time has been irretrievably lost in the training of Black apprentices and technicians who will be needed to maintain and operate these systems and networks in accordance with statutory requirements. Thus the urgent needs are for more institutions for the training of trade school teachers and instructors, additional secondary and trade schools and technical colleges and training centres for Black apprentice electricians on a massive crash course scale.

LOSS CONTROL MANAGEMENT

Consumers of electricity have a right to expect that supply authorities, which are service orientated and operate as monopoly producers, shall be effectively managed. Municipal engineers therefore must examine the comparatively new but expanding concept of loss control management. This requires planned investigations into high financial losses which arise from injuries to personnel and from damage to equipment and materials through bad design, inferior manufacture, ineffective management control, unsafe and untrained practices.

Possibly, the most serious in terms of loss of production, wasted man hours and cost of repairs and replacements is the damage caused to municipal underground services by civil engineering and construction companies.

Important investigatory work has been undertaken by a committee of the East London Branch of the South African Institution of Civil Engineers with the purpose of establishing contractual procedures for the detection, exposure and protection of important underground services.

From statistics made available by the Workmen's Compensation Commissioner the direct costs of injuries to workers and their dependants, medical expenses and the like amount to some R30 million per annum, while an estimated 31 million man days are lost annually as a result of occupational accidents. The Injury Frequency Rate, i.e. the number of disabling injuries per million man hours worked, for the six months' period ended June, 1976, for Local Authorities (including Escom Undertakings) was 11,15. A reduction of this figure to 5,0 could be achieved in three years if councillors and heads of departments committed themselves to this objective.

Frank E. Bird, Executive Director of the International Loss Control Institute in Atlanta and an Adjunct Professor, School of Business Administration, Georgia State University, who is recognised as probably the foremost authority on Loss Control Management, has defined the concept in these words:-

> "Loss control management is the application of professional management techniques and skills through those programme activities (directed at risk avoidance, loss prevention and loss reduction) specifically intended to minimise losses resulting from the pure (non-speculative) risks of business".

Hy het op grond van navorsingstudies geraam dat 30 ongelukke wat masjinerie en eiendom beskadig, voorkom vir elke ernstige of belemmerende besering. Die totale jaarlikse koste van beserings en skade is dus geweldig groot en die verantwoordelikheid om hierdie koste te verlaag moet nie deur hoofbestuur in Suid-Afrika ontduik word nie.

DIE VMEO

Ingevolge een van sy oogmerke, is 'n belangrike besluit in 1971 geneem dat die VMEO as die gesaghebbende liggaam wat die belange van munisipale elektrisiteitsondernemings in Suid-Afrika verteenwoordig, betrek behoort te word by internasionale besprekings en ontwikkelings op die gebied van elektrotegniese ingenieurswese. Die VMEO is daardie jaar vir die eerste keer verteenwordig in die Suid-Afrikaanse afvaardiging wat die vergadering van die Internasionale Elektrotegniese Kommissie in Brussels bygewoon het.

Die Uitvoerende Raad het hierdie beleid dwarsdeur die tussenkomende jare gehandhaaf en het voortgegaan om verteenwoordigers na die kongresse van die IEK te benoem.

Die VMEO het ook in oorleg met die Suid-Afrikaanse Nasionale Komitee vir Verligting vir mnr. J. K. von Ahlften benoem tot die Suid-Afrikaanse afvaardiging wat die agtiende sitting van die Internasionale Kommissie vir Verligting in 1975 in London bygewoon het.

Suid-Afrika se internasionale skakels is swak en ons moet daarna strewe om hierdie kontakte in belang van die professie van elektrotegniese ingenieurswese in die algemeen

Based on research studies he has calculated a ratio of 30 plant and property damage accidents for each serious or disabling injury. The total annual cost of injuries and damage is therefore enormous and the responsibility for reducing these costs must not be evaded by top management in South Africa.

THE AMEU

In terms of one of its objects an important decision was made in 1971 that the AMEU as the authoritative body representing the interests of municipal electricity undertakings in South Africa should be involved in international discussions and developments in the field of electrical engineering. In that year for the first time it was represented on the South African delegation which attended the meeting of the International Electrotechnical Commission in Brussels.

The Executive Council has maintained this policy through the intervening years and has continued to appoint representatives to the Congresses of the IEC.

Also the AMEU, in collaboration with the South African National Committee on Illumination, appointed Mr. J. K. von Ahlften to the South African delegation that attended the eighteenth session of the International Commission on Illumination in London in 1975.

South Africa's international links are tenuous and we should strive to maintain these contacts in the interest of the profession of electrical engineering in general and the

en die elektrisiteitsvoorsieningsbedryf in die besonder, te handhaaf.

Op plaaslike gebied het VMEO-verteenwoordigers aansienlike bydraes gelewer tot verskeie komitees en werk groepe van die Suid-Afrikaanse Buro vir Standaarde en het saamgewerk met die Wetenskaplike en Nywerheidsnavorsingsraad. Dit is vir my 'n genoeë om die VMEO se erkenning van die belang van sowel die werk as die invloed van hierdie belangrike organisasies te boek te stel.

Die VMEO verskil van soortgelyke plaaslike bestuursinstitute in Suid-Afrika ten opsigte van die grondwetlike lidmaatskap van raadslede, ingenieurs en affiliaatlede en die krag van die Vereniging lê opgesluit in die spesiale verhouding tussen hierdie lede. Ondersteun deur staatsdepartemente, die Elektrisiteitsvoorsieningskommissie, die Suid-Afrikaanse Buro vir Standaarde en die Wetenskaplike en Nywerheidsnavorsingsraad, en sy erkenning deur die Provinsiale Munisipale Verenigings, handhaaf die VMEO 'n posisie van invloed in die elektrisiteitsvoorsieningsbedryf sowel as in plaaslike bestuur in Suid-Afrika.

SLOT

Ek glo dat die magte van verandering wat elke sektor van ons nasionale lewe raak, sekere noodsaaklikhede en geleenthede aan ons oplewer wat aldus opgesom kan word:-

— dat ons die ontwerpparameters en -maatstawwe vir ons distribusiestelsels krities ondersoek;

— dat die Suid-Afrikaanse Buro vir Standaarde en die elektrotegniese en verwante bedrywe in Suid-Afrika die uitdaging van ons tyd en situasie in hulle navorsings- en vervaardigingsprogramme aanvaar;

— dat ons die nuwe geslag van bestuurders voorberei en toerus om in te pas by die nuwe ekonomiese, nywerheids- en sosiologiese patroon wat aan die opduik is;

— dat ons groter getalle Swart, Kleurling en Asiatiese tegnici en ambagsmanne opvoed en oplei en die nodige geleenthede vir hulle vordering skep;

— dat munisipale elektrotegniese ingenieurs hulself ten volle laat betrek in beleidmaking en beplanning ten opsigte van die voorsiening van elektrisiteitstoevoere en -installasies in Swart dorpe;

— dat verkwisting van energie en verliese weens beroepsbeserings en skade aan masjinerie en toerusting verminder word;

— dat die menslike hulpbronne wat in die bevolking van hierdie land verborge lê, tot hulle volle potensiaal ontwikkel en benut word;

— dat die energiebronne van hierdie vasteland bewaar, gebruik en ontwikkel word in 'n ware gees van ingenieursamewerking ten bate van almal wat die voordele daarvan sal geniet.

Ons is hier in hierdie ingenieursgenootskap byeen met die doel om sulke kwessies te ondersoek en daaroor na te dink.

Ek het 'n paar jaar gelede op hierdie woorde van dr. Jonas Salk afgekom:-

Soos ons nou gereedmaak om ons aandag aan die referate, verslae en besprekings te wy, is sy woorde besonder gepas.

electricity supply industry in particular.

On the local scene AMEU representatives have made substantial contributions to various committees and working groups of the South African Bureau of Standards and have collaborated with the Council for Scientific and Industrial Research. I am pleased to record the acknowledgement of the AMEU of the importance of both the work and influence of these important organisations.

By its constitutional membership of councillors, engineers and affiliates the AMEU differs from similar local government institutions in South Africa and in the special relationship of these constituents lies the strength of the whole. Supported by Government departments, the Electricity Supply Commission, the South African Bureau of Standards and the Council for Scientific and Industrial Research and its recognition by the Provincial Municipal Associations the AMEU maintains a position of influence in both the electricity supply industry and local government in South Africa.

CONCLUSION

I believe that the forces of change affecting every sector of our national life present us with certain imperatives and opportunities, summarised as follows:-

— that we examine critically the design parameters and criteria for our distribution systems;

— that the South African Bureau of Standards and the electrical and allied industries in South Africa accept the challenge of our time and situation in their research and manufacturing programmes;

— that we prepare and equip the new generation of managers to fit into the new economic, industrial and sociological pattern that is emerging;

— that we educate and train greater numbers of Black, Coloured and Asian technicians and artisans and create the necessary opportunities for their advancement;

— that municipal electrical engineers involve themselves fully in policy making and planning in respect of the provision of electricity supplies and installations in Black townships;

— that wastage of energy and losses due to occupational injuries and damages to plant and equipment be reduced;

— that the human resources latent in the peoples of this land be developed and used to their full potential;

— that the energy resources of this sub-continent be conserved, used and developed in a true spirit of engineering co-operation for the common good of all who will enjoy their benefits.

We are assembled in this engineering fellowship with the purpose of examining and pondering such issues.

Some years ago I came upon these words of Dr. Jonas Salk:-

"It is with the sharp cutting tool of another mind that the mind of each of us is sharpened".

As we prepare to give our attention to the papers, reports and discussions his words are particularly apposite.

K. G. ROBSON, Pr. Eng.
City Electrical Engineer, East London.

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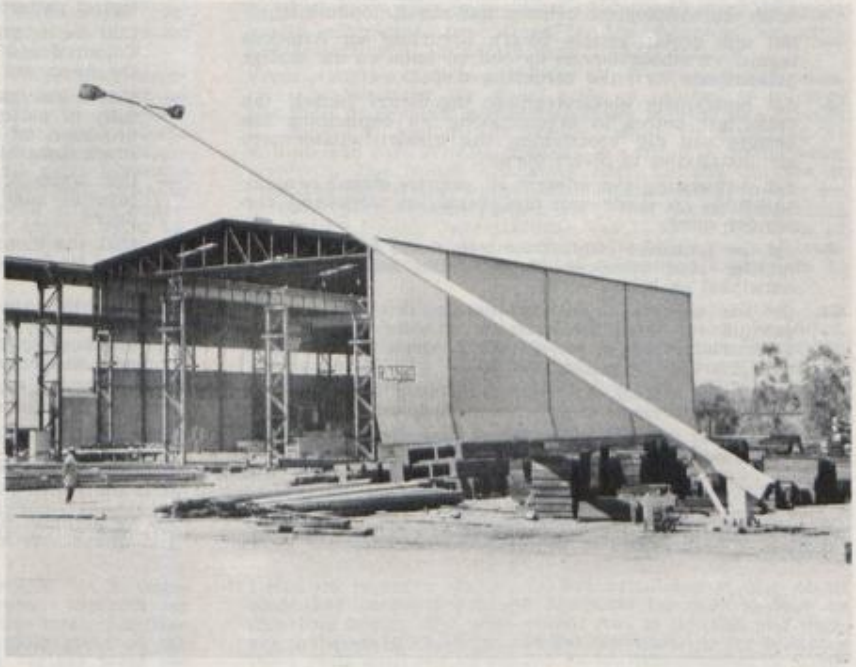

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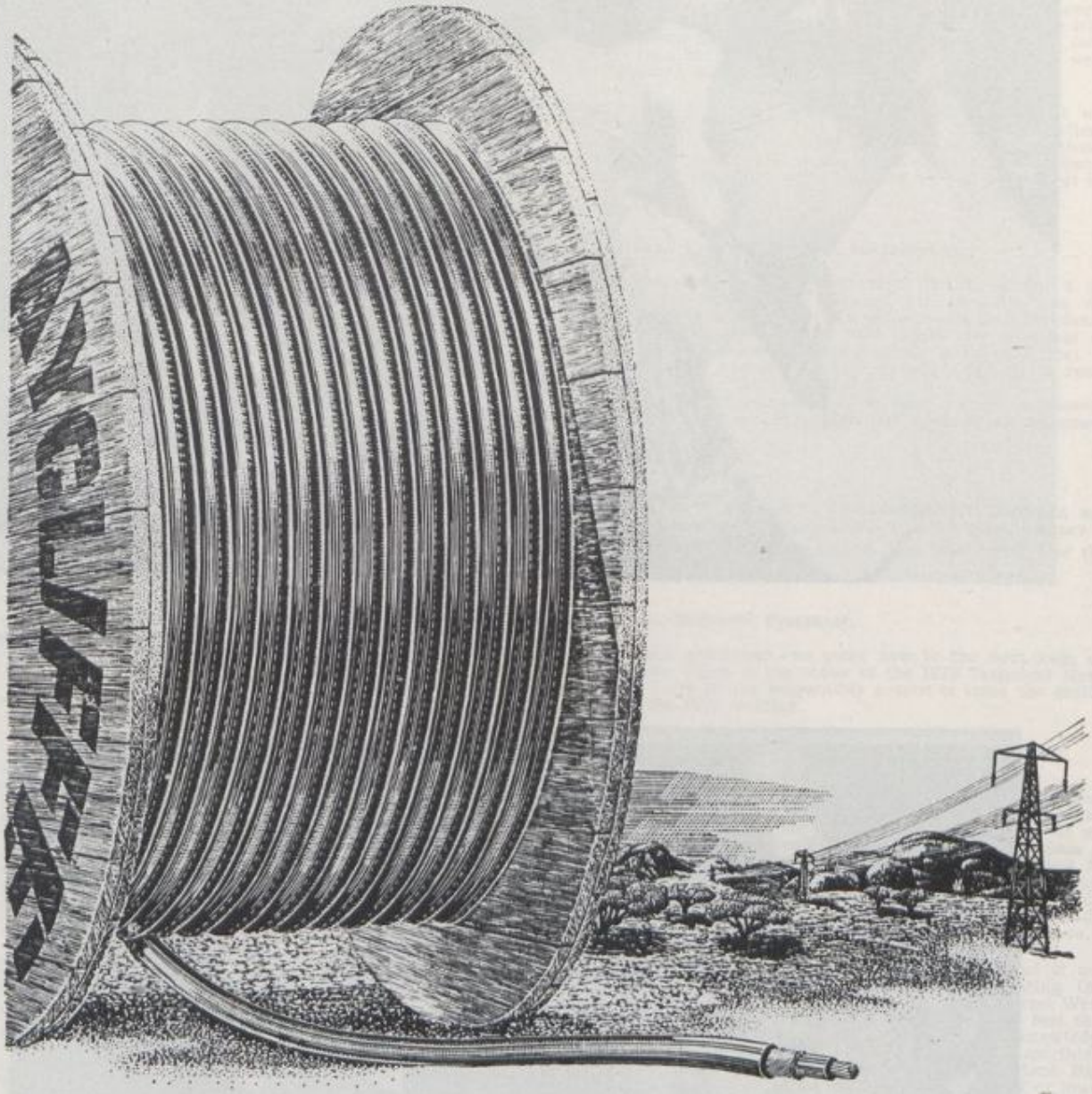

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Wie sê dat
Naude van Wyk (WNNR), Dr. R. B. Anderson (CSIR) en Pat Middlecote (SABS) hulle nie kan geniet nie!! Koorsang tydens die informele boeredans.

MR. D. H. FRASER, DURBAN:

Mr. President,

Your address to us this morning began on a rather sombre note. You threw us straight into the "deep end" represented by the present difficult economic, political and social conditions in South Africa. In these circumstances one must either sink or swim. If we lack the spiritual, moral and physical courage and leadership to face up to the challenge of our situation, we shall most certainly sink. I am hopeful that the challenge will reveal untapped human resources and strengths in individuals and leaders which will save us from this fate.

In no small measure do I base this hope on the qualities of leadership evident in the man we have elected to guide the destiny of the AMEU for the next two years. Mr. President, in your wide-ranging address you have pinpointed most of the problem areas and those matters which warrant priority attention within the sphere of influence of the members of this Association. You have also suggested the way in which we should set about solving these problems and provided for us the guidelines, or perhaps I should say, the lifeline, by which we may be drawn out of the "deep end", back on to firm ground.

'n Paar dae gelede het ek, dames en here, die voorreg gehad om insae in mnr. Robson se presidentsrede te kry. Dit het my die geleentheid gebied om ernstig na te dink oor sommige van die aanmerkings wat daarin vervat is asook oor dit wat daarin bepleit word. Die baie feitestellings en die menings wat uitgespreek is, vind eers inslag na ernstige oorweging. Dit is om hierdie rede dat ek 'n ernstige beroep nie net op die manne en die ingenieurslede wat aanwesig is nie, maar op u almal doen om die presidentsrede wat so pas gelewer is, weer te lees en dan daadwerklik op te tree.

Charges for electricity are a sore point with Supply Engineers at the moment. Gone are the opportunities to boast of the low level and stability of prices and to point a finger at the higher escalation of other living costs. My calculations indicate that the President has understated the increase in Escom's Border Undertaking tariffs which, based on Durban's consumption, reflect an increase of 76% not 65% in the period March, 1976, to January, 1977. It may be of some consolation to you, sir, to know that the corresponding increase in the Natal Undertaking's charges was a staggering 87%. The underlying causes of these alarming increases in the costs of production of electricity have been publicly stated and appear to be a reflection of the ills of the present world and certain problems peculiar to this country. We must face up to the situation, but the plea of the President for the Commission to have the direct benefit of the presence within its membership of a person well versed in Municipal matters, so that it may fully understand the particular situation of its potentially largest group of consumers, should not go unheeded. Few of us, however, would contest the wisdom of the authors of the South African Electricity Act in stipulating that Escom's charges should correspond as closely as practicable to the costs of supply. Constant attention should be given to ensuring that this principle is preserved and correctly applied.

Mr. President, you have touched on so many important matters which concern us that it would unduly delay our getting down to the real business of this Convention, if I were to try to comment or expand on all of them. Fortunately several of the papers and sub-committee reports on our programme relate to these subjects and opportunities will arise later for fuller and more representative discussions.

There is, however, one aspect of your address which I am particularly compelled to underline and support. This relates to the provision of the amenity of electricity supply to ALL the inhabitants of ALL our towns and cities, regardless of colour or race. While not denying the problems of finance and the high priority of house construction and other basic essential services such as roads, sewerage, water and drainage, I am satisfied that we are courting disaster if we regard electricity supply on a fully reticulated basis as anything but essential in an urban environment. It is gratifying to see the steps now being taken in this direction to provide electricity to homes in Soweto.

When one contemplates the magnitude of the task due to the failure to provide the service at the outset and then multiplies that many times to take in all the other similar townships throughout the country without this facility, it assumes frightening proportions.

Dit is 'n spoedeisende probleem en dit is gebiedend noodsaaklik dat aandag dadelik daaraan geskenk word. Op al my kollegas wat hierdie kongres bywoon, doen ek 'n beroep om tog verantwoordelikheid vir hierdie diens op eie skouers te neem. Ons is die mense wat die beste toegerus is om nie net hierdie diens te lewer vir en binne daardie nie-blanke dorpe waar elektrisiteit nog nie ten volle voorsien word nie, maar ook om die personeel op te lei wat die distribusiestelsels sal moet bedien en in stand hou. Ons moet hier die leiding neem, die voorkeur wat aan hierdie werk gegee behoort te word, by die owerhede tuisbring en met die hulp en deelname van die private sektor, indien moontlik, voorstelle doen in verband met die wyse waarop hierdie werk en opleiding aangepak kan word.

Ladies and gentlemen, I am sure you will agree that our President has launched this Convention with a most stimulating address and it is with humility and pleasure that I propose, on your behalf, a warm and sincere vote of thanks and coupled with that, our very good wishes throughout his term of office.

RAADSLID G. D. BORNMAN, Johannesburg:

As nuweling op hierdie Konferensie is dit vir my 'n besondere voorreg om die voorstel tot aanname van die Presidentsrede te sekondeer. Ek wil eerstens die uittredende President gelukwens met 'n baie suksesvolle ampsjaar en tweedens die inkomende ampsbekleër gelukwens met 'n Presidentsrede waaroor aandag gevestig word op 'n reeks van vraagstukke van ons tyd.
Dit is my welaangename taak om mnr. Fraser se voorstel tot aanname van die Presidentsrede hiermee te sekondeer.

MR. P. J. BOTES:

Proposed by Mr. Fraser — seconded by Mr. Bornman and I ask you to show your appreciation in the usual manner.

Mr. President, I now ask you to take over control of the meeting.

MR. K. G. ROBSON, President:

Ladies and gentlemen, we come now to the next item on the agenda, which is the venue of the 1978 Technical Meeting and I call on the responsible person to issue the invitation for the 1978 meeting.

MNR. K. J. MURPHY, Somerset-Wes:

Mnr. die President geëerde gaste, laat my toe om u namens ons dorp geluk te wens met u verkiesing en bevestiging hier vandag. Laat my ook toe om verskoning te maak vir my Raadslid, mnr. Thys Neethling. Hy is ook 'n Matie soos so baie gesê is vanmore en hy is te vas by die Universiteit, hy kon ongelukkig dit nie maak om vandag self hierdie uitnodiging te rig nie. Dit is vir my 'n genoeë om namens die Stadsraad van Somerset-Wes die VMEO uit te nooi om die **1978 Tegniese Vergadering op Somerset-Wes** te kom hou.

Mr. President, Somerset West is a small town and it was with some trepidation that we considered inviting this organisation to have a Technical Meeting in Somerset West. However, we are doing so on the strength of the fact that we have friends in our neighbours and in the knowledge that you can only be strong if you have friends. I am thinking in terms of the Strand Municipality, Gordons Bay, Stellenbosch and that small town in the lower half or lower end of Africa, namely Cape Town. Mr. President, we have ordered some fairly good weather for next year but, if the weather becomes too bad, there are always the wine lands and wine farms around, where we can pick up some very useful information and some pleasant beverages. Thank you.

MR. K. G. ROBSON, President:

Thank you, Mr. Murphy, I am quite sure, with the delights that are in store for us, we won't ask for other nominations or invitations and we accept your invitation. Will you please convey to your Council our grateful appreciation of this very kind invitation. We look forward to being with you. Thank you very much.

The next matter to be considered is the venue for the 1979 Convention. May I request that the official invitation be extended, I think by our friend, Councillor Boet Erasmus.

VMEO **AMEU**

UITVOERENDE RAAD 1977 - 1979 EXECUTIVE COUNCIL

Standing from l. to r.: Staande van l. na r.: J. D. Dawson, Rdl. V. J. Strydom, J. K. von Ahlften, Rdl. S.D. Joubert, J. A. Loubser, Rdl. C. M. Lemmer, Rdl. J. E. du Plessis, W. Barnard, D. H. Frasser, Clr. A. K. L. Shepstone, and/en A. J. van den Berg.

Seated from l. to r.: Sittende van l. na r.: K. J. Murphy, Rdl. H. J. Hugo, P. J. Botes (Aangewese President/President Elect) K. G. Robson,(President) Clr. J. J. M. Orpen, Bennie van der Walt,(Sekretaris/ Secretary.) E. de C. Pretorius.

RAADSLID J. C. K. ERASMUS, Port Elizabeth:

Mnr. die President, Sy Edele die Minister, Sy Agbare die Burgemeester, dames en here, terwyl julle hier sit en betrag het waar is dié plek Roodepoort, ek het darem hulp gekry van die voorlaaste spreker wat gesê het dis uitbreiding nommer een van Johannesburg. Maar ons kan nie die Kongres — dit is ons voorreg om dit te hou waar die President gesetel is, maar ons sal dit nou nie kan doen nie of tenminste waar die volgende President sal gesetel wees en my Raad het my die opdrag gegee om u te nooi na Port Elizabeth. Mnr. die President, u was lanklaas in Port Elizabeth met hierdie Kongres, ons het ook al 'n paar Presidente opgelewer, maar ek is seker dat die Vereniging daaronder gely het dat u so lank laas in Port Elizabeth was en dit is 'n leente wat ons nou wil vul.

Mr. President, Port Elizabeth has much to offer, there is much to do there, much to see, much to admire and I am quite sure that when you see one of the last remnants of Municipal enterprise in this country, that is our power station, you will not only admire, but you will also envy, our good fortune in having that power station. I don't know how big the thing is; the first one will be phased out by then I understand, but the second will be still there. I never know whether its capacity is 24 milliwatts or megawatts, I don't know the difference. Anyway, it has got five chimneys so you can work it out, but that power station stands us in very good stead, Mr. President, and the Engineer tells me that it helps to cut the peak demand from Escom, so we can guarantee you one thing — the Congress will not be subjected to any interruptions. We'll see to it that you are connected to the power station and not to the Escom supply and you won't have the many interruptions which are a feature of Escom supply in this part of the world. The Conference will be held at the University Hall — which will give that academic aura to the proceedings which you cannot have in Roodepoort, nor in East London.

Maar, mnr. President, ons sal regtig bly wees as u kom, u weet u is nou in Oos-Londen en die natuur het die nadele van die natuur baie kwistig uitgedeel in Oos-Londen — dis koud hier en dis nat en die winderig, ek kan u verseker dat in Port Elizabeth sal u sonnige weer hê en die Transvalers kan soontoe kom, en mnr. President, u sal daar kan sit en visvang, die nuwe President sal dan daar kan visvang en daar is baie voëls ook, hulle vlieg nie almal nie, maar kom maar, mnr. die President, ek kan u verseker dat die Transvalers daar sal 'n sonnige week hê, weg van die ryp en die koue wat nou eie is in die Transvaal en u sal rede hê om dit te onthou. 'n Hartlike uitnodiging aan u mnr. die President om die volgende **Konvensie in Port Elizabeth** te hou.

MR. K. G. ROBSON, President:

Baie dankie, mnr. Erasmus — you know for one terrible moment when you referred to the last remnant of local government, I thought you were referring to Boet Erasmus, but may I thank you very much for that kind invitation. En nou het Raadslid Hugo 'n paar woorde op die hart.

RAADSLID H. J. HUGO, Roodepoort:

Mnr. die President, Sy Edele die Minister, Sy Agbare die Burgemeester, ek wil tog net vir Raadslid Bornman sê hy moet gaan kyk daar in die argiewe van Johannesburg daar staan dit dat daar in 1916 'n deel van Roodepoort weggebreek het na Johannesburg toe, en Johannesburg skuld ons nog R35 000 agterstallige geld, en ek hoop hulle is so goed om vanjaar daardie geld op die begroting te kry sodat hulle darem Roodepoort se geld kan betaal wat hulle soveel jare skuld, plus rente.

Ek wil graag van die geleentheid gebruik maak en vir mnr. Boet Erasmus sê, namens die VMEO en namens die Stadsraad van Roodepoort, baie dankie vir die baie vriendelike uitnodiging. Ons glo as dit so goed sal wees daar soos hy gepraat het, sal ons dit geniet om die volgende Konvensie in 1979 daar te hou. Namens my raad nogmaals baie dankie vir die vriendelike uitnodiging, mnr. Erasmus.

MNR. K. G. ROBSON, President:

Baie dankie vir daardie uitnodigings — what with all the advertising for the various towns and cities, I just wonder whether Roodepoort might put on the front page of their brochure "The Fisherman's Paradise" but perhaps that won't be. Thank you very much and may I accept with very great pleasure.

THE ELECTION OF THE EXECUTIVE COUNCIL

Those who are entitled to vote will have received ballot papers in their folders this morning.

The following nominations were received:-

NORTHERN REGION/NOORDELIKE STREEK

BOTES, P. J.	— Roodepoort
BOYACK, I. F.	— Pretoria
VAN DEN BERG, A. J.	— Krugersdorp
HEYDENRYCH, J. E.	— Middelburg (Tvl.)

CENTRAL REGION/SENTRALE STREEK

BARNARD, W.	— Johannesburg
LOUBSER, J. A.	— Benoni
PRETORIUS, E. de C.	— Potchefstroom
VON AHLFTEN, J. K.	— Springs

EASTERN REGION/OOSTELIKE STREEK

FRASER, D. H. (Unopposed/Onbestrede) — Durban

SOUTHERN REGION/SUIDELIKE STREEK

DAWSON, J. D. (Unopposed/Onbestrede) — Uitenhage

WESTERN REGION/WESTELIKE STREEK

MURPHY, K. J.	— Somerset West
PALSER, D. C.	— Cape Town

MR. K. G. ROBSON, President:

It is now my pleasure to announce the results of the ballot for the members of the Executive Council and I will take them in the order that the names appeared on the ballot paper.

Mr. A. J. van den Berg	Mnr. J. K. von Ahlften
Mr. W. Barnard	Mr. D. H. Fraser(unopposed)
Mnr. J. A. Loubser	Mr J. D. Dawson(unopposed)
Mnr. E. de C. Pretorius	Mr. K. J. Murphy

Mag ek alle lede van die Uitvoerende Raad vir die volgende twee jaar gelukwens. Congratulations to the elected members who, in fact, have been re-elected to the Executive Council. We look forward to a continued happy association during the next two-year period.

I wish to thank our Scrutineers, viz.: Messrs. P. P. Capra, H. D. Howe, A. J. Levy, D. A. Robb, J. W. Smit and R. E. Walsh.

GREETINGS / GROETE

DR. R. L. STRASZACKER, Chairman of Escom:

Mr. President, allow me to start by congratulating you most heartily on your election to this very important post for everybody connected with electricity supply in our country. Ek wil baie graag ook aan mnr. Botes 'n hartlike gelukwensing uitspreek vir sy benoeming as Aangewese President. Ek doen dit besonder graag omdat ek vanoggend gehoor het dat hy sy eerste opleiding aan die Vrede-hoërskool gehad het, dieselfde skool waar ek ook groot geword het.

Nou mnr. President net om te wys hoe klein die wêreld partykeer is, u pas afgetrede President se vroutjie — dié het in haar baie jeugdige jare by my moeder musieklesse gehad op Vrede. Maar mnr. President ek dwaal af. Ek wil graag die groete van die Elektrisiteitsvoorsieningskommissie aan hierdie Vereniging oordra met die belangrike Konferensie hier in Oos-Londen. Evkom het altyd hoë agting vir die werk wat die Vereniging doen. So veel so dat ek moet nou vir u sê die vermoede wat u in u rede uitgespreek het, dié is heeltemal bewaarheid. Last year, 1976, the bulk suppliers, as we list them, took over the leading role as the main consumer block of Escom power. They are now well ahead of all the others and in that sense they represent our most important customers so, for our part, we hope they will find us as co-operative as we find them useful to us. In your address, Mr. President, you referred to quite a number of aspects that had some bearing or another on the work of Escom. I am sure that there will be other opportunities for me during the course of this Conference to have one or two words to say about this. At this stage I would just like to point out one thing and this is that when you use statistics it depends very much on the base from which you start. For example, if a man working in your garden

earns R5,00 a month and you earn R300,00 a month, and then his salary is increased by 200% and yours by 5%, you will still be earning very much more! So it is, when you compare increases in tariffs, that you must try and keep the perspective in this way. — "How does your final result compare with what happens in other places?" — and there I can assure this Association that our tariffs, even after all the increases that we've unfortunately had to impose, still compare most favourably with those in most countries of the world today even after the recent increases. Just as an example — in Germany the tariffs today are about four times higher than ours. The same applies in France and in the U.K. In Sweden the position is not much better. The only places in which tariffs are comparable to ours are in the countries where they have, by past fortunate circumstances, established hydro plant for which by now the dams have been written off and they do not pay anything for the water. But even in those countries, and I think particularly of Canada, the new nuclear stations are certainly very much more expensive than the thermal stations that we can still put up to look after our growth. This does not mean, Mr. President, that we from Escom do not realise very much how difficult it is when your tariffs are suddenly materially increased. I can assure you and everybody in the hall today that this is certainly not for the lack of trying to spread out these increases over a longer period. Some of the statistics mentioned in your address bear this out, for example, where you refer to the period from 1970 to 1974 during which there were practically no increases. I must stress it was not for lack of trying that we were unable to spread out increases move evenly over the last 8 to 10 years, but there are sometimes other factors which are overriding.

However, we have these things always in mind and try to do whatever we can to keep cost structures down. Unfortunately, as you pointed out yourself, and this affects all municipalities, I do not believe any municipality could have provided its own power supplies without experiencing similar kinds of cost rises and it does still pay to instal large units rather than small ones from a capital point of view, although this capital per installed kilowatt has increased three-fold over the last two or three years. So I just want to say to you, Mr. President, and to your organisation that we are mindful of your problems, we try to do our best in keeping the cost down. Unfortunately, Escom is no exception to the general spiral that we are experiencing and I still believe that the size of our organisation gives advantages which we otherwise would not have.

When discussions are held on ways of relieving the impact of these increasing tariffs in certain parts of the country, my personal view is that this is a problem not to be solved by one consumer trying to ride on the back of another. It is rather a national problem which the Central Government should look after in the form of subsidies which we already have today for certain border areas. It is quite a common thing for certain railway tariffs to be subsidised by the Central Government and this I believe is the way in which we should handle some of the hardships that arise from the unfortunate circumstances in which we find ourselves. Mr. President, I really wanted to say to this meeting that we wish it well, we hope that the deliberations will lead to positive results and whatever we can do to help we certainly shall do.

MR. K. G. ROBSON, President:

Thank you, Dr. Straszacker — particularly for your very kind personal remarks which are much appreciated. As the Mayor mentioned in his speech, we must be one of the oldest consumers of Escom — 30 years — and I'm quite sure that the experience of other Town and Electrical Engineers must be the same as ours, in that there exists a very happy spirit of co-operation between Mr. Gene Otten, your Manager here, and his staff and my own staff. It is something that has come to mean very much in the working day lives of municipal electrical engineers and it is an interesting offshoot of the national grid that we have been brought so much closer together — a point I tried to make in my Presidential address. There is no doubt in my mind that, without this spirit of co-operation and interdependence, the electricity supply industry would face very much greater problems than it does. Thank you very much for your remarks about the AMEU which are also appreciated and we look forward to seeing you for many years to come, Dr. Straszacker.

MR. J. K. VON AHLFTEN, Springs:

Mr. President — as the President of SANCI I wish to bring you the good wishes of our Association for a successful term of office and I do express the wish that the good relationships between the AMEU and SANCI will continue under your and Mr. Botes' leadership. Once again, our congratulations on your election to the chair as President of the AMEU.

MR. K. G. ROBSON, President:

Thank you, Mr. von Ahlften — this gives me the opportunity to congratulate you on having been elected President of SANCI. I think I am correct in saying that you and Mr. Downey, who was the first President of SANCI, are the only municipal electrical engineers to have held this office. We do most sincerely congratulate you and I am sure that this in itself will serve as a means of making the ties stronger between the AMEU and SANCI. Thank you very much for your kind remarks.

MR. K. A. H. ADAMS, Johannesburg:

Mr. President, on behalf of the South African Institute of Electrical Engineers I would extend greetings to this Convention, and the hope that it will be a very successful one; also our personal congratulations to you, sir, on your election to the high office of President of the AMEU.

RAADSLID J. F. VAN ZYL, Rustenburg:

Mr. President, allow me firstly to congratulate you on all your preparations for this Conference. I can assure you that I have attended quite a number of conferences and this one has really impressed me. Dan mnr. die President die rede waarom ek eintlik hier voor u staan, is die Transvaalse Munisipale Vereniging se Uitvoerende Komitee — Graag wil ons van hulle oorbring hulle beste wense en groete. Ons het opgemerk, as ons na u agenda kyk, dat daar baie interessante referate is — referate wat plaaslike bestuur seer sekerlik baie raak. Ons is verheug om te sien dat die elektrisiteitsmense ook daaraan dink, en veral die elektrotegniese Ingenieurs, dat daar sekere behere uitgeoefen moet word en ek dink dat ek persoonlik kan met u saamstem dat as ons nie in sekere van hierdie verliese ernstige beheer gaan instel nie gaan ons dit baie moeiliker vind in die toekoms om al hierdie aanvrae wat op ons, en aanslae wat op ons gemaak word, die hoof te bied.

Dit is so dat 'n mens seersekerlik nie alles so baie maklik die hoof kan bied nie maar dit is verblydend as 'n mens by 'n Kongres kom en jy vind uit dat die amptenare wat u almal hier vandag is — amptenare van plaaslike bestuur die meeste van u, uself ook — dat hulle ook vorentoe kom om te kyk of 'n mens nie iets kan doen aan hierdie ontsettende kostestyging nie. Nogmaals dan die beste groete van die Transvaalse Munisipale Vereniging en mag die Kongres baie suksesvol verloop en tot voordeel strek van plaaslike bestuur sowel as die land.

Thank you, Mr. President.

MR. L. FUTCHER, Kempton Park:

Mr. President, on behalf of NOSA, East Rand, I want to congratulate you on your election to this high office. As ex-Chairman of NOSA we are very proud that you have been elected to this post and wish you a very successful term of office. Thank you.

MR. DAVID LAZARUS, J.P. (by letter):

Dear Ken, it was very good of you to send me your Presidential address which reached me this morning. I made the reading of it my first priority, and want to congratulate you on an excellent, thoughtful and indeed topical exposition. As one, who, over a period of 37 years had been able to observe from close quarters the valuable contacts and co-operation emanating from the discussions, I am sure this 45th Convention will be no exception.

May I take this opportunity of wishing you and the members of the Association of Municipal Electricity Undertakings a fruitful and successful Convention.

ELSABE KEMP, Deputy Mayor, East London (by telegram):

Congratulations, Mr. President. May your turn of office be a happy one. We are proud of you.

WILLEM CRONJE, Ingenieursgenootskap van SA (per telegram):

Beste wense vir aangename suksesvolle Konvensie.

Verslag van die Sekretaris vir die jare 1975 en 1976

Namens die Uitvoerende Raad van die Vereniging van Elektrisiteitsondernemings van Suid-Afrika lê ek met genoeë die volgende beknopte oorsig van die bedrywigheid van die VMEO vir die finansiële jare 1975 en 1976 voor.

1. UITVOERENDE RAAD

Tesame met hul Raadslede wat deur die betrokke ondernemings genomineer word, is die volgende tien Ingenieurslede tydens die 44ste Konvensie gehou te Durban in 1975 gekies tot die Uitvoerende Raad:-

E. de C. Pretorius	Potchefstroom	— President
K. G. Robson	Oos-Londen	— Aangewese President
P. J. Botes	Roodepoort	— (Dagbestuurslid)
J. K. von Ahlften	Springs	— (Dagbestuurslid)
W. Barnard	Johannesburg	
J. D. Dawson	Uitenhage	
H. C. Dreyer	Paarl	
D. H. Fraser	Durban	
J. A. Loubser	Benoni	
A. J. van den Berg	Krugersdorp	

Mnr. H. C. Dreyer het gedurende 1976 uit die diens getree van die Munisipaliteit van die Paarl en het gevolglik bedank as Uitvoerende Raadslid van die VMEO.

Mnr. K. J. Murphy van Somerset-Wes is op die Uitvoerende Raad gekoöpteer in die plek van mnr. Dreyer.

2. TAKKE

Die ondergemelde lede het as ampsdraers van die takke gedien:-

2.1 Hoëveldtak

1975/76:

Voorsitter	J. E. Heydenrych	— Middelburg, Tvl.
Ondervoorsitter	J. A. Loubser	— Benoni
Sekretaris	H. J. de Bruin	— Randfontein

1976/77:

Voorsitter	J. A. Loubser	— Benoni
Ondervoorsitter	H. J. de Bruin	— Randfontein
Sekretaris	J. van Lochner	— Brits

Die tak hou gereeld twee-maandelikse vergaderings wat goed bygewoon word deur die lede.

2.2 Goeie Hoop-tak

1975:

Voorsitter	C. P. du Plessis	— Worcester
Ondervoorsitter	G. Aalbers	— Wellington
Sekretaris	A. C. T. Frantz	— Ere-lid (Kaapstad)

1976:

Voorsitter	G. Aalbers	— Wellington
Ondervoorsitter	D. C. Palser	— Kaapstad
Sekretaris	A. C. T. Frantz	— Ere-lid (Kaapstad)

Die tak vergader gereeld kwartaalliks, maar het meermale vergader gedurende die afgelop 2 jaar aangesien spesiale sake dit genoodsaak het.

2.3 Natal-tak

1975:

Voorsitter	M. P. P. Clarke	— Newcastle nou by Pietermaritzburg
Ondervoorsitter	D. H. Fraser	— Durban

1976:

Voorsitter	D. H. Fraser	— Durban
Ondervoorsitter	K. H. Bobeck	— Eshowe

Die Ondervoorsitter van die tak ageer ook as Sekretaris.

2.4 Oos-Kaaplandse tak

1975:

Voorsitter	K. G. Robson	— Oos-Londen
Ondervoorsitter	R. H. D. MacMillan	— Umtata

1976:

Voorsitter	R. H. D. MacMillan	— Umtata
Ondervoorsitter	L. E. Adams	— Port Elizabeth

2.5 Algemeen

Al die takke funksioneer goed en sake word voortdurend van die takke na die Uitvoerende Raad van die VMEO verwys.

Die vergaderings van die takke is hoofsaaklik toegespits op studiewerk, vermeerdering van praktiese kennis, die uitruil van gedagtes en die verhoging van standaarde binne die werkskedules van die elektrisiteitsondernemings.

Report of the Secretary for the years 1975 and 1976

On behalf of the Executive Council of the Association of Municipal Electricity Undertakings of South Africa I take pleasure in submitting the following condensed review of the activities of the AMEU for the financial years of 1975 and 1976.

1. EXECUTIVE COUNCIL

Together with their Councillor Members, who are nominated by the supply authorities the following ten Engineer Members were elected to the Executive Council during the 44th Convention held in Durban in 1975:-

E. de C. Pretorius	Potchefstroom	— President
K. G. Robson	East London	— President Elect
P. J. Botes	Roodepoort	— (Standing Committee)
J. K. von Ahlften	Springs	— (Standing Committee)
W. Barnard	Johannesburg	
J. D. Dawson	Uitenhage	
H. C. Dreyer	Paarl	
D. H. Fraser	Durban	
J. A. Loubser	Benoni	
A. J. van den Berg	Krugersdorp	

Mr. H. C. Dreyer left the service of the Paarl Municipality during 1976 and consequently resigned his membership of the Executive Council and of the AMEU. Mr. K. J. Murphy of Somerset West was co-opted to the Executive Council in Mr. Dreyer's place.

2. BRANCHES

The following members held office in the Branches:-

2.1 Highveld Branch

1975/76:

Chairman	J. E. Heydenrych	— Middelburg, Tvl.
Vice-Chairman	J. A .Loubser	— Benoni
Secretary	H. J. de Bruin	— Randfontein

1976/77:

Chairman	J. A. Loubser	— Benoni
Vice-Chairman	H. J. de Bruin	— Randfontein
Secretary	J. van Lochner	— Brits

This Branch regularly holds meetings at two-monthly intervals, which are well attended by members.

2.2 Good Hope Branch

1975:

Chairman	C. P. du Plessis	— Worcester
Vice-Chairman	G. Aalbers	— Wellington
Secretary	A. C. T. Frantz	— Hon. Member (Cape Town)

1976:

Chairman	G. Aalbers	— Wellington
Vice-Chairman	D. C. Palser	— Cape Town
Secretary	A. C. T. Frantz	— Hon. Member (Cape Town)

This Branch regularly meets quarterly, but held meetings more often during the past two years in order to deal with special matters.

2.3 Natal Branch

1975:

Chairman	M. P. P. Clarke	— Newcastle; presently at Pietermaritzburg
Vice-Chairman	D. H. Fraser	— Durban

1976:

Chairman	D. H. Fraser	— Durban
Vice-Chairman	K. H. Bobeck	— Eshowe

The Vice-Chairman of the Branch also acts as Secretary.

2.4 Eastern Cape Branch

1975/76:

Chairman	K. G. Robson	— East London
Vice-Chairman	R. H. D. MacMillan	— Umtata

1976/77:

Chairman	R. H. D. MacMillan	— Umtata
Vice-Chairman	L. E. Adams	— Port Elizabeth

2.5 General

All the Branches are functioning well, consistently referring matters of interest to the Executive Council of the AMEU. The meetings of the Branches are mainly aimed at study work, the broadening of practical knowledge, the exchange of ideas and the improvement of standards within the work of the electricity undertakings.

Die President, Mnr. K. G. Robson en die Sekretaris,
Mnr. Bennie van der Walt
gaan die program van die konvensie deur.

Afgevaardigdes geniet verversings.

3. VERTEENWOORDIGERS OP KOMITEES

Die Uitvoerende Raad het die ondergemelde lede op die onderskeie komitees benoem:-

3.1 **Referatekomitee**
E. de C. Pretorius (Saamroeper)
K. G. Robson

3.2 **Finanskomitee**
W. Barnard (Saamroeper)
J. K. von Ahlften

3.3 **Aanbevelingskomitee vir Nuwe Elektriese Verbruiksware**
P. J. Botes (Saamroeper)
J. A. Loubser

3.4 **SABS-Koördineerder**
P. J. Botes

3. **SABS-Bedradingsregulasies**
A. J. van den Berg (Saamroeper)
E. de C. Pretorius
J. A. Loubser
J. K. von Ahlften
J. D. Dawson (Korrespondent)
H. C. Dreyer vervang deur K. J. Murphy (Korrespondent)
D. H. Fraser (Korrespondent)

3.6 **Tegniese Opleiding**
D. H. Fraser (Saamroeper)
W. Barnard
J. D. Dawson
H. C. Dreyer vervang deur K. J. Murphy
A. J. van den Berg

3.7 **EVKOM**
W. Barnard (Saamroeper)
P. J. Botes
H. C. Dreyer vervang deur K. J. Murphy
D. H. Fraser
K. G. Robson

3.8 **Pers en Publisiteit**
K. G. Robson

3.9 **Wysigingswet op Elektrotegniese Draadwerkers en Aannemers**
J. K. von Ahlften
E. de C. Pretorius

3.10 **Registrasieraad van Elektrotegniese Draadwerkers**
J. K. von Ahlften (Statutêr)

3.11 **Hoogspanningslaboratoriumgeriewe**
W. Barnard

3.12 **Wêreld-kragbronkonferensie**
W. Barnard

3.13 **Elektrolitiese verwering: Streekskomitees**

Witwatersrand	W. Barnard (Saamroeper)
Natal	D. H. Fraser
Noord-Kaapland	G. Forbes
Wes-Kaapland	H. C. Dreyer vervang deur K. J. Murphy

3.14 **WNNR-Advieskomitee vir die Elektrotegniese Ingenieurswese**
J. K. von Ahlften

3.15 **S.A. Nasionale Komitee van die IEK**
J. K. von Ahlften

3.16 **S.A. Nasionale Komitee vir Verligting**
J. K. von Ahlften

Die verslae van die betrokke komitees wat volg, gee vir u 'n insig in hul werksaamhede.
Benewens die bogmelde komitees het die Uitvoerende Raad verskeie sake na ad hoc-komitees verwys.

4. LIDMAATSKAP

4.1 Opsommenderwys is die stand van die lede van die VMEO op 31 Desember 1976 soos volg:-

Erelede	28
Voormalige lede	33
Ingenieur lede	97
Geassosieerdes	22
Assosiaatlede	44
Plaaslike Besture	150
Geaffilieerdes	105
	479

3. REPRESENTATIVES ON COMMITTEES

The Executive Council appointed the undermentioned members on the relevant committees:-

3.1 **Papers Committee**
E. de C. Pretorius (Convenor)
K. G. Robson

3.2 **Finance Committee**
W. Barnard (Convenor)
J. K. von Ahlften

3.3 **Recommendations Committee for New Electrical Commodities**
P. J. Botes (Convenor)
J. A. Loubser

3.4 **SABS Co-ordinator**
P. J. Botes

3.5 **SABS Wiring Regulations**
A. J. van den Berg (Convenor)
E. de C. Pretorius
J. A. Loubser
J. K. von Ahlften
J. D. Dawson (Correspondent)
H. C. Dreyer replaced by K. J. Murphy (Correspondent)
D. H. Fraser (Correspondent)

3.6 **Technical Training**
D. H. Fraser (Convenor)
W. Barnard
J. D. Dawson
H. C. Dreyer replaced by K. J. Murphy
A. J. van den Berg

3.7 **ESCOM**
W. Barnard (Convenor)
P. J. Botes
H. C. Dreyer replaced by K. J. Murphy
D. H. Fraser
K. G. Robson

3.8 **Press and Publicity**
K. G. Robson

3.9 **Electrical Wiremen and Contractors' Amendment Act**
J. K. von Ahlften
E. d C. Pretorius

3.10 **Electrical Wiremen's Registration Board**
J. K. von Ahlften

3.11 **High Tension Laboratory Facilities**
W. Barnard

3.12 **World Energy Conference**
W. Barnard

3.13 **Regional Electrolytic Corrosion Committees**

Witwatersrand	W. Barnard (Convenor)
Natal	D. H. Fraser
Northern Cape	G. Forbes
Western Cape	H. C. Dreyer replaced by K. J. Murphy

3.14 **CSIR Advisory Committee for Electrical Engineering**
J. K. von Ahlften

3.15 **S.A. IEC National Committee**
J. K. von Ahlften

3.16 **S.A. National Committee on Illumination**
J. K. von Ahlften

The reports of the committees concerned provide an insight into their activities. In addition to the above committees, the Executive Council referred a number of matters to ad hoc committees.

4. MEMBERSHIP

4.1 In summary, the membership position of the AMEU as at 31st December, 1976, was as follows:-

Honorary Members	28
Past Members	33
Engineer Members	97
Associates	22
Associate Members	44
Local Authorities	150
Affiliates	105
	479

4.2 Doodsberigte

Dit is met diepe leedwese dat die Uitvoerende Raad moet berig dat mnre. D. C. Brown en G. A. Lotter, Ingenieur lede en mnr. J. G. Wannenburg, Ereleid, gedurende die tydperk onder bespreking, oorlede is.

4.3 Bekendmaking van Verandering van Adres en/of Ampsbenaming

'n Dringende beroep word op alle lede gedoen om die Sekretaris onmiddellik in kennis te stel van enige verandering van hul adres en/of ampsbenaming sodat die lidmaatskaplys altyd volledig en korrek bygehou kan word.

Die volgende persone se addresse is by die kantoor onbekend:-

R. W. Beesley	— Erelid
L. Bernhardij	— Ingenieurlid
T. M. Mocke	— Ingenieurlid
R. A. Paull	— Ingenieurlid
D. R. Pretorius	— Ingenieurlid
A. H. Williams	— Assosiaat
P. M. Jooste	— Assosiaatlid
J. F. Nieuwenhuis	— Assosiaatlid
A. G. Zwiegelaar	— Assosiaatlid
J. R. Cherry	— Ingenieurlid

Lede word daaraan herrinneer dat indien hulle die munisipale diens verlaat, hulle die Sekretaris in kennis moet stel of hulle na die voormalige lidmaatskap-kategorie oorgeplaas wil word en of hulle hul lidmaatskap van die VMEO wil beëindig.

5. LEDE-BYEENKOMSTE

5.1 Konvensie

Die 44ste Konvensie is deur 556 afgevaardigdes en dames vanaf 19 tot 22 Mei 1975 in Durban bygewoon, waar die Stadsrade van Potchefstroom en Durban as gashere opgetree het.

By daardie geleentheid is, benewens die openingsrede deur mnr. J. D. N. van Wyk, Direkteur van die Nasionale Navorsingsinstituut vir Elektrotegniese Ingenieurswese, en die presidentsrede van mnr. Eugene Pretorius, ook nog die volgende referate gelewer:-

(1) „'n Moderne benadering tot die retikulering van woongebiede", deur mnr. V. A. Raynall, Pr.Eng., B.Sc.(Eng.)(Rand).

(2) „Programbegroting", deur dr. J. W. Cowden.

(3) „Kabelfout-opsporing", deur mnr. Martin Bauer (Oostenryk).

(4) „Verkeerseining in Durban", deur mnr. H. R. Whitehead, Pr.Eng., B.Sc.(Eng.).

(5) Die praktiese en ekonomiese aspekte van moderne straatverligting", deur mnr. H. Wood, Pr.Eng., C.Eng.

Die ledeforum het interessante en leersame bespreking uitgelok.

5.2 Tegniese Vergadering

Die sesde Tegniese Vergadering het op 12 en 13 Mei 1976 te Rustenburg plaasgevind, waar die Stadsraad van Rustenburg as gasheer opgetree het.

Die ledeforum het 'n volle dag in beslag geneem en was onder die bekwame leiding van Jules von Ahlften en John Morrison.

Twee referate is deur sprekers van die Verenigde Koninkryk gelewer t.w.:-

„Die praktiese toepassing van C.I.E. 13" 2"," deur mnr. P. Hartill, C.Eng.

„Vakuumstroombreker-skakeltuig", deur mnr. G. Auton, C.Eng.

Die vergadering is bygewoon deur 247 afgevaardigdes en dames.

6. KONGRESSE VAN ANDER LIGGAME

6.1 Die 40ste Algemene Vergadering van die IEK is deur die President mnr. Eugene Pretorius vanaf 15 tot 27 September 1975 in Den Haag, Nederland, bygewoon.

6.2 Die Internasionale Kongres van die CIE is deur mnr. Jules von Alhften gedurende September 1975 in London bygewoon.

6.3 Die 41ste Algemene Vergadering van die IEK is gehou 17 tot 20 Mei 1976 te Nice, Frankryk, is deur mnr. Piet Botes bygewoon.

6.4 Die President van die VMEO het ook die kongresse van die Instituut van Stadsklerke en die Transvaalse Munisipale Vereniging bygewoon.

4.2 Obituaries

It is with deep regret that the Executive Council reports the decease during the period under review of Mr. D. C. Brown and Mr. G. A. Lotter, Engineer Members and Mr. J. G. Wannenburg, Honorary Member.

4.3 Reporting Changes of Address and/or Titles

An urgent appeal is made to all members to inform the Secretary of any change of address and/or title immediately, in order that the membership list may be kept up to date and correct.

The following persons' addresses are not known to the office:-

R. W. Beesley	— Honorary Member
L. Bernhardij	— Engineer Member
T. M. Mocke	— Engineer Member
R. A. Paull	— Engineer Member
D. R. Pretorius	— Engineer Member
A. H. Williams	— Associate
P. M. Jooste	— Associate Member
J. F. Nieuwenhuis	— Associate Member
A. G. Zwiegelaar	— Associate Member
J. R. Cherry	— Engineer Member

Members are reminded that, on leaving municipal service, they should inform the Secretary as to whether they want to be transferred to the category of Past Member or have their membership terminated.

5. MEMBER MEETINGS

5.1 Convention

The 44th Convention, held in Durban from 19th to 22nd May, 1975, was attended by 556 representatives and ladies. The City Councils of Potchefstroom and Durban were the hosts.

In addition to the inaugural address by Mr. J. D. N. van Wyk, Director of the National Electrical Engineering Research Institute, and the presidential address by Mr. Eugene Pretorius, the following papers were read:-

(1) "A Modern Approach to the Reticulation of Residential Areas", by Mr. V. A. Raynall, Pr.Eng., B.Sc. (Eng.)(Rand).

(2) "Programme Budgeting", by Dr. J. W. Cowden.

(3) "Cable Fault Tracing", by Mr. Martin Bauer (Austria).

(4) "Traffic Signalling in Durban", by Mr. H. R. Whitehead, Pr.Eng.B.Sc.(Eng.).

(5) "The Practical and Economic Aspects of Modern Street Lighting", by Mr. H. Wood, Pr.Eng.C.Eng.

The Members' Forum elicited interesting and informative discussion.

5.2 Technical Meeting

The sixth Technical Meeting was held at Rustenburg from 12th to 13th May, 1976. The host was the City Council of Rustenburg. The members' forum, ably led by Jules von Ahlften and John Morrison, took up a full day.

Two papers were read by speakers from the United Kingdom. These were:-

"The Practical Applicationo f CIE 13" 2"," by Mr. P. Harthill, C.Eng.;

"Vacuum Circuit Breaker Switchgear", by Mr. G. Auton, C.Eng.

The meeting was attended by 247 representatives and ladies.

6. CONGRESSES OF OTHER BODIES

6.1 The 40th General Meeting of the IEC was attended by the President, Mr. Eugene Pretorius, from 15th to 27th September, 1975, in the Hague, Netherlands.

6.2 The International Congress of the CIE was attended by Mr. Jules von Ahlften during September, 1975, in London.

6.3 The 41st General Meeting of the IEC, which was held from 17th to 29th May, 1976, at Nice, France, was attended by Mr. Piet Botes.

6.4 The President of the AMEU also attended the Congresses of the Institute of Town Clerks and of the Transvaal Municipal Association.

6.5 Mnr. Dennis Fraser het die jaarlikse simposium van die Elektriese Kontrakteursvereniging, gehou op 23 Oktober 1976 te Durban, bygewoon.

6.6 Dit is die beleid van die Uitvoerende Raad van die VMEO om soortgelyke institute en organisasies uit te nooi na sy jaarlikse byeenkomste, en om op uitnodigings ander instansies se kongresse by te woon.

7. PUBLIKASIES

7.1 Die verrigtinge van beide die 44ste Konvensie en die 6de Tegniese vergadering is in boekvorm uitgegee. Danksy die ondersteuning van ons adverteerders kon albei publikasies op goeie gehalte papier gedruk word.

7.2 Die tydskrif „Munisipale Administrasie en Ingenieurswese" is die amptelike orgaan van die VMEO. Verskeie referate en aangeleenthede van die VMEO is deurlopend in dié maandelikse tydskrif gepubliseer om lede op die hoogte te hou van belangrike sake.

8. FINANSIËLE STATE

Die geouditeerde rekeningstate vir die jare geëindig 31 Desember 1975 en 31 Desember 1976 is aan lede uitgestuur. Die Vereniging toon 'n uiters gesonde finansiële groei oor die twee jaar. Finansiële hoogtepunte is soos volg:-

	1975	1976
INKOMSTE	R40 936	R37 370
UITGAWES	R27 571	R18 484
SURPLUS	R13 365	R18 886
BELEGGINGS	R35 500	R53 000

In die jaar waarin die Konvensie plaasvind, is die uitgawes uiteraard heelwat meer. 'n Konserwatiewe finansiële beleid word egter gevolg.

Die VMEO wens langs hierdie weg sy waardering te betuig aan die ouditeure, mnre. Haasbroek, Smit en Vennote vir hul dienste aan die Vereniging.

9. ALGEMEEN

Hierdie verslag moet saamgelees word met die verskillende komitees en/of verteenwoordigers se verslae. Daar dien vermeld te word dat 'n aansienlike hoeveelheid tyd deur die verteenwoordigers opgeoffer en heelwat werk gelewer is. Die hulp wat aldus verleen word, is van onskatbare waarde vir die VMEO en sy lede en ons betuig namens die lede dank vir daardie onbaatsugtige dienste aldus gelewer.

Die Uitvoerende Raad het te alle tye getrag om die belange van die plaaslike besture en sy lede na die beste van sy bermoë te dien.

Graag bedank ons ook alle instansies met wie die VMEO 'n noue verbintenis het vir hulle goeie verstandhouding en samewerking.

6.5 Mr. Dennis Fraser attended the annual symposium of the Electrical Contractors' Association held in Durban on the 23rd October, 1976.

6.6 It is the policy of the Executive Council of the AMEU to invite similar institutes and organisations to its annual meetings, and to attend the congresses of other organisations on invitation.

7. PUBLICATIONS

7.1 The proceedings of both the 44th Convention and the 6th Technical Meeting were published in book form. Thanks to the support of our advertisers both publications could be printed on good quality paper.

7.2 The "Municipal Administration and Engineering Journal" is the official organ of the AMEU. Various papers and matters of the AMEU are regularly published in this monthly magazine to keep members abreast of important developments.

8. FINANCIAL STATEMENTS

The audited statement of accounts for the years ending on 31st December, 1975, and 31st December, 1976, were circulated to members.

The Association showed a very healthy financial growth over these two years. Salient points were:-

	1975	1976
REVENUE	R40 936	R37 370
EXPENDITURE	R27 571	R18 484
SURPLUS	R13 365	R18 886
INVESTMENTS	R35 500	R53 000

In the year during which the Convention takes place, expenditure is obviously higher. A conservative financial policy is however followed.

The AMEU wishes to take this opportunity to thank the auditors, Messrs. Haasbroek, Smit and Partners, for their services to the Association.

9. GENERAL

This report should be read in conjunction with the reports of the various Committees and/or Representatives. The considerable time sacrificed by the Representatives and the appreciable amount of work put in by them must be specially mentioned. The aid given in this way is of incalculable value to the AMEU and its members, and on behalf of the members we express our gratitude for the selfless services thus rendered.

The Executive Council at all times endeavoured to serve the interests of the local authorities and its members to the best of its ability.

We gladly extend our thanks to all organisations with whom the AMEU maintains close contact for their goodwill and collaboration.

BENNIE VAN DER WALT,
Sekretaris/Secretary.

BENNIE VAN DER WALT

MNR. E. de C. PRETORIUS, Potchefstroom:

Mnr. die President, baie dankie vir die geleentheid om iets te sê oor die Sekretariële Verslag vir 1975 en 1976. Ek is seker maar die aangewese persoon om dit te doen want gedurende die onderhawige tydperk was ek as President intiem gemoeid met die doen en late van die VMO.

Die verslag is so volledig as wat prakties moontlik is. Soos die Sekretaris dit dan ook stel, moet dit egter saamgelees word met die verslae van die verskillende komitees en verteenwoordigers. Laat my egter toe om enkelepunte te beklemtoon of daarop uit te brei.

Uitvoerende Raad

Die UR het gedurende sy ampstermyn vier keer vergader en, as my geheue my nie parte speel nie, het al die ingenieurlede al die vergaderings bygewoon. Die Dagbestuur wat, benewens die twee vermelde lede, ook die President en die Aangewese President saam met hulle raadslede as lede gehad het, het ook vier keer vergader en al die ingenieurlede daarvan het al hierdie vergaderings bygewoon. Weens die koste aspek en die feit dat raadslede ook na hulle eie sake moet omsien, was dit nie altyd moontlik vir hulle om vergaderings by te woon nie.

Die verskillende komitees en individuele lede van die UR het hard gewerk, sommige baie hard. Die feit dat die betrokke verslae sowat een helfte van die agendastukke van hierdie Konvensie uitmaak, is sprekende bewys daarvan. Hiermee dan ook my gelukwense aan die verantwoordelike persone vir puik verslae.

Die uitdienstreding van mnr. H. C. Dreyer van Paarl het aanleiding gegee tot samesprekings wat die Dagbestuur met die Dagbestuur van die Verenigde Munisipale Bestuur gevoer het, voortspruitend waaruit die VMB besluit het om by die Kaaplandse en ek dink die Natalse Provinsiale Rade aan te beveel dat in die Plaaslike Bestuursordonnansies van dié provinsies 'n bepaling bygevoeg word dat, soos in die geval is in Transvaal, die ontslag van 'n elektrotegniese stadsingenieur onderworpe is aan die goedkeuring van die Administrateur. Ons hoop en vertrou dat die betrokke owerhede gehoor sal gee.

Ek wil graag melding daarvan maak dat een van die UR-lede, mnr. Jules von Ahlften, onlangs verkies is tot President van die SANKV (SANCI)

Takke

As lede van die UR het ons die notules van alle takvergaderings ontvang. Ek kan u verseker dat die takke uitstekend funksioneer en waardevolle werk verrig en dat hulle notules puik is. Dit was seker een van die wysste stappe van die VMEO om die stigting van takke te magtig. Dit kom my egter voor of daar regverdiging is vir 'n vyfde tak wat die ondernemings in die Sentraal- en Suid-Vrystaat, die Sentraal- en Noord-Wes-Kaapland en Suid-Wes-Transvaal insluit.

Kongresse van ander liggame

Dit is goed dat die VMEO hom meer en meer na buite laat geld, ook op internasionale vlak. (Ek het self ondervind dat elektrotegniese ingenieurs meer as politici vermag!)

Dit is verblydend dat ander organisasies met munisipale inslag ook begin agterkom dat die VMEO bestaan. (Ons is immers een van die oudste verenigings met munisipale verbintenis — amper 62 jaar oud!) Dit strek egter nie die ander provinsies tot eer, en ek hoop die raadslede hier teenwoordig sal dit in die oor knoop, dat slegs die Transvaalse Munisipale Vereniging die VMEO na sy kongresse uitnooi; die ander se deure is vir ons toe. Ons is die TMV innig dankbaar daarvoor, ook dat hulle vandag hier 'n amptelike verteenwoordiger het in die persoon van Raadslid Kobie van Zyl van Rustenburg.

Publikasies

Ons moet die Sekretaris gelukwens met die publikasie van die Verrigtinge van die 44e Konvensie en die 6e Tegniese Vergadering. Die tegniese versorging daarvan is puik. Baie dankie en geluk ook dat ons dit so spoedig kon ontvang, iets waaraan ons voorheen nie gewoond was nie. Daar moet egter net gewaak word dat oorywerigheid in dié verband nie ten koste van deeglike redigering is nie.

Wat redigering betref, lê die Dagbestuur sekere aanbevelings aan die UR voor wat, indien dit geïmplimenteer kan word, die meeste probleme in dié verband uit die weg behoort te ruim.

Finansies

Wat geldsake betref, is die VMEO so kerngesond as wat kan kom. Fyner besonderhede verskyn in die verslag van die ouditeure en dié m.b.t. inkomste en uitgawe. Ek vereenselwig my met mnr. W. Barnard se skriftelike kommentaar op hierdie verslae.

Die huidige ledegelde van die VMEO is so lank terug as 1971 vasgestel en is sedertdien nie verhoog nie en ek sien geen rede dat dit in die afsienbare toekoms verhoog sal moet word nie. Voorwaar 'n prestasie in ons tyd! en Evkom kan maar seker daarvan kennis neem.

Dit is interessant om daarop te let dat die wins op publikasies vir die paar 1976 die ongelooflike bedrag van nagenoeg R5 100 beloop het, wat reiskoste, insluitende die koste van twee afgevaardigdes na internasionale kongresse, tw. R2 624 meer as gedek het. Ons is ons Sekretaris en geaffilieerdes ons opregte dank verskuldig.

Afsluiting

Ek wil net noem dat ons Sekretaris onlangs onbestrede herkies is as stadsraadslid van die stad Roodepoort, en die eer het hom te beurt geval om as Onderburgemeester verkies te word. Baie geluk, Bennie. Ons hoop net dat as jy volgende jaar Burgemeester word, dié amp tweede viool sal speel.

Mnr. die President, ek stel voor dat die Sekretariële Verslag vir 1975 en 1976, met dank en waardering aan die Sekretaris, ontvang en aanvaar word.

MR. K. J. MURPHY, Somerset West:

I would like to point out a very small error on the front page of Mr. van der Walt's report, viz. that the Good Hope Branch meets twice annually. The Good Hope Branch actually meets four times a year, i.e. quarterly. Would you make that correction please?

En vir die res daarvan, meneer, wil ek my graag vereenselwig met mnr. Eugene Pretorius se aanmerkings met betrekking tot mnr. van der Walt se werk. Baie dankie.

BENNIE VAN DER WALT, Secretary/Sekretaris:

Mr. President, my I extend to you my personal congratulations on your election to the high office of President of the AMEU. I had the privilege of working very closely with you since I assumed the secretaryship of this Association in 1973 and I can honestly say that you have rendered an outstanding service to the AMEU during that period and no doubt will continue to do so during your tenure of office as President. May God bless you and your wife in the task that lies ahead.

Mnr. die President, vergun my om die uittredende President, mnr. Eugene Pretorius van harte te bedank vir sy onderskraging te alle tye in die uitvoering van my pligte. Ek het baie geheg geraak aan mnr. Pretorius, want 'n wonderlike samewerking en verstandhouding het tussen ons twee bestaan. Mnr. Pretorius was 'n baie bekwame President van die VMEO en ek wens hom nog baie gelukkige jare toe by die VMEO. Baie dankie, Eugene ook vir jou gelukwensinge met my verkiesing as Raadslid en Onderburgemeester van Roodepoort.

Ek neem ook die geleentheid waar om mnr. Piet Botes, 'n Roodepoorter van harte te felisiteer met sy verkiesing tot Aangewese President. As 'n Raadslid van Roodepoort kan ek getuig dat mnr. Botes 'n pligsgetroue en hardwerkende persoon is en 'n goeie hoof van sy Departement. Ek glo mnr. die President, dat hy u nie teleur sal stel nie.

Voorts wil ek ook graag my dank betuig teenoor die uittredende Uitvoerende Raad wat soos 'n span saamgewerk het. Vanweë dié feit kon hulle baie vermag het in belang van die lede van die VMEO. Die talle verslae wat aan u voorgelê word is die duidelikste bewys van die bereidwillige samewerking wat lede van die Uitvoerende Raad op onbaatsugtige wyse gelewer het gedurende die afgelope twee jaar.

Mr. President, as you have said in your Presidential Address, it is the policy of the Executive Council that the AMEU must as far as is possible be represented at the various national conferences in South Africa and even at certain relevant international meetings. This is one way of building a sound image of the AMEU. I regret to state that whilst the Transvaal Municipal Association regularly invites the AMEU to send delegates to attend its Congresses, and I may say the TMA is represented here at this Convention, the other three Provincial Associations, viz. Natal, Cape and OFS still cannot see their way open to extend similar invitations to the AMEU although we invite these Associations to our Conventions. It is worthwhile to mention that a growing co-operation exists amongst the other municipal institutes.

I would like to emphasise again that the AMEU is working in close collaboration with the SABS and those members serving in one of the many SABS committees, deserve a word of appreciation for their continued assistance and contributions made towards the aims of the SABS and may I also thank the directorate and staff of the SABS for a most amiable understanding.

There are many other organisations also on which our members serve and I want to predict that this will be expanded as the image of the AMEU grows in importance.

Mnr. die President, die Uitvoerende Raad gaan op versoek van die Direkteur van Plaaslike Bestuur, die tydsduur van die Konvensie is hersiening neem, veral vanweë die huidige ekonomiese klimaat. Soos ek die VMEO leer ken het, bestaan sy lede uit studerende mense en is hulle 'n verantwoordelike klomp manne wat uit hul byeenkomste alles haal. As ons in gedagte hou dat die basiese koste van sulke byeenkomste in elk geval aangegaan moet word en terwyl talle belanghebbendes van oor die hele Suider-Afrika na die byeenkomste kom, sal die Uitvoerende Raad die aangeleentheid met die grootste versigtigheid moet oorweeg.

Sir, it is interesting to know that in staging this Convention, I estimate that my office has spent a minimum of 2 000 man hours up to date in organising this Convention. Then there is your own time and that of your staff who was heavily involved in the arrangements, planning and conduct of this Convention which may easily double the number of hours. I took out a survey that shows that eight Municipal Institutes held meetings over a 5-day period; two over a 4-day period; one over a 3-day period; three over a 3-day period; three over a 2-day period and one over a 1-day period. This excludes the Congresses of the Provincial Municipal Associations, some of whom held Congresses of a period of five days. It therefore seems to me that a Convention held every two years over four days is justified.

Furthermore, the main justifications for holding these conventions may be summarised as follows:-

1. For its educational value;
2. For its informal discussions between sessions;
3. It ensures the continued health and growth of the organisation;
4. It encourages its members to active participation;
5. It enhances the public standing of the organisation.

Branches:

In regard to the four Branches, I wish to comment that it serves a very good purpose as a study forum; exchange of knowledge, resolving problems and referring matters of national interest to the Executive Council of the AMEU. The Branches are really playing a big part in the activities of the AMEU.

Publications and Sponsorships:

Once again it is my pleasure to express our sincere appreciation to our Affiliates who so readily provided the advertisements for the two publications, viz. the 44th Convention Proceedings 1975 and the 6th Technical Meeting Proceedings 1976. It is due to this financial support that we were able to print such prestige publications and with printing costs escalating all the time, I trust that the AMEU will always be given the financial support by our Affiliates.

(1) Limited number 1975 copies available.
Names/addresses Information Desk.
(2) Advertising space available.

I also place on record our thanks for the various sponsorships organised by our Affiliates. This makes for a better understanding and co-operation amongst our members.

Finansies:

Die administrasie van die geldsake van die VMEO is deel van my pligte. Ek strewe daarna om 'n sterk fonds op te bou vir die VMEO, sodat dit nie weer nodig sal wees om ledegelde te verhoog nie. Trouens terwyl alles opgegaan het in die prysstruktuur gedurende die afgelope jare, het die heffings van die VMEO konstant gebly en hoop ek dat dit so kan bly vir baie jare om te kom. Dit is 'n feit dat mense nie geassosieerd wil wees met 'n finansieël swak organisasie van watter aard ook al, daarom is dit 'n doelwit wat ek te alle tye sal uitbou mnr. die President en afgevaardigdes. Dit is nou vir my aangenaam om my sekretariëleverslag en die geouditeerde finansiële state vir die jaar geëindig 31 Desember 1976 aan u voor te lê vir u goedkeuring.

MR. W. BARNARD, Johannesburg:

Mr. President, as you said, time is short and the report is short and it seems to me the previous speakers have encroached very much on my field, so you will excuse me if I am very brief. I feel I cannot add very much to the report which has been laid on the table and which, unlike the Presidential Address, I think gives rather an optimistic and a very promising vision of the future for the Associaiton. I would like also to add to what the previous speakers have said about the Secretary. I think it is important, if you want to establish yourself on a sound financial basis, to be prepared to spend money and I think that recently in spending money on a prestige publication, we have cast our bread on the waters and it has come back ten fold. I think we have a first class publication; we enjoy tremendous support from our Affiliates and, as I have already said in my report, I doubt that they can find a better medium for their advertising.

Mnr. die President, ek het ook melding gemaak in my verslag dat ons fondse het wat ons moet belê. Ons het nou besluit dat ons van die fondse in Munisipale en Evkomeffekte en -obligasies gaan belê. Ek voel baie gelukkig oor die finansiële posisie waarin die VMEO verkeer. Dankie.

RAADSLID G. D. BORNMAN, Johannesburg:

Mr. President, I am afraid I was not briefed on this one, but it seems to me, having looked at the results of your Organisation, that they are much better than those of certain other organisations we know of and I would like to second the adoption of the Financial Report placed before you. Thank you.

RAADSLID S. D. JOUBERT, Springs:

Mnr. die President ek wil net vooraf u gelukwens met u Sekretariaat; aan die persone wat weer gekies is en u hartlik bedank vir die pragtige samewerking en die reelings wat getref is om ons van daar ver af so tuis te laat voel. Baie dankie. Dit is vir my 'n baie besondere eer om die kans gegun te word om 'n paar woorde aan u te te rig.

It is with some misgiving that I undertake the task of addressing such an illustrious gathering. You must remember that we on the Highveld are used to having our municipal taxes met by the taxpayer presenting some bags of mealies or pumpkins, etc., in payment.

This reminds me of the very overweight American Negress who, when asked her surname by the Judge, replied "Mrs. Electricity". When the Judge questioned her about her queer surname, she replied "Well sir, my name is Dinah and my husband's name is Mo, so if that does not make electricity, then I don't know".

This fat "Mrs. Electricity" reminds me of the malady that most South African women suffer from: If they had less span they would be more spick.

Ek het die voorreg gehad om u finansiële verslag te lees. Dit weerspiël 'n baie gesonde toestand van sake en ek wil u daarmee felisiteer.

Wat my veral opgeval het, was dat u in staat was om die uitgawes so laag te kon hou dat die inkomste uit ledegelde eersgenoemde kon dek.

Die inkomste wat verkry word uit advertensiegelde, kongresbywoning se bydraes, rente uit belegging en inkomste uit die verkoop van publikasies, dra alles by tot 'n pragtige surplus. Inderdaad 'n navolgenswaardige voorbeeld van gesonde besigheidsbeginsels en samewerking wat uniek is.

In this day and age, with the cost of all commodities skyrocketing daily, and with the substantial surplus in mind, a justifiable case could easily be made out in support of a reduction of members' subscriptions. I contend though that this would be a shortsighted view, and not in the best interests of the Association.

Dit moet in gedagte gehou word dat hierdie Vereniging die kulminasie van al die munisipale elektrisiteitsondernemings in Suid-Afrika is, en waar hy in die brandpunt staan van alle kennis en tegnologiese vordering op die gebied van kragopwekking en retikulasie, moet hy inderdaad finansiëel in staat gestel word om hierdie versamelde kennis te versprei tot al die uithoeke van ons land en selfs oorsee. „Meer fondse gee meer amperes".

Kyk ons na die sekretariële dienste, met mnr. Bennie van der Walt aan die spits, sien ons dat inkomste verkry uit beleggings deur die Vereniging gemaak, bykans die koste dek en dit getuig van die ywer en ondernemingsgees van die kant van mnr. van der Walt. Saam met die uitstekende werk van die komitee vir geldsake, onder voorsitterskap van mnre. Wessel Barnard en Jules von Ahlften, wil ek hiermee mnr. van der Walt van harte gelukwens met die mooi resultate wat bereik is.

Verhoging in kragverbruik is altyd 'n aanduiding van 'n dorp se vooruitgang, en dit is waarom my vriend Jules gedurig soos 'n hoender sy eiertjie lê. Dit laat my dink aan die kêrel wat sy broer na 'n psigiater toe gebring het, en aan hom verduidelik dat sy broer vir vier maande lank glo hy is 'n hoender wat eiers lê. Verbaas vra die psigiater waarom hy dan nou eers na hom toe kom. Wel mnr., sê die broer, u sien, ons is maar baie arm en die eiers het handig te pas gekom.

Nogmaals baie dankie, mnr. die President.

VERSLAG VAN DIE KOMITEE VIR GELDSAKE OOR DIE FINANSIELE RESULTATE VIR DIE JARE WAT OP 31 DESEMBER 1975 EN 31 DESEMBER 1976 GEËNDIG HET

'n Ondersoek van die balansstate vir hierdie twee jaar kan net groot tevredenheid met die finansiële posisie waarin die Vereniging hom bevind, verskaf.

Nog onlangs, op 1 Maart 1973, was daar 'n tekort van R566 en sedertdien het die Vereniging van krag tot krag gegaan. 'n Opvallende kenmerk van die balansstate is die aansienlike verhoging in die inkomste uit advertensies. Dit het in so 'n mate toegeneem dat die koste verbonde aan die druk van die Handelinge nou deur dié inkomste gedek word.

Dit is 'n merkwaardige prestasie en dit kan net aan die uitstekende finansiële bestuur van die Sekretariaat toegeskryf word.

Ons wil ook graag ons opregte waardering jeens die Geaffilieerdes uitspreek vir hulle aansienlike en volgehoue steun in die verband. Ek is seker dat ons geaffilieerde organisasies nie maklik 'n winsgewender reklamemedium as ons puik publikasie sal vind nie.

Sommige lede sal dalk meen dat die ledegeld vanweë die vereniging se sterk finansiële posisie verminder kan word. Ons meen dat dit 'n kortsigtige houding sal wees en die posisie moet inteendeel eerder verstewig word sodat die Vereniging se werksaamhede uitgebrei kan word ten einde deur middel van groter deelname aan beide nasionale en internasionale aktiwiteite ruimer doelstellings te bereik, wat vir die Suid-Afrikaanse elektrisiteitsondernemings van belang is. Dit kan net maar tot die voordeel van die land as geheel strek en die uiters belangrike rol van die munisipale elektrotegniese ingenieur met betrekking tot die lewering van 'n noodsaaklike diens bestendig.

Ons meen dat as die VMEO 'n belangrike rol in dié verband gaan speel, hy deur 'n gesonde finansiële posisie gerugsteun moet word.

Ten besluite moet daar oorweeg word hoe die Vereniging se geld ten beste belê kan word. Die Komitee vir Geldsake skenk verdere aandag hieraan en sal mettertyd verder hieroor verslag doen.

REPORT OF THE FINANCE COMMITTEE ON THE FINANCIAL RESULTS FOR THE YEARS ENDING 31 DECEMBER, 1975, AND 31 DECEMBER, 1976

An examination of the Balance Sheets for these two years can only result in great satisfaction at the financial position in which the Association finds itself.

It was only a short while back, on 1 March, 1973, that there was a deficit of R566 and from that point onwards the Association has gone from strength to strength.

A significant feature of the Balance Sheets is the considerable increase in advertising revenue to the extent that the cost of printing the Proceedings is now being covered by this income.

This is a very remarkable achievement and can only be attributed to the excellent financial management of the Secretaries.

We would also like to express our sincere appreciation to the Affiliates for their substantial and continuing support in this regard. I am sure, with the very fine publication now being produced, our Affiliates wil not easily find a more profitable advertising medium.

Some members might feel that because of the Association's strong financial position, the subscriptions could be reduced. This, we consider would be a short-sighted attitude and on the contrary the position should rather be consolidated so that the Association's activities can be broadened to achieve wider objectives by greater participation in both national and international activities of concern to the South African electricity supply industry. This can only be of considerable benefit to the country as a whole and establish the vital role of the Municipal Electrical Engineer in providing an essential service.

We consider that if the AMEU is to play an important role in this regard it should be placed in a position to operate from a sound financial base.

Finally, consideration should be given to the best investment of the Association's funds. The Finance Committee is giving further attention to this and will report further in due course.

W. BARNARD,
Saamroeper — Komitee vir Geldsake/Convenor — Finance Committee.

PUBLISITEITSVERSLAG

„Munisipale Administrasie en Ingenieurswese" onder hoofredaksie van mnr. Robert Calburn, B.S.(Oxon), is sedert Januarie 1974 die amptelike lyfblad van die Vereniging van Munisipale Elektrisiteitsondernemings van Suid-Afrika.

In hierdie verslag oor die onderhawige tydperk sedert die 44ste Konvensie, moet in die besonder melding gemaak word van die redakteur se indrukwekkende dekking van die Konvensie-verrigtinge en -funksies wat in die uitgawe van Junie 1975 verskyn het. Die inhoud en ruime vertoon van foto's het die Vereniging ongetwyfeld tot eer gestrek in 'n publikasie wat erken word as die gesaghebbende kommunikasiemiddel vir munisipale sake.

Daarbenewens is die volgende artikels in verband met die Vereniging se bedrywighede ook gepubliseer:-

Referaat oor "Cable Fault Location", deur mnr. Martin Baur (Augustus 1975).

Referaat oor "A Modern Approach to the Reticulation of Residential Townships", deur mnr. V. A. Raynal (September 1975).

Artikel oor "Sportsfield Lighting, deur mnr. F. Strutt (Oktober 1975).

Referaat oor "Vacuum Circuit Breaker Switchgear", deur mnr. G. Auton (Augustus 1976).

Referaat oor "The Practical Application of C.I.E. 12/2", deur mnr. P. Hartill (September 1976).

Beknopte „Nuusbrokkies oor Persone" ten opsigte van uitdienstredings en aanstellings van ingenieurs het ook van tyd tot tyd verskyn, sowel as verslae oor ontwikkelings op die gebied van ingenieurswese in verskeie munisipale elektrisiteitsondernemings. Hierdie berigte van aktuele belang het lede op hoogte van sake en in voeling met mense en projekte gehou.

Daar moet egter weer eens 'n beroep gedoen word op diegene wat betrokke is by sodanige belangwekkende ontwikkelings en gebeurlikhede, om stof vir publikasie in te dien.

Alle artikels en bydraes het opvallend in die tydskrif verskyn onder die Vereniging se naam en wapen en waardering word uitgespreek teenoor diegene wat stof en foto's vir publikasie ingedien het.

PUBLICITY REPORT

Since January, 1974, "Municipal Administration and Engineering", under the General Editorship of Mr. Robert Calburn, B.A.(Oxon), has been the official journal of the Association of Municipal Electricity Undertakings of South Africa.

In this report for the period under review since the 44th Convention, special mention must be made of the Editor's impressive coverage of the Convention Proceedings and functions published in the June, 1975, issue. The text and lavish display of photographs undoubtedly brought special honour to the Association in a publication which has come to be recognised as the authoritative communication medium for Municipal Affairs.

In addition the following articles related to activities of the Association were published:-

Paper on "Cable Fault Location", by Mr. Martin Baur (August, 1975).

Paper on "A Modern Approach to the Reticulation of Residential Townships", by Mr. V. A. Raynal (September, 1975).

Article on "Sportsfield Lighting", by Mr. F. Strutt (October, 1975).

Paper on "Vacuum Circuit Breaker Switchgear", by Mr. G. Auton (August, 1976).

Paper on "The Practical Application of CIE 12/2", by Mr. P. Harthill (September, 1976).

Brief "Personality News Items" of retirements and appointments of engineers appeared from time to time as well as reports of engineering developments in various Municipal electricity undertakings. These items of topical interest served to keep members informed and in touch with people and projects.

However, the appeal must be made again to those involved in such newsworthy developments and events, for wider support in submitting material for publication.

All articles and contributions have been published prominently in the journal under the Association's name and Coat of Arms and appreciation is expressed to those persons who contributed copy and photographs for publication.

Raychem Termination systems

Raychem first introduced heat-shrinkable tubing and moulded parts in the late 1950's. Millions of termination systems have been used in applications up to 1 kV throughout the world for more than ten years. Concurrently, extensive research and field trials were conducted to develop new heat-shrinkable materials capable of operating at voltages up to 36 kV. These materials which are resistant to low temperatures, ultra violet radiation, and extreme atmospheric pollution, have for many years proved their performance throughout the world at these high voltages. Out of these new materials developed a unique termination system consisting of a heat-shrinkable non-tracking weather resistant outer protection with a specially formulated electrical stress control tubing, conclusively proved to terminate all types of plastic and paper insulated cables. The terminations have shown excellent performance and are designed to meet, or even exceed, the life of the cable itself. These systems are now specified by many electrical utilities throughout the world. They are acknowledged to be simple, highly reliable and much cheaper to install than traditional termination systems. Standard kits are available to provide a minimum of terminations to meet maximum variation in cable diameters and insulation thickness. This means substantially reduced inventories. Shrinking is fast and requires no special tools or skills. Normally a standard electrician's torch is used but a large range of electrically powered shrinking devices are available.

Raychem (Pty) Ltd.

Head Office:
42 Industry Road
P.O.Box 134
Olifantsfontein 1665
Tel: 012-611628/29/30
Twx: 3-0593 SA

Durban Office:
407 Picadilly House
Aliwal Street
P.O.Box 54
Durban 4001
Glenashley 4022
Tel: 031-323679

Die Konvensie in Durban in 1975 het 'n redelike mate van radio-dekking geniet en die geleentheid het veral op die voorgrond getree as gevolg van die onderhoud met die President, mnr. E. de C. Pretorius, wat gedurende die Konvensieweek deur die Suid-Afrikaanse Uitsaaikorporasie uitgesaai is.

Die Hoofredakteur, mnr. Robert Calburn, word gelukgewens met sy uitstekende bydrae tot die werk en invloed van die Vereniging. Sy redaksionele huldeblyk aan die Vereniging het ongetwyfeld en in die besonder daartoe gelei dat die Vereniging in 'n groter mate erkening geniet as 'n invloedryke en allerbelangrike sektor van Plaaslike Bestuur in Suid-Afrika.

The Convention in Durban in 1975 was given a fair measure of radio coverage and the occasion was especially marked by the recorded interview with the President, Mr. E. de C. Pretorius, transmitted by the South African Broadcasting Corporation during Convention week.

General Editor, Mr. Robert Calburn, is commended for his outstanding contribution to the work and influence of the Association. In particular his editorial tribute to the Association undoubtedly served to enhance its image as an influential and vitally important sector of Local Government in South Africa.

K. G. ROBSON,
Publisiteitsbeampte/Publicity Officer.

VERSLAG VAN DIE AANBEVELINGSKOMITTEE VIR NUWE ELEKTRIESE TOEBEHORE 1975-1976

Die Komitee bestaan uit die volgende persone:-

Mnre/Messrs.	P. J. BOTES	—	Sameroeper (VMEO)/Convenor (AMEU)
	J. A. LOUBSER	—	VMEO/AMEU
	D. P. VILJOEN	—	Johannesburg Elektrisiteitsdepartement Johannesburg Electricity Department
	L. B. CUMMING	—	S.A.I.E.I./S.A.I.E.E.
	G. H. KOHLER	—	EVKOM/ESCOM
	E. J. CHAPPLE	—	EVKOM/ESCOM
	F. J. PRINS	—	SABS
	B. C. LAWRENCE	—	SABS
	J. V. GRANT	—	SABS
	A. F. W. EGGERS	—	HPK/GPO
	R. A. LEIGH	—	Johannesburg Elektrisiteitsdepartement Johannesburg Electricity Department
	J. T. WILLIAMS	—	S.A.I.E.I./S.A.I.E.E.
	J. A. MORRISON	—	E.I.A.N./E.E.A.I.A.
	D. J. J. CONRADIE	—	SAVRI/SAACE
	D. F. KNEALE	—	EKV(SA)/ECA(SA)

Die VMEO behartig die administrasie van die komitee en dit behels heelwat korrespondensie. Die SABS lewer 'n hoogsgewaardeerde bydrae deur die toetsing van die toebehore en dra by tot die besluite wat geneem word. So ook verskaf Johannesburg Elektrisiteitsdepartement die byeenkomplek en huisves alle toebehore wat voorgelê word vir oorweging. Namens die komitee doen die verteenwoordigers van Johannesburg sekere inspeksies op verbeterde toerusting in oorlegpleging met die vervaardigers.

Mnr. H. P. Alexander (EVKOM) Natal, het versoek dat die een of ander leiding gegee moet word wat betref enige spesiale faktore wat in aggeneem moet word wanneer goedkeuring verleen word. Dit word normaalweg gedoen en wanneer geen melding gemaak word in die brief van goedkeuring nie word geen spesiale voorsorgmaatreëls nodig geag nie. Die klousule wat betrekking het op die verkryging van die Ingenieur se toestemming kan egter nie van afgesien word nie.

REPORT OF THE RECOMMENDATIONS COMMITEE FOR NEW ELECTRICAL COMMODITIES 1975-1976

The Committee consists of the following persons:-

The AMEU handles the administration of the committee which is involved in a substantial amount of correspondence. The SABS renders a highly valued contribution in the testing of the commodities and also contributes to the resolutions taken. Johannesburg Electricity Department provides the meeting place and accommodates all commodities submitted for consideration. On behalf of the Committee the members of Johannesburg carry out certain inspections on improved equipment and consult with the manufacturers.

Mr. H. P. Alexander (ESCOM) Natal, requested that some guidance should be given concerning any special factors to be taken into account in giving approval. This is normally done, and when no mention is made in the letter of approval no special precautions are considered necessary. The clause regarding obtaining permission of the Engineer, however, cannot be waived.

MNR. PIET BOTES

Datum/Date	Aantal items goedgekeur Number of items approved	Aantal items terugverwys Number of items deferred	Aantal items nie goedgekeur Number of items not approved
1975 - 06 - 05	6	1	1
1975 - 07 - 30	9	1	2
1975 - 10 - 30	9	2	0
1976 - 02 - 12	10	—	2
1976 - 06 - 10	6	1	0
1976 - 09 - 08	1	1	2
1976 - 11 - 04	2	2	0
TOTAAL/TOTAL	43	8	7

Van die sewe (7) items wat nie goedgekeur is nie was vyf (5) van 'n soort kabellas waar die gevoel was dat dit buite die bevoegheid van die Komitee val.

'n Aansoek vir 'n ligspoor was afgewys weens die feit dat dit nie gepolariseerd was nie. Die Komitee het 'n staande besluit geneem dat in die toekoms slegs ligspore wat gepolariseerd is aanbeveel sal word vir gebruik.

'n Volledige lys van die aanbevelings sal elke twee jaar beskikbaar gestel word. Wanneer lede goedkeuring van nuwe toebehore oorweeg moet hulle aandring op 'n kopie van die VMEO-goedkeuringsbrief waarin alle spesiale vereistes gemeld sal word.

Ek wil graag van hierdie geleentheid gebruik maak om almal wat op die Komitee dien te bedank vir hulle samewerking en veral aan die Elektrisiteitsdepartement van Johannesburg vir die verskaffing van die vergaderplek asook die versnaperings wat voorgesit word.

Of the seven (7) items not approved five (5) were for a type of cable joint which fell outside the jurisdiction of the Committee.

An application for a light track was turned down because it was not polarised. The Committee took a standing resolution to the effect that in future only polarised light tracks will be recommended for use.

A comprehensive list of the recommendations will be made available every two years. When members consider the use of newly approved commodities, they must insist on a copy of the AMEU-approval letter in which all special conditions will be mentioned.

I wish to take this opportunity of thanking all Committee members for their co-operation and especially the Johannesburg Electricity Department for the provision of the meeting place and for the refreshments provided.

P. J. BOTES
Sameroeper/Convenor

Afgevaardigdes geniet verversings.

MR. K. G. ROBSON, President:

We have apologies for non-attendance from the Editor of Municipal Administration and Engineering, Mr. Robert Calburn, but it is my pleasure to welcome in his place Mr. John Arundel, who is the Engineering Editor of that journal. I have nothing further to add to my report, but I would ask Mr. John Arundel to come forward and contribute to the discussion on the Publicity Report.

MR. JOHN ARUNDEL, MA&E:

Mr. President, it certainly is a pleasure to be here today and an honour to speak on the Publicity Report. Mr. Robert Calburn, the General Editor of the Magazine, asked me to apologise for his absence and to read to you his comments on the Publicity Report. These are as follows:-

Although MA&E has been your official journal since January, 1974, my endeavours to bring about that happy situation go back much farther than that. Indeed it must be at least 15 years ago that I attended a meeting of your Executive Council held in the Electricity Department of Johannesburg — in the days of Mr. Kane — for a discussion on the question of the Association's adopting **Municipal Affairs** (as the magazine was then known) as its official organ. MA&E is the country's only local government magazine of a general nature, covering every aspect of local government activity, including engineering. That means that it is read by councillors and senior executive officials, administrative and engineering, throughout local government, which in turn means that the extensive coverage it gives to AMEU matters reaches all those people, and an even wider circle of readership, academic and otherwise; which I take it is what the Association really wants. It is only to give you that assurance that I have ventured to mention the magazine here, and I would like you all to be assured that, in co-operation with your Publicity Officer and with your indefatigable Secretary, Mr. Bennie van der Walt, MA&E will continue to do everything it can — and with very great pleasure, too — to give the AMEU the fullest and most effective publicity possible.

As a local government commentator, I am most impressed by the AMEU as a benefit to local government. I am convinced that that benefit is in large measure due to its affiliate membership — the electrical industry of the Republic. The AMEU has acted wisely in bringing in the electrical industry and giving it affiliate membership of the Association. In its membership of the AMEU, and through its lively participation in the Association's conventions, the electrical industry has a platform from which to address local government directly on any difficulties which it wishes to air, or matters which it thinks worthy of special attention. The AMEU is so far unique — though the grapevine has it that it will, happily, not remain so — in its affiliate membership derived from electrical trade and industry. It has set a very important example by instituting that arrangement.

With my good wishes for the Association's future, Mr. President, I venture to couple the hope that MA&E may be privileged for a long time to render it such small assistance as within it lies. Thank you.

MR. K. G. ROBSON, President:

Thank you, Mr. Arundel. Please convey to Mr. Calburn our thanks for his continued interest in the affairs of the AMEU and for the publicity he is giving it through the pages of Municipal Administration and Engineering.

MR. J. K. VON AHLFTEN, Springs:

Mr. President, it has crossed my mind that a quarterly newsletter would be an effective method of advertising our Association's affairs. I see that Mr. van der Walt does issue quarterly newsletters on the activities of the Recommendations Committee, but I wonder if we couldn't publish this on a quarterly basis in the Journal, covering the activities of IEC, SABS, the Recommendations Committee and other information. At the moment occasionally one sees an AMEU news item in the Journal, but this is not often.

MR. K. G. ROBSON, President:

Thank you for your proposal, Mr. von Ahlften. The problem is to give effect to it. One of the great disappointments when you handle publicity matters — and I speak from several years of experience as Publicity Officer — is that everyone is far too modest and it is extremely difficult to get anything out of anybody particularly, for some strange reason, a photograph. I think it will depend on the man who is responsible for publicity to endeavour to gather this kind of information and pass it to the Editor of the Journal who, I am sure, will publish it on a quarterly basis appearing under the Coat of Arms of the Association. But one comes up against this almost insurmountable difficulty of getting people, not only to write about themselves, but also to write about some of the things that are being done in their Undertakings. May I make another appeal to the members of the AMEU — ALL the members — to give this matter their support. There is always something of interest to the other man who is going to read the Journal and I think, Mr. von Ahlften, that we should take up your suggestion — it is one worthy of keeping in mind and, if I may say this to the Secretaries of the various Branches, it really isn't sufficient just to refer the Publicity Officer, or for that matter the Editor of the Journal, to the minutes of your meetings, because these people have not the time to read these minutes in the hope of finding what you consider to be of interest and would like to have published. If you want something to be published in the Journal, then give the information clearly and concisely to the Publicity Officer or the Editor of the Journal.

MNR. P. J. BOTES, Roodepoort:

Eerstens wil ek die SABS en daardie Voorstadjie van Roodepoort — Johannesburg bedank vir die bydraes wat hulle lewer om van hierdie komitee die sukses te maak wat dit is. Ek wil eger ook onder u aandag bring dat die organisasie verbonde aan die werksaamhede van hierdie komitee baie tyd van die Sekretaris is beslag neem. Graag wil ek 'n regstelling maak ten opsigte van item 2 op Bulletin nr. 129 van Februarie 1977. Dit gaan oor „Nie-gepolariseerde stelsels" want ek vind die bewoording skep verwarring. Die bewoording behoort te lees „Nie-gepolariseerde verligtingstelsels" in Engels "Non-polarised lighttracks". Dit hou geen verband met gepolariseerde en nie-gepolariseerde aardbeveiligingstoestelle nie.

The following request was received from Escom's Cape Western Undertaking:-

"In view of the number of fatal household accidents that occur in South Africa every year as a result of incorrect or poor connections in 15 amp plugs, could not regulations be formulated which would compel the suppliers of such goods to fit plugs correctly before sale".

I personally am not sure whether this is practical. An indication in due course on how members feel on this subject will be appreciated.

During the year, Mr. Kohler, who has served on this Committee as Escom's representative for a number of years, has now retired and I wish to express my sincere appreciation of the services rendered to the Committee by Mr. Kohler.

Thank you, Mr. President.

MR. J. A. LOUBSER, Benoni:

If the statistics of the past 2 years are compared with those of earlier years, it will be observed that far less items were finally disapproved than was the case in the past. The reason for this is that the Committee has referred a considerable number of products back to the suppliers/manufacturers with proposals for amendments to make them acceptable. This is certainly a step in the right direction, which should be welcomed by all.

Unfortunately, as a result of this policy of the Committee, considerably more correspondence has to be handled. In addition, the facts that meetings take up to 1½ hours each and that 15 highly qualified people are involved, lead one to wonder whether the time is not ripe for a fee to be charged for this service. An advantage which would result from this is that commodities would not lightly be submitted to the Committee for approval.

As a further thought, the allocation of a mark of some sort or another as an indication that the equipment concerned has been found suitable for use by the Committee, could also be considered.

During the 44th Convention, it was reported that the Committee had recommended that the Standard Wiring Regulations be amended in such a manner as to provide for a new wiring system which should have a great influence on the cost of the installation. Applications for these systems are still being received and, although finality has not as yet been reached in this connection, members can nevertheless be assured that each case will be treated on its merits.

The Committee will inform you of any such approval in due course.

I wish to associate myself with the words of thanks expressed by the Convenor, and also to express thanks to our Secretary for the competent manner in which he handles the administration of the Committee.

VERSLAG VAN DIE EVKOM-SUBKOMITEE VIR 1975 EN 1976

1. **Spesiale Tarief vir Munisipaliteite**

Die Komitee het die afgelope twee jaar baie tyd aan vergaderings met Evkom en aan korrespondensie met die Verenigde Munisipale Bestuur bestee in 'n poging om 'n spesiale elektrisiteitstarief vir plaaslike owerhede te verkry.

Dié toedrag van sake duur nog voort maar dit blyk 'n verlore saak te wees aangesien Evkom in die eerste plek nie bereid is om 'n spesiale tarief te oorweeg nie en tweedens het die Sekretaris van Nywerhede daarop gewys dat meeste munisipaliteite skynbaar tot bevredigende tariefooreenkomste met hulle verbruikers geraak het.

Daar is egter nog 'n poging deur die Verenigde Munisipale Bestuur aangewend op grond van die feit dat munisipaliteite organisasies sonder winsbejag is wat 'n noodsaaklike diens aan baie verbruikers lewer wat nie dié geld kan verhaal nie en blykbaar is daar regverdiging daarvoor om verbruikers ten koste van die handel en nywerheid te subsidieer.

2. **Bekendmaking van Evkom-verhogings**

Lede het versoek dat Evkom jaarliks die voorgestelde verhogings in September moet aankondig of minstens ses maande kennis van tariefverhogings moet gee sodat daar in die plaaslike bestuur se jaarlikse begroting daarvoor voorsiening gemaak kan word. As gevolg van die verhogings wat deesdae so kort op mekaar volg, steenkoolpryse wat elke kwartaal aangepas word, en 'n toeslag twee maal per jaar is dit nie moontlik nie. Evkom het egter beloof om so lank as moontlik voor die tyd kennis te gee maar dit blyk dat dit 'n bevredigende oplossing is dat al die plaaslike besture outomatiese prysaanpassingsklousules moet hê waarvolgens enige styging in Evkom-tariewe verhaal sal kan word sonder om the Raad of the Provinsiale owerheid se magtiging vir die styging te verkry.

3. **Aankoop van 'n Plaaslike Evkom-netwerk**

Hierdie aangeleentheid is bevredigend afgehandel aangesien uitstaande skuld aan Evkom afbetaal is. Evkom is in sommige gevalle bereid om dit te oorweeg dat die plaaslike bestuur die uitstaande lening oorneem.

4. **Toevoeronderbrekings — Middelburg, Tvl.**

Die munisipaliteit van Middelburg het die VMEO genader met die oog daarop om hulle steun te verkry om korting te vra ten opsigte van heffings vir oormaataanvraag wat te wyte is aan heraansluiting van Evkom se toevoer nadat dit onderbreek is.

Evkom is die saak goedgesind maar hy wys op tegniese probleme veral waar daar nie aanvraagdrukkers vir aanvraagmeting gebruik word nie.

Gevolglik is daar ooreengekom om by alle lede per omsendbrief vas te stel wat die omvang van die probleem is. Die uitslag van 'n vraelys wat uitgestuur is, dui daarop dat Middelburg feitlik die enigste plek is waar dié probleem opgeduik het en 'n oplossing kan wees om in sulke gevalle met Evkom in aanraking te kom ten einde magtiging te verkry om die vasgestelde gewone maksimum aanvraag te oorskry voordat dit gedoen word.

5. **Spanningsvalsekering**

'n Tegniese memorandum oor spanningsvalsekering wat deur Evkom opgestel is, is aan al die lede gestuur.

Plaaslike Besture wat hulle eie kragsentrales of groot

REPORT OF THE ESCOM SUB-COMITTEE FOR 1975 AND 1976

1. **Special Tariff for Municipalities**

The Committee has over the last two years devoted a considerable amount of time, both at meetings with Escom and in correspondence with the UME, in an attempt to obtain a special electricity tariff for Local Authorities.

This is still continuing but appears to be a lost cause, in that as firstly, Escom are not prepared to consider a special tariff and secondly, that the Secretary for Industry pointed out that most Municipalities have apparently reached satisfactory tariff arrangements with their consumers.

A further approach has, however, been made through the UME on the basis that Municipalities are non-profit organisations supplying an essential service to many consumers who are unable to pass on these charges and there appears to be justification to subsidise them at the expense of commerce and industry.

2. **Notification of Escom Increases**

Members have asked that Escom should declare proposed increases each year in September or give at least six months' notice of tariff increases so that provision can be made in the Local Authority's annual budget.

With the frequency of present-day increases, coal adjustments every quarter and surcharge twice per year, this is not feasible. However, Escom have undertaken to give as much notice as possible, but a more satisfactory solution appears to be for all Local Authorities to have excalation clauses which will automatically recover any increase in Escom charges without the need to obtain Council or Provincial authority for the increase.

3. **Purchase of an Escom Local Reticulation Network**

This matter has been satisfactorily finalised on the basis of paying Escom the outstanding debt. In some cases Escom are prepared to consider permitting the Local Authority to take over the outstanding loan.

4. **Supply Failures — Middelburg, Tvl.**

Middelburg Municipality requested the AMEU to approach Escom with a view to getting their agreement to rebate excess demand charges resulting from restoration of supply after failure of Escom's supply.

Escom are sympathetic but pointed out technical difficulties, especially where printometers are not used for demand metering.

It was therefore agreed to circularise all members to establish the extent of the problem. The result of a questionnaire sent to Local Authorities indicates that Middelburg is virtually the only place where this problem has arisen and a solution could be, in such instances, to contact Escom for authority to exceed the established normal maximum demand before this is done.

5. **Volt Dip Proofing**

A technical memo on Volt Dip Proofing, drawn up by Escom, was sent to all members.

Local Authorities operating their own power stations or

pompinstallasies het, moet spesiale aandag aan die memorandum skenk, maar blykbaar hoef die meeste Plasslike Besture geen stappe te doen nie.

6. **Grond wat vir Evkom- en ander hoogspanningskraglyne in nuwe voorstede opsygesit word**

Die VMEO is gevra om kommentaar te lewer op „Grond wat vir Evkom- en ander hoogspanningskraglyne in nuwe voorstede opsygesit is". 'n Memorandum is voorgelê en belangstellende lede kan by die sekretariaat inligting daaroor verkry.

7. **Gemeenskaplike vore: HPK-gebruikskode**

Die finale gebruikskode is aan al die takke gestuur en aangesien baie ongunstige kommentaar ontvang is, is die HPK in kennis gestel dat die VMEO die kode onaanvaarbaar vind.

Die ongunstige kommentaar is nou met die HPK bespreek en die kode word met inagneming van die kommentaar gewysig — voorsiening word ook gemaak vir die lê van waterleidings in die gemeenskaplike vore.

large pumping plants, should pay special attention to the memo, but for the majority no action appears necessary.

6. **Ground Reserved for Escom and Other HV Power Lines in New Townships**

The AMEU were asked to give their comments on "Ground Reserved for Escom and other HV Power Lines in New Townships". A memo was submitted and is available from the secretaries to members who are interested.

7. **Common Trenches — GPO Code of Practice**

The final code of practice was sent to all branches and, as many adverse comments were received, the GPO was notified that the AMEU found the code unacceptable.

The adverse comments have now been discussed with the GPO and the code is being amended, taking the comments into account — also to make provision for sharing trenches with water services.

W. BARNARD,
Saamroeper/Convenor.

Mr. J. C. (Jack) Waddy, Past President of the AMEU receives his Honorary Membership Certificate from Mr. K. G. Robson, President.

MNR. E. de C. PRETORIUS, Potchefstroom:

Voor ek 'n vraag vra, mnr. die President, hulle sê alles in hierdie wêreld is relatief. Toe Dr. Straszacker netnou verwys na Vrede, u weet hy self het hier grootgeword en ons aangewese president het daar grootgeword en my vrou het daar grootgeword, toe sê hulle die wêreld is klein, maar eintlik is Vrede groot. Mnr. die President, in verband met die verslag wil ek net vra, ek weet wat die posisie is maar ek dink hy moet dit aan die vergadering verduidelik. Is daar sprake dat die werksaamhede van hierdie komitee deur die Buro van Standaarde oorgeneem gaan word?

MNR. P. J. BOTES, Roodepoort:

Mnr. die President, dit is natuurlik 'n turksvy. Ek persoonlik, dit is my persoonlike opinie en dit sal my aanbeveling wees vir die Uitvoerende Bestuur, dat die werk wat hierdie komitee verrig, deur 'n verbruikers-organisasie gedoen word. Die Buro het seer sekerlik sy funksie van standaardisasie, maar ons het hier te doen met verbruikersitems wat goedgekeur behoort te word en ek voel dat dit ons plig as Ingenieurs is om daardie funksie te vervul, en ek voel persoonlik dat dit by ons tuishoort. Daar mag miskien natuurlik verskil van opinie wees, maar dit is hoe ek voel. Ek weet nie hoe my vriend mnr. Pat Middlecote daaroor voel nie, miskien sal hy ook daaroor iets wil sê, ek weet nie, maar dit is hoe ek daaroor voel. Ons is 'n verbruikersorganisasie en ons behoort daardie reg te behou om daardie sake af te handel. Dankie, mnr. die President.

MR. W. BARNARD, Johannesburg:

Mr. President, we have spent a lot of time discussing with Escom electricity charges to municipalities. I think to a large extent we were clear in our own minds what we were trying to achieve. Some people thought we should get special treatment, others felt we were being overcharged, but I think, with the establishment of the Commission of Enquiry by the Board of Trade, we have now got down to thinking this matter through more rationally and that we are much clearer now as to what we are trying to achieve. We accept the provisions of the Electricity Act which say that Escom will charge us according to what it costs to provide that service, and I am quite confident that when we get down to examining this carefully and objectively, we will arrive at a result which will be satisfactory to all of us. Thank you.

MR. J. C. WADDY, Pietermaritzburg:

The Sub-Committee has obviously been very active during the past two years and it is pleasing to know that considerable progress has been made in most of the matters that have been dealt with.

The first item mentioned in the report is that of a special tariff for municipalities. Although the Sub-Committee considers that this may be a lost cause, they are making a further approach on the somewhat different basis that municipalities are non-profit organisations, but presumably they will be faced with the difficulty of justifying the payment of electricity revenue into rates funds.

Recently the Board of Trade and Industries was asked by the Minister of Economic Affairs to investigate and report on various aspects of electricity supply in the Republic, including tariff policies, and it is to be hoped that this will give the AMEU the opportunity of again raising the matter of a special tariff for municipalities.

In connection with notification by Escom of forthcoming tariff increases, the Sub-Committee has suggested that a more satisfactory solution would be for local authorities to have automatic escalation clauses in their own tariffs and this suggestion appears to be worthy of adoption.

With regard to the purchase by a municipality of an Escom local reticulation network, the Sub-Committee has reported that this matter has been finalised on the basis of paying Escom the outstanding debt. I recall that the problem was that, although Escom were willing to transfer such networks, their consumers were unwilling to terminate their agreements with Escom and enter into new ones with a municipality. However, I understand that, in the particular case at Ladysmith which gave rise to this problem, the consumers have now agreed to the transfer.

I am surprised to hear that what was intended to be a final code of practice for the sharing of trenches with the GPO was found to be unacceptable. However, the Sub-Committee has reported that the code is being amended and it is to be hoped that this matter, which has been dragging on for many years, will soon be satisfactorily resolved.

My comments so far have been on the matters dealt with by the Sub-Committee during 1975 and 1976 but I would now like to make a few remarks, if I may, on one or two matters which I hope will be dealt with by the new Sub-Sommittee during 1977 and 1978.

The first of these is the very considerable and rapid increase in Escom's charges during the past year. The extent of the increase has probably caused great concern to all Municipal Undertakings in the Republic. It has necessitated consequential increases in municipal tariffs and led to deterioration in relations between Municipal Undertakings and their own consumers. I am sure that we all appreciate the difficulties confronting Escom due to rapidly escalating costs of coal, equipment, labour and capital, as well as the scarcity of overseas loan capital and that they have probably had no alternative to the policy of deriving a considerable proportion of their capital requirements from revenue. However, it is necessary to ensure that this policy is not unbridled because, if electricity costs continue to escalate rapidly, a stage will be reached where the products of South African industries will not be competitive in export markets and electrical energy will be beyond the means of most domestic consumers. I therefore hope that the Executive Council will request our Escom Sub-Committee to take whatever action it can to assist in restraining the upward trend in Escom's tariffs.

The recently published Electricity Amendment Act, 1977, will, no doubt, also give the Sub-Committee something to think about. This Act provides for the annual amounts paid into Escom's Reserve Fund and Capital Development Fund to be doubled as well as doubling the sum in the Capital Development Fund.

The new Act also enables the Minister of Economic Affairs, if he deems it necessary in the public interest and after consultation with the Electricity Control Board, to instruct Escom to pay into a separate fund an amount not exceeding 3% of its total annual income from the supply of electricity. The Minister of Economic Affairs, with the concurrence of the Minister of Finance, will determine the purpose and the manner in which the monies in the fund will be utilised or invested.

It would appear that these additional sums of money will have to be raised by increasing Escom's income which, of course, means further increases in its tariffs. The new separate fund and the purpose for which it will be used are both rather mysterious and it is to be hoped that the Sub-Committee will give its attention to these points.

I now have pleasure in proposing adoption of the Sub-Committee's report.

MR. E. de C. PRETORIUS, Potchefstroom:

Ek sal baie kort wees — mnr. die President ons kry gewoonlik, en ons is baie dankbaar daarvoor, genoegsame kennis van voorgenome verhogings in Evkom se tarief en dus die algemene verhogings dit wil sê die algemene verhogings en die toeslag. Dit gee ons genoeg tyd om, binne die bepalings van die Plaaslike Bestuursordonnansie in Transvaal, aanpassings van ons eie elektrisiteitstariewe te maak. Maar ons probleem lê by die kwartaallikse aanpassing van die kilowatt-uur-heffing ingevolge die sogenaamde steenkoolklousule. Is dit nie moontlik om vroeër kennis te ontvang van verhogings van die kilowatt-uur-tarief nie? Dit sal ons help, binne die raamwerk van ons Plaaslike Bestuursordonnansie, om ons tariewe betyds aan te pas.

MR. K. G. ROBSON, President:

This question has been asked and answered before, if I remember correctly, when Dr. Straszacker gave the undertaking that as much notice as possible would be given in every instance of tariff increases. I am not sure whether Escom would like to add to that in any way.

MR. A. J. LEVY, Escom:

As far as the question of notice of increase is concerned, Dr. Straszacker did give an undertaking, I think it was at the Pietermaritzburg Convention, that we will endeavour to give three months' notice of any tariff surcharge increases and so far we have managed to do that and we hope to continue to be able to do so. So far as the quarterly coal adjustment is concerned, it is not so easy because we recover in arrear and I think the answer probably is in the suggestion made in a Paper this is to be presented later, of an automatic arrangement to cover both the coal adjustment and tariff increases. This would seem to be the most acceptable method.

MR. E. P. E. W. TRAUTMAN, Ladysmith:

Mr. President, first my personal congratulations on your election to the office of President. May I just make one remark about the application of automatic adjustment formulae to tariffs and I would ask Escom to take this into consideration when introducing tariff increases. Unless these increases are reasonably closely related to the cause, application of an escalation clause in the local authority's tariff may lead to excessive recovery from the consumer, with the consequent need for re-adjustment of the tariff. The automatic clause can only work when the Escom increase is related to the cause of inflation and not to some additional costs which they have to recover from us. Thank you.

Verslag van die Suid-Afrikaanse Nasionale Komitee oor Verligting

By die voorlê van hierdie verslag aan die 1977 Konvensie moet melding gemaak word van die uitstekende werk wat gedoen is deur mnr. R. W. Barton wat 'n hele aantal jare voor die 1975- Konvensie die VMEO-verteenwoordiger by SANKV was. Dit is daarom gepas dat hierdie Konvensie sy opregte dank uitspreek en aanteken vir die diens wat mnr. Barton in hierdie opsig gelewer het.

U sal ook in herinnering roep dat ooreenkomstig die Bestuurskomitee se nuut aanvaarde beleid geen jaarverslag vir 1975 by die Tegniese Vergadering tydens 1976 te Rustenburg voorgelê is nie. Hierdie verslag sal dus die aktiwiteite en kongresse van SANKV vir 1975 en 1976 dek.

1975 — ALGEMENE JAARVERGADERING EN KONGRES

Die twee en twintigste jaarvergadering van SANKV is van 9 tot 11 April 1975 in die Kimberley Hotel gehou en die President mnr. D. W. Young was die Voorsitter.

Die kongres is amptelik deur Sy Edele die Burgemeesfer van Kimberley Raadslid J. P. Smit geopen en hy het die feit in herinnering geroep dat Kimberley in 1882 die eerste stad in die land met elektriese straatverligting was. Teen sononder elke aand het die duisende nie-blankes wat op die baie myne in Kimberley gewerk het, betowerd gestaan om te sien hoe al die booglampe gelyktydig aanslaan.

In sy Presidentsrede met die titel "Lighting in the Service of Mankind" het die President, mnr. Young die belangrike opmerking gemaak dat die grootse gevaar vir verligting die vloek van eenvormigheid van reëls, kodes en regulasies is wat 'n debatteerbare grondslag het wanneer dit uit enige ander oogpunt as dié van die opgeleide verligtingsingenieur beskou word.

Die volgende referate is voorgedra en bespreek:-

(1) "Optical radiometry at the Australian National Measurement Laboratory", deur Dr. W. R. Blevin, CSIRO, Australia.

(2) "A spectroradiometric approach to photometry", deur mnr. C. J. Kok, WNNR, Pretoria.

(3) "Explosion-proof equipment and increased safety lighting", deur mnr. F. Mullany, Hagles Ltd., Johannesburg.

(4) "High Lighting Masts", deur mnr. R. Crowther, Concrete Utilities Limited, England.

(5) "The Missing Link", deur mnr. H. Marinier, Instituut van Suid-Afrikaanse Argitekte, Klerksdorp.

(6) "Specialized lighting systems in hospitals", deur mnr. B. Verhey, S.A. Philips (Edms.) Bpk., Johannesburg.

(7) "Principles of colour rendering and colour preference assessment", deur mnr. Muench, Osram, GMBH, Germany.

(8) "An interim study of the requirements for lamps and lighting equipment suitable for satisfactory service in the Republic of South Africa", deur Messrs. J. Grundy (Phosware Ltd., Springs) en D. Young (Litecraft Ltd., Johannesburg).

Report on the South African National Committee on Illumination

In submitting this report to the 1977 Convention mention must be made of the excellent work done by Mr. R. W. Barton who was the AMEU representative on SANCI for many years prior to the 1975 Convention and it will therefore be appropriate for this Convention to express and record its sincere appreciation of the services rendered by Mr. Barton in this regard.

It will also be recalled that no annual report for 1975 was submitted to the Technical Meeting in Rustenburg during 1976 in accordance with the Executive Council's newly adopted policy. This report will therefore cover the activities and congresses of SANCI for the years 1975 and 1976.

1975 ANNUAL GENERAL MEETING AND CONGRESS

The twenty-second annual general meeting of SANCI was held in the Kimberley Hotel from 9 to 11 April, 1975, and the President, Mr. D. W. Young, was in the chair.

The Congress was officially opened by His Worship the Mayor of Kimberley, Councillor J. P. Smit, and he recalled the fact that Kimberley was the first town in the country to have electric street lighting (early in 1882). At sunset each evening the thousands of natives working on the many mining concerns in Kimberley stood spellbound watching the arc lamps light up simultaneously.

In his Presidential address entitled "Lighting in the Service of Mankind", the President, Mr. Young, made the important remark that the biggest danger to lighting is the curse of conformity to rules, codes and regulations which have a debatable basis when looked at from any viewpoint other than the trained lighting engineer's.

The following papers were read and discussed:-

(1) "Optical radiometry at the Australian National Measurement Laboratory", by Dr. W. R. Blevin, C.S.I.R.O., Australia.

(2) "A spectroradiometric approach to photometry", by Mr. C. J. Kok, C.S.I.R., Pretoria.

(3) "Explosion-proof equipment and increased safety lighting", by Mr. F. Mullany, Hagles Ltd., Johannesburg.

(4) "High Lighting Masts", by Mr. R. Crowther, Concrete Utilities Limited, England.

(5) "The Missing Link", by Mr. H. Marinier, Institute of South African Architects, Klerksdorp.

(6) "Specialised Lighting systems in hospitals", by Mr. B. Verhey, S.A. Philips (Pty.) Ltd., Johannesburg.

(7) "Principles of Colour rendering and colour preference assessment", by Mr. Muench, Osram, GMBH.

(8) "An interim study of the requirements for lamps and lighting equipment suitable for satisfactory service in the Republic of South Africa", by Messrs. J. Grundy (Phosware Ltd., Springs) and D. Young (Litecraft Ltd., Johannesburg).

(9) "Optical filters and their application in photometry and some related fields", deur Dr. F. Hengstberger, WNNR, Pretoria.

'n Vraagforum is weereens onder voorsitterskap van mnr. J. K. von Ahlften gehou.

Vrae oor skittering van straatverligting, groep- teen individuele lamp vervanging, stygende energiekoste vir verligting, TV- en sportverligting, ens. is bespreek en geskikte antwoorde is verkry.

By die bespreking van die verslag van die Tegniese Komitee is dit genoem dat die volgende Afrikaanse terminologie in die Staatskoerant gepubliseer is:-

Luminansie: Luminance,
Illuminansie: Illumination.

Die verslag van die Uitvoerende Bestuur is ter tafel gelê en die vergadering het die afvaardiging vir 1975-sessie van die CIE gedurende September 1975 in Londen goedgekeur.

Mnr. M. J. F. Dempster is as die President, mnr. J. K. von Ahlften as die senior vise-president en mnr. L. Foster as die vise-president verkies.

Tydens die algemene bespreking is 'n voorstel van mnr. Chalmers goedgekeur dat die Universiteit van Natal genader word om 'n kurses in verligting in te stel.

Laastens is die uitstekende vergaderplek en reëlings vir die Kongres in Kimberley aangeteken met 'n spesiale dankbetuiging aan die Stads- Elektrotegniese Ingenieur, mnr. Forbes.

1976 — ALGEMENE JAARVERGADERING EN KONGRES

Die drie en twintigste algemene jaarvergadering van SANKV is van die 17 tot 19 Mei 1976 in die Milpark Holiday Inn in Johannesburg gehou. Die President, mnr. M. J. F. Dempster was die voorsitter.

Die kongres is amptelik deur Sy Edele die Burgemeester van Johannesburg, Raadslid M. Sklaar geopen en hy het verwys na die vermaaklike, dog menslike aspek van straatverligting wat deur die Stadsraad ondervind is toe nuwe gebiede ingelyf is wat nie straatligte gehad het nie en toe 'n nele aantal inwoners beswaar daarteen aangeteken het dat straatverligting voorsien word aangesien hulle die donker plattelandse atmosfeer sonder straatligte verkies het.

In sy presidensiële rede het mnr. Dempster verwys na die noodsaaklikheid vir meer navorsing oor padverligting, hoe dit deur padoppervlaktoestande beinvloed word en die invloed daarvan op padveiligheid. Sy bekommernis word in die volgende uittreksel uit sy presidensiële rede weerspieël:-

„Terwyl sommige Staats- en semistaatsondernemings nou by die probleme van verligtingsnavorsingsontwikkeling en -toepassings betrokke is, is daar ander wat nie betrokke is nie en wat na my mening moet wees. In oorseese lande het vervoer- en padnavorsingslaboratoria belangrike werk oor padverligting gedoen maar, sover, my kennis strek, is baie min in die Republiek gedoen ten spyte daarvan dat klimaatstoestande, padoppervlakke ens. verskillend is van die van oorsee en 'n spesiale ondersoek regverdig ten einde optimum parameters vir padverligting in die Republiek daar te stel. Motorwegverligting is natuurlik 'n belangrike faktor by padveiligheid wat baie meer aandag vereis as wat tot dusver daaraan geskenk is. Daar is rede tot kommer deurdat slegs een provinsie in Suid-Afrika, nl. die Kaapprovinsie goeie motorwegverligting aanmoedig deur skemas te subsidieer wat binne die invloedsfeer val en wat aan die vereistes van die SABS- gebruikskode voldoen.

„Aan die ander kant sluit Transvaal baie beslis motorwegverligting uit by die deelname aan enige subsidies wat wel toegestaan word en, tot onlangs, die verligting van snelweë teengestaan. In hierdie verband is vergelyking tussen die ongeluksyfer op verligte en onverligte snelweë deur mnr. Yates aangeteken in 'n verslag vir Automobiel Assosiasie van Suid-Afrika. (Opmerking: Hierdie verslag is van NIVPN-inligtingsentrum beskikbaar onder verwysing 37-4747).

„Koste/voordeel-studies het oorsee bruikbaar geblyk by die vasstelling van voorkeure vir padverligtingsinstallasies en die CIE-dokument 12/2 met sy verbonde tegniese verslae bied riglyne op die gebied. Hier is dit egter weer 'n saak wat op Provinsisiale en Regeringsvlak aangepak moet word en dit moet gerugsteun word deur navorsing oor ongelukstastiek en koste deur 'n liggaam soos die WNNR".

Dit is voorgestel dat die volgende twee aspekte oorweeg word as die nuwe navorsingsprogram vir die Nasionale Instituut vir Vervoer- en Padnavorsing opgestel word:-

(a) Die voordele daaraan verbonde om materiale met beter ligkaatseienskappe vir padoppervlakke te gebruik.
(b) Die kostedoeltreffenheid ten opsigte van verbeterde

(9) "Optical filters and their application in photometry and some related fields", by Dr. F. Hengstberger, C.S.I.R., Pretoria.

A question forum was again held, chaired by Mr. J. K. von Ahlften.

Questions involving glare from streetlighting, group versus individual lamp replacement, rising energy cost for lighting, TV and sports lighting, etc., were discussed and suitable answers were forthcoming.

In discussing the Technical Committee report it was mentioned that the following Afrikaans terminology was published in the Government Gazette:-

"Luminansie" for luminance,
"Illuminansie" for illuminance.

The Executive Committee Report was tabled and the meeting approved the delegation to attend the 1975 CIE Session in London during September, 1975.

Mr. M. J. F. Dempster was elected as President with Mr. J. K. von Ahlften as Senior Vice-President and Mr. L. Foster as Vice-President.

During the general discussions it was decided on a proposal by Mr. Chalmers that the University of Natal be approached to introduce a degree course in lighting.

Finally, the excellent venue and arrangements for the Congress in Kimberley were recorded with a special vote of thanks to the City Electrical Engineer, Mr. Forbes.

1976 ANNUAL GENERAL MEETING AND CONGRESS

The twenty-third annual general meeting of SANCI was held in the Milpark Holiday Inn, Johannesburg, from 17 to 19 May, 1976, and the President, Mr. M. J. F. Dempster, was in the chair.

The Congress was officially opened by His Worship the Mayor of Johannesburg, Councillor M. Sklaar. He referred to a rather amusing but very human reaction to the street lighting installed by the Council in certain newly incorporated townships which previously had not been provided with street lighting. Quite a number of residents objected on the basis that street lighting destroyed the dark, rural atmosphere to which they were accustomed!

In his Presidential Address, Mr. Dempster referred to the need for more research into roadway lighting, how it is affected by road surfacing conditions and its affect on road safety. His concern is reflected in the following extract from his Presidential Address:-

"Whilst some Government and Semi-Government bodies are deeply involved in problems of lighting research development and application, there are others which I believe should be and are not. In overseas countries, for example, transportation and road research laboratories have done important work on roadway lighting, but so far as I am aware, little has been done in the Republic in spite of the fact that conditions of climate, road surfaces, etc., are different from those overseas and warrant special investigations with a view to establishing optimum parameters for road lighting in the Republic. Also roadway lighting is, of course, an important factor in road safety which merits more attention than it has so far been given. It is a matter of concern that only one province in South Africa, the Cape, encourages good roadway lighting by subsidising schemes falling within the sphere of influence and which comply with the requirements of the SABS Code of Practice. The Transvaal on the other hand expressly excludes roadway lighting for benefiting from any subsidies granted, and even opposed, until recently, the lighting of expressways. In this connection the comparison between night accident rates on lit and unlit expressways has been documented by Mr. Yates in a report to the Automobile Association of South Africa. (Note: This report is available from NITRR Information Centre, reference no. 37 4747).

"Cost Benefit Studies have proved useful overseas in establishing priorities for road lighting installations and the new CIE Document 12/2 with its associated Technical Reports offers guide lines on this subject. But here again is a matter which must be tackled at Provincial and Central Government level, and be backed by research into accident statistics and costs by a body such as the CSIR".

It was suggested that these two aspects of road research should receive consideration when drawing up the new research programme of the National Institute for Transport and Road Research, i.e.:-

(a) The benefits of using better light reflecting materials for road surfacings, and
(b) The cost effectiveness of providing fixed roadlighting

MNR. J. K. VON AHLFTEN

padveiligheid om vaste padverligting te voorsien.

Na aanleiding van die sake uit die notule van die 1975-kongres het mnr. Chalmers verslag gedoen dat in die lig van die huidige finansiële situasie in die land die Universiteit van Natal vir die volgende 3 tot 4 jaar nie sy weg oopsien om 'n graadkurses in verligting in te stel nie.

Die volgende referate is by die vergadering voorgedra:-

(1) "The practical application of the proposed CIE Publication 12/2 for Roadway Lighting", deur mnr. P. Hartill, Phosco, United Kingdom.

(2) "Calculation of natural lighting from diffusing window illuminated by clear skies and direct sunlight", deur mnr. I. Boyd, NBNI, WNNR.

(3) "Discharge lamps and future developments", deur mnr. E. Miles van GEC Electrical Products Ltd., United Kingdom.

(4) "Quality of lighting improvements needed in South Africa", deur Dr. H. D. Einhorn, Raadgewende Ingenieur, Kaapstad.

(5) "Some aspects of visual acuity, colour deficiency and dark adaptation of black mine workers", deur mnr. C. van Graan van die S.A. Kamer van Mynwese.

(6) "Swedish Roadway Lighting", deur mnr. B. Knudsen van ASEA Jarnkonst Ab, Sweden; en mnr. L. O. Foster van ASEA Reunert (Pty.) Ltd.

(7) "A new definition for the unit of light", deur mnr. C. J. Kok, NFNL, WNNR.

(8) "Sports and exterior lighting", deur mnr. R. Yates, Elektrisiteitsdepartement, Stadsraad van Johannesburg.

(9) "Visual Signalling", deur mnr. F. J. Strutt, Elektrisiteitsdepartement, Stadsraad van Port Elizabeth.

(10) "Photometry of Floodlights", deur mnr. J. T. Grundy, Phosware Ltd., Springs.

(11) "Lighting and the Environment", deur mnr. K. Gow, Argitek, Durban.

Vir die derde agtereenvolgende jaar is 'n vraebank onder voorsitterskap van mnr. J. K. von Ahlften gehou en vrae oor die noodsaaklikheid van ononderbroke of gedeeltelike padverligting op stedelike snelweë en buitestedelike snelweë, staking van die vervaardiging van pêrel-GLS-lampe, doelgemaakte binnenshuise fluoresseerapparature, die nuwe CIE 12/2-aanbeveling vir padverligting, ens. is breedvoerig bespreek.

Tydens die bespreking van die verslae van die Tegniese Komitee is dit gemeld dat TC 21 'n finale verslag gepubliseer het wat die fisiese en totometriese eienskappe van tungsten/halogeen, metaal/halied en H.D. natriumlampe beskryf.

Die verslag van die Bestuurskomitee en die 1975-CIE-sessie te Londen is ter tafel gelê. Mnr. J. K. von Ahlften het die CIE-sessie in Londen as 'n gedeeltelik geborgde VMEO-afgevaardigde van SANVK bygewoon en 'n volledige verslag van die verrigtinge is aan die Uitvoerende Bestuur voorgelê. Die toekomstige internasionale deelname van 'n VMEO-geborgde afgevaardigde aan CIE-sessies word aanbeveel aangesien belangrike navorsingswerk ten opsigte van hoe padverligting munisipale owerhede oor die hele wêreld raak een van die belangrikste aktiwiteite van die CIE is.

Mnr. M. J. F. Dempster is as president vir 1976/77 herkies met mnr. J. K. von Ahlften as senior vise-president en mnr. L. Foster as vise-president. Daarbenewens is 'n VMEO-lid, mnr. A. H. L. Fortman van Boksburg as Publisiteitsbeampte van SANKV tot die bestuur verkies.

for improved traffic safety.

In the matters arising from the minutes of the 1975 Congress, Mr. Chalmers reported that in view of the present financial situation in the country the University of Natal will for the next 3 or 4 years not see its way clear to institute a degree course in lighting.

The following papers were read at the meeting:-

(1) "The practical application of the proposed CIE Publication 12/2 for Roadway Lighting", by Mr. P. Hartill, Phosco, United Kingdom.

(2) "Calculation of natural lighting from diffusing windows illuminated by clear skies and direct sunlight", by Mr. I. Boyd, NBRI, CSIR.

(3) "Discharge lamps and future developments", by Mr. E. Miles of GEC Electrical Products Ltd., United Kingdom.

(4) "Quality of lighting improvements needed in South Africa", by Dr. H. D. Einhorn, Consulting Engineer, Cape Town.

(5) "Some aspects of visual acuity, colour deficiency and dark adaptation of black mine workers", by Mr. C. van Graan of the S.A. Chamber of Mines.

(6) "Swedish Roadway Lighting", by Mr. B. Knudsen of ASEA Jarnkonst Ab, Sweden; and Mr. L. O. Foster of ASEA Reunert (Pty.) Ltd.

(7) "A new definition for the unit of light", by Mr. C. J. Kod, NPRL, CSIR.

(8) "Sports and exterior lighting", by Mr. R. Yates, Electricity Department, City Council of Johannesburg.

(9) "Visual Signalling", by Mr. F. J. Strutt, Electricity Department, City Council of Port Elizabeth.

(10) "Photometry of Floodlights", by Mr. J. T. Grundy, Phosware Ltd., Springs.

(11) "Lighting and the Environment", by Mr. K. Gow, Architect, Durban.

A question forum was held for the third successive year, chaired by Mr. J. K. von Ahlften, and questions relating to the need of continuous or partial roadlighting on urban freeways and rural freeways, discontinuation of manufacture of pearl G.L.S. lamps, custom-made indoor fluorescent luminaires, the new CIE 12/2 recommendations for road lighting, etc., were discussed at length.

Arising from discussions of Technical Committee Reports it was mentioned that T.C. 2.1 have issued a final report describing the physical and photometric characteristics of Tungsten Halogen, Metal Halide and H.P. Sodium lamps.

The Executive Committee report and the 1975 CIE London Session report was tabled. The CIE Session in London was attended by Mr. J. K. von Ahlften as a partially-sponsored AMEU delegate of SANCI and a full report on the proceedings was submitted to the AMEU Executive Council. International participation on future CIE sessions by an AMEU sponsored delegate is recommended as research into roadlighting on it affects municipal authorities throughout the world and is one of the major activities of the CIE.

Mr. M. J. F. Dempster was re-elected as President for 1976/77 with Mr. J. K. von Ahlften as Senior Vice-President and Mr. L. Foster as Vice-President and in addition an AMEU member, Mr. A. H. L. Fortmann, of Boksburg, was elected to the Executive Committee as Publicity Officer of SANCI.

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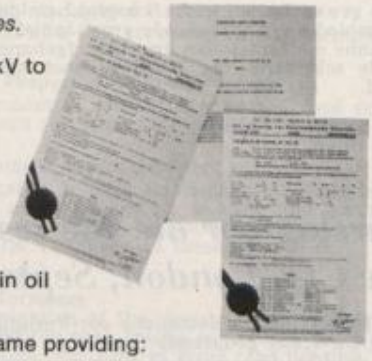

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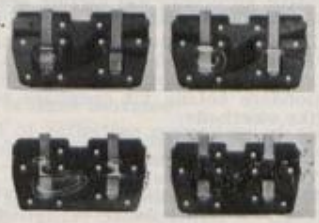

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Tydens die algemene bespreking het mnr. J. H. Kieser van die Departement van Arbeid verslag gedoen dat die Staatspresident 'n Komitee van Ondersoek aangestel het om ondersoek in te stel na beroepsgesondheid in die Republiek en dit sluit verligting in die leerplanne van Tegniese Kolleges en Universiteite in. Sy voorstel is aanvaar dat SANKV voorstelle indien ten opsigte van verligtingsopleiding by die Kommissie se aanbevelings wat binnekort verwag word.

Dr. Einhorn se voorstel is aanvaar dat SANKV 'n memorandum aan die Instituut van Argitekte en toepaslike Staatsdepartemente voorlê dat wanneer geboumodules gestandaardiseer word, toegelaat moet word vir die lengtes van fluoresserlampe wat internasionaal gestandaardiseer is.

Soos gewoonlik is hierdie kongres baie goed georganiseer en aangebied en 'n verbasende groot aantal onderwerpe en sake is binne die bestek van drie dae afgehandel en die organiserende sekretaris van SANKV moet hiermee gelukgewens word.

During the general discussion, Mr. J. H. Kieser, of the Department of Labour, reported that a Commission of Inquiry had been appointed by the State President to investigate occupational health in the Republic which includes lighting in the curriculum of the technical colleges and universities in South Africa. His suggestion was accepted that SANCI make recommendations regarding training in the lighting field to be included in the Commission's proposals that were expected shortly.

Dr. Einhorn's proposal was accepted that SANCI forward a memorandum to the Institute of Architects and the relevant Government Departments proposing that, when building modules are standardized, provision should be included for the use of fluorescent lamps having internationally standardized lengths.

As usual this congress was very well organised and conducted and a surprisingly vast number of subjects and work was covered within the short period of three days. For this the organising Secretary of SANCI is to be congratulated.

J. K. VON AHLFTEN,
Verteenwoordiger/Representative.

Verslag oor die 18e sessie van die CIE London, September 1975

Die Internasionale Kommissie oor Verligting het sy vierjaarlikse 18e sessie gedurende September 1975 in London gehou.

Die Suid-Afrikaanse afvaardiging wat hierdie sessie bygewoon het, het bestaan uit mnr. M. Dempster die President van SANCI as leier van die afvaardiging, mnr. J. K. von Ahlften die Senior Visepresident, Dr. W. Rennhackkamp die Eresekretaris en tien (10) ander afgevaardigdes wat openbare verligtingsingenieurs, verligtingsvervaardigers en verskeie ander verligtingsorganisasies en instellings in Suid-Afrika verteenwoordig.

Die VMEO het die lugreisgeld na Londen voorsien vir mnr. J. K. von Ahlften, wat ook die VMEO-verteenwoordiger by SANCI is, ten einde hom in staat te stel om hierdie sessie by te woon en hierdie verslag word dus aan die Uitvoerende Raad voorgelê op versoek van die Dagbestuur ten opsigte van die waarde en belang wat hierdie sessie gehad het vir sover dit die VMEO aangaan.

Die CIE is saamgestel uit 23 Tegniese Komitees behalwe die 5 Studiegroepe wat hulle toespits op al die ingewikkeldhede van die verligtingsveld. Die volgende is van algemene en besondere belang vir openbare verligtingsingenieurs en plaaslike owerhede:-

TC-2.4 — Apparature
TC-3.4 — Ongemakskittering
TC-4.4 — Sportverligting
TC-4.1 — Binneshuise verligting
TC-4.5 — Buitenshuise verligting
TC-4.6 — Straatverligting
TC-4.7 — Motorvoertuigverligting

U afgevaardigde het dus op die praktiese werk en sessies van hierdie komitees gekonsentreer met die hoofbelang in TC-4.6 — Straatverligting. Hierdie komitee werk onder voorsitterskap van Prof. J. B. de Boer van Nederland — wat geen vreemdeling in Suid-Afrika is nie aangesien hy in die verlede SANCI-kongresse hier te lande bygewoon het.

TC-4.6 — STRAATVERLIGTING

In die eerste plek het die huidige naam van die komitee, nl. Straatverligting onder bespreking gekom en dit is algemeen aanvaar dat Padverligting (Roadlighting) meer toepaslik is gesien in die lig van die nuut aanvaarde terminologie vir padtipes — waarvan 'n kopie aangeheg is. Kragtens die verskillende sessies van TC-4.6 is die volgende konsepwerkprogram vir die volgende vierjaarlikse vergadering aanvaar:-

(Items wat bestudeer word maar nog nie afgehandel is nie):-

1. **Padverligting en ongelukke**
   Opstel van 'n tegniese verslag oor die huidige situasie ten opsigte van padverligting en verkeersveiligheid in besonder ten opsigte van die invloed van verligting op veiligheid by paaie wat slegs vir hoëspoed-verkeer bedoel is.
2. **Tonnelverligting**
   2.1 Opstel van tegniese verslae.
   2.1.1 Agtergrond oor aanbevelinge in Publikasie 23.
   2.1.2 Ingenieursondervinding.
   2.1.3 Onlangse ontwikkelinge.

Report on the 18th session of the CIE London September, 1975

The international Commission on Illumination held its quadrennial 18th Session in London during September, 1975.

The South African delegation attending this Session consisted of Mr. M. Dempster, President of SANCI, as leader of the delegation, the Senior Vice-President, Mr. J. K. von Ahlften, the Honorary Secretary, Dr. W. Rennhackkamp and ten other delegates representing public lighting engineers, lighting manufacturers and various other lighting organisations and institutions in South Africa.

The AMEU sponsored the air fare to London of Mr. J. K. von Ahlften, as the AMEU representative on SANCI, and this report is being submitted to the Executive Council at the request of the Standing Committee so that the value and interest of this Session to the AMEU can be assessed.

The CIE comprises 23 Technical Committees and 5 Study Groups dealing with all the complexities in the lighting field, of which the following are of general and specific interest to public lighting engineers and local authorities:-

TC-2.4 — Luminaires
TC-3.4 — Discomfort Glare
TC-4.4 — Sports Lighting
TC-4.1 — Interior Lighting
TC-4.5 — Exterior Lighting
TC-4.6 — Street Lighting
TC-4.7 — Automobile Lighting

Your delegate concentrated on the practical work and Sessions of these Committees with a primary interest in TC-4.6 Street Lighting. This Committee functions under the leadership of Professor J. B. de Boer from the Netherlands who is no stranger to South Africa, as he has attended SANCI Congresses in the past in this country.

TC-4.6 — STREET LIGHTING

In the first instance the present name of the Committee — "Streetlighting" — came up for discussion and it was generally agreed that "Roadlighting" was more appropriate in view of the newly accepted terminology for road types, a copy of which is attached. Pursuant to the various Sessions of TC-4.6 the following draft working programme was adopted for the next quadrennium:-

(Items under study, not yet finished)

1. **Road Lighting and Accidents**
   Drafting of a Technical Report on the present situation of road lighting and traffic safety, with particular respect to the influence of lighting on safety for roads intended for high speed traffic only.
2. **Tunnel Lighting**
   2.1 Drafting of the following Technical Reports:-
   2.1.1 Background of Recommendation in Publication 23.
   2.1.2 Engineering Experience
   2.1.3 Recent Developments

Die verslae onder 2.1.2 en 2.1.3 moet in samewerking met PIARC opgestel word.

2.2 Eksperimente en studies oor die volgende items:-
- 2.2.1 Aanpasluminansie buitekant die tonnel (L1).
- 2.2.2 Luminansie vir die drumpelsone (L1/L2).
- 2.2.3 Verligting van kort tonnels en onderdeurpaaie.
- 2.2.4 Luminansiepeil in lang tonnels wat min verkeer dra.

2.3 Evaluering van bestaande aanbevelings.
2.4 Toepasing van seinskerms.
2.5 Ligbronne en apparature.
2.6 Toepassing van terugkaatsende materiale.

3. **Voertuigverligting in verligte gebiede**
Ontwikkeling van CIE-standpunt in samewerking met TC-4.7.

4. **Kaatseienskappe van padoppervlakke**
1. Ontwikkeling van een stel standaard padoppervlakke wat vir luminansieberekeninge gebruik word.
2. Ontwikkeling van standaard natoppervlakke.
3. Ondersoek na die verhouding tussen kaatseienskappe en samestelling, tekstuur en aanwendmetode van padoppervlakke en die kort- en langtermyn veranderinge in hierdie eienskappe.

(Toekomstige bedrywighede)

5. **Visuele prestasie**
5.1 Bepaling van die visuele taak by padverkeer.
5.2 Verligting vir padverkeer beskou as 'n integrale stelsel wat bestaan uit die vaste padverligting, motorvoertuigverligting en -seining, padverkeerseining en die gebruik van bakens.
5.3 Onderlinge verhouding tussen individuele kriteria van verligtingsgehalte, bv. gemiddelde padoppervlakluminansie, die eenvormigheid daarvan en skitterbeperking. Tot watter mate kan nie-fotometriese eienskappe en verbeterde optiese leiding vir verlaagde verligtingsgehalte verbeter?

6. Waarskynlikheid van ongeluksvermindering as 'n funksie van verligtingsgehalte.

7. Regverdiging daarvoor om die gehalte van verligting te verhoog tot bo die peil wat vir veiligheid vereis word tot die voordeel van bestuursgemak, gladde verkeersvloei en paddravermoë.

8. Wisselwerking tussen visuele prestasie, visuele gemak, veiligheid en ekonomie.

9. **Eienskappe van padoppervlakke**
9.1 Beskrywing van kaatseienskappe van padoppervlakke, gegrond op betekenisvolle fisiese eienskappe.
9.2 Gevolge van verbetering van kaatseienskappe op glyeienskappe, slytasie en ruis.

10. **Verligting onder droë en nat toestande**
10.1 Moet dieselfde vereistes vir die gehaltekriteria wat vir die droë toestand vereis word ook in die nat toestand volgehou word?
10.2 Kontrolering van verligtingstelsels ten opsigte van verskille in prestasie onder droë en nat toestande.

11. Ondersoek na die nabehandeling van die CIE-aanbevelings en die tegniese verslae in lidlande.

12. **Verligtingsvoorskrifte — hulle doel en toepassing**
Ondersoek na die moontlikheid van die daarstelling van 'n internasionale waarborgstelsel wat op die bestaande praktyk in verskillende lande gegrond is met inagname van die standpunte wat onder 7 en 8 ontwikkel is.

13. **Terminologie**
Ten opsigte van padverligting en ongelukke was dit die algemene gevoel dat op **tussenstedelike** motorweë of deurpaaie (die Amerikaanse term) padverligting baie min invloed op padongelukke het maar op **stedelike** motorweë word ongelukke tot 'n groot mate deur verligting beïnvloed. Die MI- en M2-motorweë in Johannesburg kan as stedelike motorweë beskou word.

Meer inligting word egter ingesamel ten opsigte van die invloed van paduitleg en gesigskerpte tesame met verligting op verkeersveiligheid.

Die gevolgtrekking wat oor die bedrywighede van TC-4.6 gemaak kan word, is dat dit in alle wêrelddele 'n belangrike rol vervul ten opsigte van die rol wat

The reports under 2.1.2 and 2.1.3 are to be drafted in collaboration with PIARC.

2.2 Experiments and studies on the following items:-
- 2.2.1 Adaptation luminance outside the tunnel (L1).
- 2.2.2 Luminance in the threshhold zone (L1/L2).
- 2.2.3 Lighting of short tunnels and underpasses.
- 2.2.4 Luminance level in long tunnels with little traffic.

2.3 Evaluation of present recommendations.
2.4 Application of sun screens
2.5 Light sources and luminaires
2.6 Application of retro-reflective materials.

3. **Vehicle Light in Lighted Areas**
Development of a CIE viewpoint in collaboration with TC-4.7.

4. **Reflection Properties of Road Surfaces**
1. Development of one set of standard road surfaces to be used for luminance calculations.
2. Development of standard wet road surfaces.
3. Investigation into the relationship of reflection properties and composition, texture and method of application of road surfaces and long-term and short-term variations in these properties.

(Future Activities)

5. **Visual Performance**
5.1 Determination of the visual task in road traffic
5.2 Lighting for road traffic considered as an integral system consisting of fixed road lighting, motor vehicle lighting and signalling, road traffic signalling and the use of beacons.
5.3 Interrelationship of individual criteria of lighting quality, e.g. average road surface luminance, and its uniformity and glare restriction. To what extent can non-photometric characteristics and improving optical guidance compensate for reduced lighting quality?

6. Probability of accident reduction as a function of quality in lighting.

7. Justification of increasing the quality of lighting above the level required for safety to the benefit of driving comfort, smoothness of traffic flow and road capacity.

8. Interaction of visual performance, visual comfort, safety and economy.

9. **Characteristics of Road Surfaces**
9.1 Description of reflection properties of road surfaces, based upon meaningful physical characteristics.
9.2 Consequences of improving reflection properties with respect to skidding properties, wear and noise.

10. **Lighting Under Dry and Wet Conditions**
10.1 Are the requirements for the quality criteria desired in the dry condition to be maintained in the wet condition?
10.2 Checking lighting systems with respect to differences in performance under dry and wet conditions.

11. Inquiry into the follow-up of CIE Recommendations and Technical Reports in member countries.

12. **Lighting Warrants, Their Purpose and Application**
Investigation of the possibility of setting up an international system of warrants based upon the existing practice in various countries and taking into account the viewpoints developed under 7 and 8.

13. **Terminology**
Regarding roadlighting and accidents, it was the general consensus that on **inter-city** "motorways" or "freeways" (the American term) road lighting has a small influence on road accidents, but that on **city** "Motorways" accidents are influenced substantially by good lighting. The M1 and M2 motorways in Johannesburg, for instance, can be classed as city "motorways".

More information is however being collected regarding the influence of road geometry and visual acuity coupled with lighting on traffic safety.

The conclusions that can be reached from the activities of TC-4.6 are that it fulfills a most important function affecting road traffic and road safety coupled with

goeie padverligting op pad- en verkeersveiligheid speel en dat die onderwerp padverligting en voertuigverligting baie meer ingewikkeld is as wat algemeen aanvaar word. Dit blyk ook uit die bedrywighede van TC-4.7 Voertuigverligting.

Laasgenoemde komitee het tot die volgende gevolgtrekkings geraak:-

TC-4.7 — VOERTUIGVERLIGTING

By paaie en strate sonder vaste (oorhoofse) verligting of verligting van 'n baie lae standaard moet nagsigbaarheid van die pad en onverligte voorwerpe daarop deur die voertuigverligting (voertuigkopligte) gewaarborg word. Wanneer daar nie ander verkeer teenwoordig is nie, word dit geredelik deur die skerp ligte voorsien. As ander (aankomende) verkeer teenwoordig is, veroorsaak die skerp ligte egter geweldige skittering. Hier word gedompte kopligte gebruik. In strate met 'n lae standaard van verligting, d.w.s. gemiddelde padoppervlakluminansie is laer as ongeveer 0,1 cd/m² tot 0,2 cd/m² is die situasie soortgelyk aan onverligte strate.

Daar is afdoende bewys dat die sig op paaie waar die straatverligting 'n gemiddelde padoppervlakilluminansie van effens meer as 0,1 cd/m² (sê tussen 0,2 cd/m² en 0,7 cd/m²) lewer die sig onvoldoende is vir veilige en vinnige verkeer — veral op paaie met gemengde verkeer. Bestuursgemak is onder sulke toestande ook laag. Dit is egter verkeerd om te glo dat die situasie sal **verbeter** as voertuie hul gedompte ligte op hierdie tipe pad gebruik. Eerstens word die sig en bestuurgemak nog steeds deur die skittering vanaf aankomende voertuie beïnvloed. Tweedens, sonder aankomende verkeer sal die sigbaarheid (kontras) van voorwerpe baie min verander deur gedompte kopligte in plaas van syligte alleen aan te skakel; en dan op 'n wyse wat nie altyd voorspel kan word nie. Dit is duidelik dat dit nie op trukaatsers van toepasing is nie en ook van die tipe bundelverspreiding afhang. Derdens sal die resulterende skittering van voertuigkopligte hoofsaaklik die meer kwesbare padgebruikers soos voetgangers en fietsryers beïnvloed.

Die voorbeligting van voertuie het slegs op onverligte en swak verligte paaie 'n funksie. Op alle ander paaie— sowel met swak as goeie standaarde van openbare verligting, en bedags — is die voorste ligte van voertuie **seinligte.** Op onverligte paaie dien die voorste ligte van voertuie vir **sowel** verligting as seining; op paaie met swak en goeie verligting is hulle funksie hoofsaaklik **seining.** Dit blyk dus geregverdig te wees om op die seinfunksie te konsentreer.

Die verligtingsvereistes vir voldoende illumanansie in die nag is:-

Totale topbundelintensiteit van meer as 100 000 cd en 'n bundelbreedte van 'n hele paar grade. Skerp ligte is gewoonlik voldoende maar gedompte ligte is nie — as gevolg van hul kompromiseienskappe.

Die vereistes vir voldoende seining is heeltemal verskillend en hang af van die boodskap wat gesein moet word. Die meeste van die volgende oorwegings slaan op die **seining van die beweging.** As **slegs** die teenwoordigheid van die voertuig aangedui moet word, is dit duidelik dat daar geen maksimum intensiteit is nie; hoe meer lig hoe beter. Oorweging van die verkeersituasie toon egter dat teenwoordigheid slegs een, en dan gewoonlik ook 'n ondergeskikte, eienskap is wat gesien moet word.

Posisie, klas van voertuig of voorwerp, afstand, beweging en, baie belangrik, veranderinge en toekomstige veranderinge in posisie en beweging moet gesien word. In dié geval kan te veel lig wat skittering en straling veroorsaak, die werklike seinfunksie benadeel. Eenvoudigheidshalwe sal slegs topintensiteite hier gegee word (die vereistes ten opsigte van bundelbreedte, kleur, grootte, inrigting, ens. is maklik om aan te voldoen). As 'n eerste benadering word die volgende waardes algemeen aanvaar (elke lamp afsonderlik):-

(a) Nag — helder atmosfeer:
ongeveer 50 cd (tussen 20 en ongeveer 100)

(b) Nag/mis en dag/helder:
ongeveer 500 cd (tussen ongeveer 200 en ongeveer 2 000)

(c) Dag/mis:
5 000 cd of meer.

Dit is duidelik dat dit 'n baie rowwe benadering is. Die aanduidings nag, helder atmosfeer en mis moet duideliker gespesifiseer word. Skemer en dynserigheid word nie in aanmerking geneem nie. Minstens drie duidelike vlakke van ligintensiteit is egter nodig. As mens sowel dag **en** nag en helder atmosfeer **en** mis in aanmerking neem, is slegs twee vlakke van verligting **nie** voldoende vir die seinfunksie van die voertuig se voorste ligte nie. (Let daarop dat die redenasie wat hier gevolg word in die gevolglike intensiteitsdata wat hier aangehaal word na die permanente voorste seinligte van die voertuig verwys).

good road lighting in all parts of the world and that the subject of "road lighting" coupled with "vehicle lighting" is more compiex than is generally realised. This was also borne out by the activities of TC-4.7 — Automobile Lighting.

This latter Committee came to the following conclusions:-

TC-4.7 — AUTOMOBILE LIGHTING

On roads and streets without fixed (overhead) lighting or with overhead lighting of a very low standard, the night-time visibility of the road and of unlit objects on it must be guaranteed by the vehicle lighting (vehicle headlamps). When no other traffic is present, this is fairly easily achieved by means of the high beams or country beams. When oncoming traffic is present, however, high beams provoke severe glare. Here low beams (dipped headlights) are used. In streets with a low standard of lighting, that is the average road surface-luminance is below some 0,1 cd/m² to 0,2 cd/m², the situation is similar to that for unlighted roads.

There is ample proof that visibility in roads where the street lighting results in an average road surface luminance of a little over 0,1 cd/m² (say between 0,2 and 0,7 cd/m²) is insufficient for safe and fast traffic, particularly on roads with mixed traffic. Driving comfort is also low under these conditions. However, it is definitely wrong to believe that the situation will **improve** when vehicles use their low beams on this type of road. Firstly, the visibility and driving comfort are still influenced by glare from oncoming vehicles. Secondly, without opposing traffic the visibility (contrast) of objects will change very little by switching on low beam headlamps instead of side-lights alone, and in a way that cannot always be predicted. Obviously, this does not hold for retroflectors, and does depend on the type of beam distribution. Thirdly, the resulting glare from vehicle headlamps will effect primarily the more vulnerable road users, such as pedestrians and pedal cyclists.

Vehicle front lighting has an "illumination" function only on unlit and very poorly lit roads. On all other roads both of mediocre and good standards of public lighting, and during the day, vehicle front lights are "signalling lights". On unlit roads therefore vehicle front lighting serves both for illumination and signalling; on roads with mediocre and good lighting and during the day their function is exclusively signalling. Therefore, it seems justifiable to concentrate on the signalling function. The lighting requirements for adequate illumination at night are: peak beam intensity over 10 000 cd in total and a beam width of several degrees. High beams generally are adequate, but low beams mostly are not, because of the compromise character they have.

The requirements for adequate signalling are quite different and depend on the message to be signalled. Most of the following considerations are related to "signalling the movements". When **only** the presence of the vehicle is to be marked, obviously there is no maximum intensity; the more light the better. Consideration of the traffic situation will show clearly, however, that presence is only one, and mostly only a subordinate, characteristic that has to be signalled. Position, class of vehicle or object, distance movement and, most important, changes and future changes in position and movement have to be signalled. In this respect, too much light — causing glare and irradiation — may hamper the proper signalling function. For reasons of simplicity, only peak intensities will be given here (requirements, regarding beam width, colour, size, arrangement, etc., are easy to fulfill). As a first approximation, the following values are generally accepted (each lamp separately).

(a) night, clear atmosphere:
about 50 cd (between 20 and about 100)

(b) night/fog; and day/clear atmosphere:
about 500 cd (between about 200 and about 2 000)

(c) day/fog:
5 000 cd or more.

Obviously, this is a very crude approximation only. Notably, the indications: night, clear atmosphere and fog will have to be specified in more detail. Twilight and haze are not taken into consideration. At least three distinct levels of luminous intensity, however, are necessary. When one takes both day **and** night, and clear atmosphere **and** fog into consideration, only two levels of lighting are **not** sufficient for the signalling function of vehicle front lighting. (It may be noted that the reasoning given here, and consequently the intensity data quoted here, relate to permanent vehicle front signal-

Mens kan nou die vereistes ten opsigte van die voertuig se voorste seinligte met die huidige praktyk vergelyk. Alle voertuie het minstens drie verskillende tipes ligte aan die voorkant (rigtingwysers en ander seinligte wat slegs by uitsondering gebruik word, word nie ingesluit nie).

(a) Syligte, parkeerligte — ECE-vereiste 5 cd 1 60 cd.

(b) Gedompte kopligte — Selfs met ECE is daar 'n verskeidenheid (E-tipe, H-tipe, die Brits/Amerikaanse-tipe ens.).

Onder laboratoriumtoestande is bo-die-horison-intensiteit (wat vir die seining belangrik is) tussen 200 cd en 1 000 cd per lamp; 'n waarde wat maklik verdubbel of selfs verdriedubbel kan word as gevolg van verkeerde lynrigting, stof, reën, voertuiglaaiing, ens. Aan die ander kant, en veral by ouer motors, is die waarde weens spanningval byna die helfte.

(c) Skerp ligte — Hier bestaan slegs 'n paar regulasies. Die meeste voertuie het 'n totaal van tussen 100 000 en 400 000 cd.

Aanbeveling 1: Verdere navorsing word ten opsigte van die verligtingsintensiteit van die gedompte ligte in verskillende rigtings aanbeveel.

Aanbeveling 2: Daar word aanbeveel dat ondersoek ingestel word na die tegniese realisering van 'n verlaging in die intensiteit (bv. deur 'n stelbare vermindering van die ligvloed van die lampe) van die (aangepaste) gedompte kopligte ten einde 'n meer effektiewe seinstelsel vir die voorkant van voertuie te verkry.

Aanbeveling 3: Daar word aanbeveel dat die navorsing na die ander aspekte van die verbetering van voertuigverligting (gepolariseerde kopligte, geïntegreede verligtingstelsels, ens.) voortgesit word.

Aanvaar: Nog iets word by voertuigverligting tussen die gedompte en skerp lig vereis.

PADVERLIGTINGSINSTANDHOUDING

Ten opsigte van lampvervanging, skoonmaak en algemene meganiese, optiese en elektriese instandhouding, is die volgende aanbeveling aan TC-4.6 voorgelê en oor die algemeen aanvaar.

1. **Lampvervanging**

As aan die een kant geneem word die byna totale ophoping op 'n groot aantal paaie en aan die ander kant die lang lewensduur van ontladingslampe, is daar al hoe meer belangstelling in die uitskakeling of dan minstens vermindering van die besoeke om gefaalde lamp op te spoor — behalwe in groot stede waar die vervanging van afsonderlike lampe op belangrike deurpaaie nie sonder meer uitgeskakel kan word nie — en die algemene vervanging van alle lampe op dieselfde roete of sektor na 'n sekere aantal werkure wat ver genoeg onder die gemiddelde lewensduur is om 'n lae persentasie gefaalde lampe te gee. Hierdie metode veronderstel dat dit moontlik is om nie toe te gee aan plaaslike aandrang ten opsigte van die vroeë faling van 'n lamp nie en, in beginsel, dat geen vervanging van lampe buite die algemene vervanging op die bepaalde tye gedoen sal word nie. Dit blyk egter dat in hierdie geval 'n besoek na 100 werkure wenslik is om lampe op te spoor wat gefaal het kort na dit in gebruik geneem is.

Onder sulke omstandighede is algemene vervanging die ekonomieste metode as ook die praktieste metode aangesien dit in die dag uitgevoer kan word en dus voorkom dat instandhoudingspersoneel aan die gevare van nagverkeer blootgestel word en daar ook voorkom word dat die omgewing deur die geraas van enjins, leersperratte ens. gesteur word. Dit is ook uit 'n sekuriteitsoogpunt beter aangesien mens dan nie met lewendige geleiers werk nie.

Voordeel kan tydens algemene vervanging getrek word om alle lopende instandhouding op die lamp en apparatuur te doen, d.w.s. skoonmaak van die lamp;
Korrekte fokussering van die lamp;
Skoonmaak van die apparatuur en veral die optiese stelsel;
Kontrolering van hulpapparaat; en
Kontrolering van die meganiese dele van die apparatuur.

Inligting oor die optimum aantal werkure vir elke tipe lamp voordat 'n lamp vervang moet word, moet van die vervaardiger verkry word.

2. **Skoonmaak**

Oor die algemeen en veral waar die besoedeling erg is, is dit nie moontlik om slegs te vertrou op skoonmaak wat tydens algemene vervanging uitgevoer word.

ling lights). Now, one can compare the requirements regarding vehicle front signalling lights with the current practice. All vehicles have at least three different types of lights at the front (direction indicators and other signalling lights that are used only occasionally, are not included).

(a) side lights, parking lights. ECE required 5 cd 1 60 cd.

(b) low beam headlamps. Here, even within ECE, some variety does exist ("E" type, "H" type, the Anglo American types, etc.).

Under laboratory conditions, the above-the-horizon-intensity (the one of importance for signalling) is between 200 cd and 1 000 cd per lamp, a value which may easily be doubled or even trebled as a result of misalignment, dust, rain, vehicle loading, etc. In contrast, as a result are sometimes less than half.

(c) High beam headlamps. Here only a few regulations exist. Most vehicles have between 100 000 and 400 000 cd in total.

Recommendation 1: Further research is recommended regarding the luminous intensities in different directions of the "low beam headlamps".

Recommendation 2: It is recommended that the technical realisation for reduction in intensity (e.g. by an adjustable reduction of the luminous flux of the lamps) of the (adapted) low beam headlamps be investigated in order to arrive at a more effective signalling system for vehicle fronts.

Recommendation 3: It is recommended that research in other respects regarding the improvement of vehicle lighting (polarised headlights, integrated lighting systems, etc.) be continued.

Resolved: Something is needed between low beam and passing beams for automobile lighting.

ROAD LIGHTING MAINTENANCE

On lamp replacement and cleaning and general mechanical, optical and electrical maintenance, the following recommendations were put forward to TC-4.6 and generally accepted:-

1. **Lamp Replacement**

Taking on one hand the more or less total congestion on a large number of roads and on the other the long lives of discharge lamps, there is more and more interest in eliminating, or at least reducing, visits to check for failed lamps, except in big cities, where individual lamp replacements in important thoroughfares cannot reasonably be dispensed with, and in making group replacements of all the lamps on the same route or in the same sector after a number of hours of burning sufficiently lower than the average lamp life to ensure a low percentage of failed lamps. This method presupposes that it is possible not to yield to local demands concerning the premature failure of a lamp and, in principle, that no lamps will be replaced before the group replacement date. Nevertheless, in this case, at the end of 100 hours of burning, a visit to check on lamps which may have failed shortly after being brought into service appears to be a wise precaution.

In such conditions, group replacement constitutes the most economic method as well as the most practical since it can be carried out by day and thus avoid exposing maintenance staff to the dangers of night traffic and disturbing the neighbourhood with the noise of engines, ratchets of ladders, etc. Also, it is better from the security point of view, since one does not need to work on live conductors.

Advantage can be taken on the occasions of group replacement to make all the running maintenance on the lamp and luminaire, i.e.:-
Cleaning of the lamp
Correct focussing of the lamp
Cleaning of the luminaire and particularly of the optical system
Checking of auxiliary apparatus
Checking of the mechanical parts of the luminaire.

As to the optimal number of hours of burning at the end of which the lamps should be replaced, information on each particular type of lamp should be obtained from the manufacturer.

2. **Cleaning**

In general and particularly in heavily polluted zones and on routes carrying heavy traffic, it is not possible to rely solely on cleaning carried out during group re-

'n Subveelvoud van die siklus vir algemene vervanging moet dus vir die skoonmaaksiklus aanvaar word (in Londen alle toebehores elke vier weke). Ten spyte van die mees metodiese en versigtige instandhouding, herwin die installasie nooit die aanvanklike vloed wat tydens die ingebruikneming gemeet is nie. Skoonmaak moet in elke tussenpoos tussen twee algemene vervangings uitgevoer word. Waar algemene vervanging aan die einde van sê 8 000 uitgevoer word, moet die skoonmaak een maal per jaar plaasvind.

3. **Meganiese instandhouding**

Periodieke kontrole (ongeveer jaarliks) van die fondament en loodregtheid van die kolom, toestand van die deur, as en steun, oriëntasie van die steun en al die meganiese dele van die apparaat met insluiting van boute en skroewe.

4. **Elektriese en optiese instandhouding**

Kontroleer elke 12 tot 18 maande die korrekte aarding van kolomme, muursteune, seinpale en verkeerseine waar verligting voorsien word.

Kontroleer vir die goeie isolasie van al die metaalelemente van die installasie, met inbegrip van die apparature.

Periodieke kontrole (elke twee jaar) van die verdelingstelsel.

Periodieke kontrole (elke twee jaar) van die toestand van al die geleiers in die kolom en steun tot by die lamp. Hierdie kontrole moet alle skakelborde, klokke, relês, tele-instruksiestelsels, kontaktors, transformators, hulpapparaat, sekerings en sokke insluit en moet ook die toets van die korrekte fokussering van die lampe en die korrekte oriëntasie van apparature en die periodieke kontrole van die isolasie en die herstel van moontlike foute insluit.

Periodieke meting van die illumanansie of luminansie van die pad.

Instandhouding van verkeersligte wanneer dit met openbare verligting verband hou.

OPMERKING: Geen presiese tydperk vir kontroles kan gegee word aangesien dit nou verband hou met klimaatstoestande.

5. **Instandhouding van korrosiebeskerming en verfwerk**

Vir staalkolomme word 'n volledige en doeltreffende behandeling deur warmdoempelgalvanisering met volledige onderdompeling van die kolom in die bad verkry — as die galvanisering van 'n goeie gehalte is. So 'n bewerking maak dit onnodig om die basis van die kolom teen roes te beskerm deur die metaal te verdik.

Dit is nodig om 'n sistematiese program van kontrolering van die korrosiebeskerming en die toestand van die verfwerk daar te stel. Hierdie program kan dié volgende insluit vir staal pale met insluiting van die voetstuk:-

(a) Elke 5 tot 7 jaar volledige oorverf met insluiting van:-
- — harde afborsel van die geoksideerde oppervlak,
- — toepaslike behandeling van alle geverfde oppervlakke;
- — noukeurige aanwending van 'n laag roeswerende beskerming op alle oppervlakke wat voorheen geskuur is; en
- — aanwend van 'n verf met 'n alkiedbasis.

(b) Elke 3 jaar 'n beperkte opknapping wat bestaan uit die aanwend van 'n laag verf met 'n alkiedbasis na voorsorgbehandeling van alle verweerde oppervlakke — As hierdie opknapping metodes uitgevoer word, is dit moontlik om die volledige oorverf tot die einde van 8 tot 10 jaar uit te stel aangesien dit maklik is om korrosie by die eerste verskyning te behandel.

Die verf wat op alle metaaldele aangewend word, moet voorafgegaan word deur 'n laag rooilood plus 'n laag roeswerende verf. 'n Goeie verf behoort minstens sewe jaar in gemiddelde vogtige klimaat te hou.

So ver betonpale aangaan, is daar byna geen noodsaaklikheid vir die eerste 8 tot 10 jaar nie.

Na hierdie tydperk is dit raadsaam om seker te maak dat geen sementemeniskus losgeraak het nie — veral om die deur in die voetstuk van die kolom.

Aluminium- en poliësterkolomme vereis byna geen instandhouding nie.

OPMERKING: Daar kan geen absolute tydperk vir hierdie bewerkings gegee word nie aangesien dit baie van klimaattoestande afhang.

placement. A sub-multiple of the cycle for group replacement must therefore be adopted for the cleaning cycle. (In London all fittings every 4 weeks). In spite of the most methodical and careful maintenance, the installation never completely recovers its initial flux measured at the time of bringing into service. Cleaning should be carried out between each interval separating two group replacements. Where group replacements are carried out at the end of say 8 000 hours, the cleaning should take place once a year.

3. **Mechanical Maintenance**

Periodical check (about yearly) of the foundation and the perpendicularity of the column, state of door, shaft and bracket, orientation of the bracket and all mechanical parts of the luminaire, including bolts and screws.

4. **Electrical and Optical Maintenance**

Check every 12 or 18 months for correct earthing of the columns, wall brackets, signal posts and traffic signs provided with lighting.

Check for good insulation of all the metal elements of the installation, including the luminaires.

Periodic check (every 2 years) of the distribution system.

Periodic check (every 2 years) for good state of all conductors inside the column and bracket up to the lamp.

This check must include switchboards, clocks, relays, telecommand systems, contactors, transformers, auxiliary apparatuses, fuses, sockets and also the verification of the correct focussing of the lamps and the orientation of luminaires, inspection of the insulation and repair of incipient faults.

Periodic measurement of the illuminance or luminance of the carriageway.

Maintenance of traffic lights which may be connected with public lighting.

N.B.: No absolute period of checking can be given, since this strongly depends upon climatic conditions.

5. **Maintenance of Corrosion Protection and Paintwork**

For steel columns, a complete and effective treatment is obtained by hot galvanising with complete immersion of the column in the bath, provided the galvanizing is of very good quality. Such an operation renders unnecessary any protection of the base of the column against rust by means of a thickening of the metal.

It is necessary to establish a systematic programme of checking of the corrosion protection and the state of repair of paintwork. For steel columns including base this programme can comprise:-

(a) Every 5 to 7 years, complete repainting including:-
- — brisk scratching of oxydized surface,
- — appropriate treatment of all painted surfaces,
- — careful application of a coat of anti-rust protection to all surfaces previously perfectly scoured,
- — application of a coat of alkyd based paint.

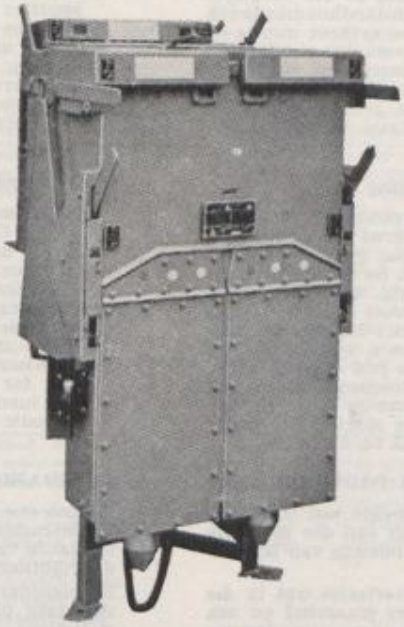
(b) Every 3 years, a limited renovation comprising the application of a coat of alkyd based paint after protective treatment of corroded surfaces. This procedure carried out methodically, often makes it posible to put off complete re-painting till the end of 8 to 10 years, since it is easy to deal with corrosion at its first appearance.

Painting of all metallic parts should be preceded by the application of a coat of red lead plus a coat of anti-rust paint. A good paint should last about seven years in temperate humid climates.

As far as concrete columns are concerned, there is practically no need for any protection or maintenance during the first 8 to 10 years. After this time it is sensible to ensure that no meniscus of cement has become detached, particularly around the door in the base of the column.

Aluminium and polyester columns need practically no maintenance.

N.B.: No absolute period can be given for these operations, since this depends strongly upon climatic conditions.



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6. **Instandhouding van verligtingsinstallasies by boogbrûe en verhoogde paaie**

Aangesien brûe, boogbrûe en verhoogde paaie duur strukture is, word hulle slegs gebou as die verwagte verkeer die uitgawe regverdig. Instandhoudingswerk moet dus gedoen word wanneer die verkeer min is — wat versiening duur maak. Mens moet dus vir die verligting van hierdie strukture stewig en duursame materiaal kies waarvan die instandhouding maklik en teen redelike lang tussenpose gedoen kan word sonder verswakking van die prestasie van die installasie.

7. **Instandhouding van hoëmas-verligting**

Ligtoebehores met 'n hoë monteerhoogte bestaan gewoonlik uit 'n mas, verskeie lanterns en 'n vaste of mobiele platform wat bo-op die mas gemonteer is en waaraan die lanterns gemonteer is. So ver dit die mas aangaan, moet die instandhouding uitgevoer word soos in 5 aanbeveel word. Aangesien die hoë hoogte die versiening moeiliker maak, moet die mas verkieslik van 'n materiaal wees wat min instandhouding vereis. Wanneer maste ver van 'n pad opgerig word, is dit nodig om vir elkeen 'n toegangspad te bou waarop instandhoudingsvoertuie kan ry. Die instandhouding van apparature en bronne moet al die periodieke bewerking insluit wat in 2, 3 en 4 beskryf is.

4. INDELING VAN APPARATURE VIR PADVERLIGTING

Ek dink een van die belangrikste aspekte wat in TC-4.6 bespreek was, was die veranderlikheid van die prestasie van padverligtingsinstallasies en die indeling van lanternintensiteitsverspreiding.

Deur die grootte van die praktiese variasies wat in die prestasie van padverligtingsinstallasies plaasvind en ook die gevoeligheidspeil van padverbruikers op veranderinge in prestasie te oorweeg, blyk dit dat 'n reseptegniek vir installasie-ontwerp ontwikkel kan word sonder om ernstige foute in te voer. Daar is egter 'n groter aantal lanternklassifikasies nodig as die twee of drie wat tans vir lanterns gebruik word. 'n Studie word dus onderneem waar 3 strekke van bereik, 4 strekke van beheer en 2 klasse van spreiding gebruik word om 8 klasse lanterns te identifiseer.

Dit is 'n interessante ondersoek en ontwikkeling en dit lei geen twyfel nie dat die Suid-Afrikaanse kode deur die uitslag van hierdie studies geraak sal word. Dit sal egter ook beteken dat openbare verligtingsliggame eindelik in staat sal wees om padverligtingsinstallasies te installeer onderworpe aan minimum veranderings in prestasie deur die korrekte tipe lantern uit 'n groter aantal lanternklassifikasies te kies.

5. TC-4.6 — SPORTVERLIGTING

Wat TC-4.4 — Sportverligting — aangaan, is tegniese verslag 28 "The lighting of sports events for colour TV broadcasting" voltooi en dit is van SANCI beskikbaar vir diegene wat in hierdie onderwerp belangstel.

'n Interessante stelling wat in die verslag van die voorsitter van TC-4.4 gemaak word, is dat sportverligting oor die algemeen meer 'n geval van praktiese ondervinding as teoretiese ondersoek is en die aanbevelings is dus op hierdie feit gegrond.

6. GEVOLGTREKKING

My persoonlike waarneming van die bedrywighede van die CIE is dat dit belangrik en in belang van alle openbare verligtingsingenieurs en plaaslike owerhede wêreldwyd is om op hoogte van moderne ontwikkelinge te bly as aanvaarbare en ekonomiese verligtingstandaarde volgehou moet word. In die opsig het die VMEO ook 'n belangrike rol om te speel so ver dit Suid-Afrika aangaan en toekomstige deelname aan CIE-sessies is nodig as ons verligtingstandaard wil volhou wat internasionale erkenning sal geniet.

Ten besluite wil ek die VMEO bedank vir sy bydrae wat my in staat gestel het om die CIE-sessie in Londen by te woon en ek vertrou dat hierdie kort verslag sowel insiggewend as interessant sal wees.

6. **Maintenance of the Lighting Installations of Viaducts and Elevated Roads**

Bridges, viaducts and elevated roads, being costly structures, are built only when the expected traffic justifies the expense. Hence maintenance operations must be dealt with during the hours of low traffic, which makes the servicing expensive. Thus, for the lighting of these structures, one must select robust and durable materials, the maintenance of which is easy and required only at long intervals, without deterioration of the performance of the installation.

7. **Maintenance of High Mast Lighting**

Hogh mounted lighting generally comprises a mast with a fixed or movable platform, situated at the top of the mast, bearing the lanterns. As far as the mast is concerned, the maintenance should be carried out as recommended in 5. As the great height makes the servicing more difficult, the masts should preferably be made of a material requiring little maintenance. When masts are erected far from any carriageway, it is necessary to build, for each of them, an access way for maintenance vehicles. The maintenance of the luminaires and sources should include all the periodic operations described in 2, 3 and 4.

4. LUMINAIRE CLASSIFICATION FOR ROAD LIGHTING

I think one of the most important aspects that came up for discussion in TC-4.6 was road lighting installation performance variability and classification of lantern intensity distribution.

By considering the magnitude of the practical variations that take place in the performance of road lighting installations and the level of sensitivity of road users to changes of performance, it appears that a "recipe" technique could be evolved for installation design without introducing serious errors. However, then a larger number of lantern classifications is required than the two or three that are being used for lanterns at present. A study is therefore being done in which 3 ranges of "throw", 4 ranges of "control" and 2 ranges of "spread" are to be used to identify 8 classes of lantern.

This is an interesting investigation and development and no doubt the South African Code will be affected by the outcome of these studies. This will, however, also mean that public lighting authorities will eventually be able to install road lighting installations subject to minimum changes in performance by choosing the correct type of lantern out of a larger number of lantern classifications.

5. TC-4.4 — SPORTS LIGHTING

Regarding TC-4.4 — Sports Lighting — Technical Report No. 28, "The lighting of sports events for colour TV broadcasting", has been completed and is available from SANCI for those interested in this subject.

An interesting statement made in the report by the Chairman of TC-4.4 is that "sports lighting" in general is more a case of practical experience than one of theoretical investigations and recommendations are therefore based on this fact.

6. CONCLUSION

My personal observation of the activities of the CIE is that it is important and in the interest of all public lighting engineers and local authorities all over the world to keep abreast of modern developments if acceptable and economical standards of lighting are to be maintained. In this respect the AMEU also has a major role to play as far as South Africa is concerned and future participation in CIE Sessions will be advisable if we are to maintain standards of lighting which will receive international recognition.

In conclusion, I wish to thank the AMEU for its contribution in enabling me to attend the CIE Session in London and trust that this brief report will prove to be both informative and interesting.

J. K. VON AHLFTEN,
VMEO-afgevaardigde/AMEU Delegate.

TERMINOLOGIE VIR PADTIPES

Term	Beskrywing van tipe pad	Ooreenstemmende term in ander CIE-tale
Pad	'n Algemene term wat enige openbare weg vir die doeleindes van voertuigverkeer aandui.	Road (B), Roadway (USA, CD), Voie publique (F) Strasse (D)
Straat	'n Pad wat gedeeltelik of heeltemal deur geboue aan een of beide fronte gedefinieer word.	Street (L) Street (USA, CD), Rue (F) Stadstrasse (D)
Motorweg	'n Pad wat vir motorverkeer gereserveer is en wat slegs van gegradeerde afsonderlike wisselaars toeganklik is en waarop, in besonder stilhou en parkering verbode is.	Motorway (B) Freeway (USA, CD) Autoroute (F) Autobahn (D)
Snelweg	'n Pad wat soortgelyk is aan 'n motorweg, maar sonder een of ander eienskap van 'n motorweg, bv. nie dubbelryvlak nie (PIARC) nie heeltemal toegangsbeheerd nie (USA), nie alle toegange is gegradeerd nie (USA).	Express road (B) Expressway (USA, CD) Voie express (F) Schnellverkehrsstrasse (D)
Aldoelpad	'n Pad wat deur alle verkeer (insluitend voetgangers en fietsryers) gebruik kan word.	All-purpose road (B) Route ordinaire (F) Offentliche Strasse (D)
Hoofpad	'n Hoofroete in die deurkommunikasiestelsel van 'n land.	Trunk road, major road (B) Major highway (USA, CD) Arterial h'way (USA, CD) Route à grand traffic Route primaire (F) Hauptverkehrsstrasse Verkehrsstrasse (D)
Ondergeskiktepad	'n Pad wat 'n laer verkeerswaarde het, of waaraan 'n laer verkeerswaarde toegeken is as 'n hoofpad.	Minor road (B) Minor highway (USA, CD) Route secondaire (F) Nebenstrasse (D)
Ringpad	'n Pad om 'n stedelike gebied wat verkeer in staat stel om die stedelike gebied te vermy.	Ring road (B) Belt highway (USA, CD) Voie de ceinture, Rocade, Boulevard périphérique (F) Ortsumgehung, Ringstrasse (D)
Radiale	'n Pad wat direkte kommunikasie tussen die sentrum van 'n stedelike gebied en die omliggende distrikte voorsien.	Radial road (B) Radial highway (USA, CD) Radiale (F), Radialstrasse, Einfallstrasse Ausfallstrasse (D)
Handelstraat	Straat met 'n front wat uit 'n hoë persentasie handelspersele (wat gewoonlik nie snags verlig is nie) bestaan en wat 'n hoë persentasie goederevoertuie in die verkeerstroom het.	Commercial street (B, USA, CD) Rue commercante (F) Industriestrasse (D)
Winkelstraat	Straat met 'n front wat uit 'n hoë persentasie winkels en ander persele bestaan wat snags verlig kan wees en met swaar voetgangerverkeer (en moontlik ook fietsverkeer).	Shopping street B, USA, CD) Rue commercante (F) Geschäftsstrasse (D)
Woonstraat	Straat, waar die grootste deel van die front uit private woonhuise bestaan.	Resdental st. (USA, CD) Voie (ouille'e) Residentielle (F) Wohnstrasse (D)
Versamepad	'n Verbinding tussen die radiale of ringpad en die plaaslike toegangstrate.	Collector road (B) Collector r'way (USA, CD) Sammelstrasse (D) Verbindingstrase (D)
Plaaslikestraat	'n Straat wat direkte toegang tot geboue en persele gee met 'n minimum van deurverkeer.	Local street (B) Local roadway (USA, CD) Coie de desserte totale (F) Anliegerstrasse (D)
Dienspad	'n Ondergeskikte pad, gewoonlik parallel met die hoofpad, wat toegang tot persele gee.	Service road (B) Frontage road (USA, CD) Chaussée de desserte (F) Anliegerfahfbahn Ortsfahrbahn (D)
Voetpad	Die deel van 'n pad wat uitsluitlik vir voetgangers gereserveer is.	Footway (B) Sidewald (USA, CD) Trottoir (F) Gehweg (D)
Fietspad	'n Weg of deel van 'n pad wat vir gebruik deur slegs fietse gereserveer is.	Cycle track (B) Bicycle path (USA, CD) Piste cyclable (F) Radweg (D)

TERMINOLOGY FOR ROAD TYPES

Term	Description of Type of Road	Corresponding term in other CIE languages
Road	A general term denoting any public way for a purpose of vehicular traffic.	Roadway (USA, CD) Voie publique (F) Strasse (D)
Street	A road which has become partly or wholly defined by buildings along one or both frontages.	Street (SA, CD) Rue (F) Stadtstrasse (D)
Motorway	A road reserved for motor traffic, accessible only from grade de-separated interchanges and on which, in particular, stopping and parking are prohibited. Roads of this type should have two or several separate and one way carriageways.	Freeway (USA, CD) Autoroute () Autobahn (D)
Express Road	A road similar to, but lacking some feature of, a motorway, e.g. not dual - carriageway (PIARC), not fully access-controlled (USA) not all intersections grade-separated (USA).	Expressway (USA, CD) Voie Express (F) Schnellverkehrs-strasse (D)
All-Purpose Road	Road usable by all traffic (including pedestrians and cyclists). Used to distinguish other roads from motorways.	Route ordnaire (F) Offentlichestrasse (D)
Trunk Road Major Road	A main route in the through communication system of a country.	Major highway (USA, CD) Arterial h'way (USA, CD) Route à grand traffic (F) Route primaire (F) Hauptverkehrstrasse (D) Verkehrsstrasse (D)
Minor Road	A road which has, or to which is assigned, a lesser traffic value than that of a major road.	Minor Highway (USA, CD) Route secondaire (F) Nebenstrasse (D)
Ring Road	A road round an urban area enabling traffic to avoid the urban centre.	Belt Highway (USA, CD) Voie de ceinture (F) Rocade (F) Boulevard périphérique (F) Ortsumgehung (D) Ringstrasse (D)
Radial Road	A road providing direct communication between the centre of an urban area and the outer districts.	Radal Hghway (USA, CD) Radiale (F) Radialstrasse (D) Einfallstrasse (D) Ausfallstrasse (D)
Commercial Street	Street with frontages comprising a high proportion of commercial premises (usually unlit at night), and with a high proportion of heavy goods vehicles in the traffic stream.	Commercial Street (USA, CD) Rue commercante (F) Industriestrasse (D)
Shopping Street	Street with frontages comprising a high proportion of shops or other premises which may be lit at night and with heavy pedestrian (and possible pedal cycle) traffic.	Shopping Street (USA, CD) Rue commercante (F) Geschäftsstrasse (D)
Residential Street	Street with the majority of frontages comprising private houses.	Resdental st. (USA, CD) Voie (ou allée) residentielle (F) Wohnstrasse (D)
Collector Road Distributor Road	A link between the radial or ring roads and the local access streets.	Collector r'way (USA, CD) Sammelstrasse (D) Verbindungsstrasse (D)
Local Street	Street giving direct access to buildings and land with a minimum of through traffic.	Local Roadway (USA, CD) Coie de desserte locale (F) Anliegerstrasse (D)
Service Road	A subsidiary road, usually paralled to the major road and giving access to premises.	Frontage Road (USA, CD) Chaussée de desserte (F) Angliegerfahrbahn (D) Ortsfahrbahn (D)
Footway	That portion of a road reserved exclusively for pedestrians.	Sidewalk (USA, CD) Trottoir (F) Gehweg (D)
Cycle Track	A way, or part of a road, reserved for use only by cycles.	Bicycle Path (USA, CD) Piste cyclable (F) Radweg (D)

MR. J. K. VON AHLFTEN, Springs:

Mr. President, there are some corrections to be made in the report as printed. On page 5 the words "research into road lighting" have been left out in the third paragraph from the top, which should read: "International participation in future IEC Sessions by an AMEU sponsored delegate is recommended, as research into road lighting as it affects Municipal Authorities . . ." Then in the second last paragraph, in Dr. Einhorn's proposal, which is a very important one, the words "for the length of fluorescent lamps which are internationally standardised", have been left out after the word "made", in other words the modules must fit into nationally standardised lamp lengths. Unfortunately this was left out in the translation. Next I would just like to refer to page 3 of the CIE Report. I think an interesting deduction was made that, regarding road lighting and accidents, it was the general opinion that on "inter-city motorways" (the American term), road lighting has only a small influence on road accidents, whereas on city motorways like the M1 and M2, road lighting definitely influences road accidents. The other important point I would like to refer to, Mr. President, is that as far as classification of road lighting and lanterns is concerned, you will see on page 8 that the new approach will be to do away with the cut off, semi cut off and medium angle and to go for three ranges of throw, 4 ranges of control and 2 ranges of spread. There will actually be 8 sizes of road lanterns, giving the user a larger selection to choose from when undertaking a particular installation. As far as normal lighting is concerned, it was very interesting to note at CIE that there seems to be a problem with the high beam and low beam lighting and that something in between these will be required. This is being pursued by the relevant Committee. That is all, Mr. President.

MR. A. H. L. FORTMANN, Boksburg:

Mr. President, thank you for extending the invitation to me to open the discussion on the report on SANCI.

Natal had the honour of winning the "double" in cricket this past season by taking both the Gillette Cup and Currie Cup. Although he did not achieve the "double" during the same year, Mr. Von Ahlften was elected AMEU President a few years ago and only last month at the SANCI Congress held in Port Elizabeth, he was elected President of SANCI — a praiseworthy achievement and I would like to take this opportunity of extending to him my heartiest congratulations on his election. Mr. Von Ahlften is our representative on SANCI, and as such was responsible for compiling this report. His report covers the two annual general meetings and congresses of 1975 and 1976 as well as the 18th Session of the CIE, London, held during September, 1975.

To those of us who give these reports a fleeting glance, I would like to say, give the matter a little more thought and consider what is involved in compiling these reports. I can assure you the time put into them amounts to many hours of hard work and, with this in mind, I wish to place on record our sincere appreciation for the excellent report.

I would like also to endorse Mr. Von Ahlften's comment regarding Mr. Barton's valuable contribution over many years as the AMEU representative on SANCI prior to 1975.

Lighting in all its different forms fascinates the mind, be it of the laymen or the engineer and it is therefore not surprising when we read that in Kimberley, way back in 1882, at sunset each evening thousands of natives stood spellbound to see the arc lamps light up simultaneously.

Well, we have come a long way since those days and today lighting serves mankind in many varied ways. We have, however, got so used to lighting that we are sometimes apt to forget its real value. Here I think especially of lighting on our roads and highways. Numerous papers have been presented concerning the effect good lighting on roads has in saving lives and hundreds of thousands or even millions of Rand by curbing vehicle accidents, not to mention the pleasure it gives of driving along well-lit roads and the safety it holds for pedestrians.

A recent report drawn up for the AA shows the drastic reduction in night accidents obtained from good lighting.

On trunk roads there is a reduction of 40% in accidents, compared with roads with no lighting.

On urban or class "B" type roads there is a reduction of 30% in accidents compared with unlit roads.

On motorways this reduction is 50%.

In 1973 the Financial Mail carried a report stating that the total cost arising from accidents on our roads amounted to R203 000 000. The cost of accidents which occur at night on unlit roads amounts to R60 000 000 per annum.

When one takes the lowest figure of 30% reduction in accidents for lit roads, the saving on night accidents should amount to R18 000 000 per annum.

A further consideration of good lighting is prevention of crime. About 1972 Brigadier Van Keyserlingh prepared a report covering the Witwatersrand area, in which he stated that in streets with poor lighting there is an increase in crime of 190% compared with streets with good lighting and in streets with no lighting compared with streets with good lighting there is an increase in crime of two-and-a-half times (250%).

In spite of this, many of our Municipal Engineers and Councillors do not recognise the significance of efficient and good lighting.

The greater the numbers of members of SANCI, the greater the chances are of success in solving the problems of lighting research development, as reflected by Mr. Dempster in his Presidential Address in Johannesburg during 1976.

In this regard I make a sincere plea to all non-members of SANCI to give their assistance by getting involved in SANCI matters and to give their earnest consideration to becoming members. Local authorities, large and small, are urged to encourage their Engineers and Technical Assistants to attend the lighting courses which are offered by some of our institutions. ILESA offers lighting courses, but I feel they are not doing enough to publicise what they have to offer. In this regard I would like, on behalf of all the AMEU members, to ask Mr. Von Ahlften to raise this question of courses offered by ILESA with SANCI so that details can be made available and for a little more publicity to be given to ILESA. This can only be to the benefit of local authorities.

Tydens die 1976 SANKV Kongres is 'n belangrike voorstel deur Dr. Einhorn ingedien, en wat ook deur SANKV aanvaar is, waar onder andere die Instituut van Argitekte gevra word om boumodules so te standardiseer dat fluoresseerlampe met standaard grotes maklik in die plek van modules sal pas. Graag verneem ek van mnr. Von Ahlften of hy enige inligting oor die vordering wat in hierdie verband gemaak is, het.

Ons neem met trots kennis van die feit dat mnr. Von Ahlften afgevaardig was om die Internasionale Kommissie oor Verligting se 18e vierjaarlikse sessie gedurende September 1975 in London by te woon. Sy teenwoordigheid daar is vir al die Munisipale Ingenieurs van belang omdat hy met tegniese komitee TC 4.6 wat met straatverligting gemoeid is, betrokke was.

Kyk ons na die dertien items wat oor hierdie enkele onderwerp van verligting, naamlik komitee TC 4.6 bestudeer word, besef 'n mens hoe baie werk daaraan verbonde is.

Ek wil dan ook mnr. Von Ahlften se gevolgtrekking beaam waar hy onder andere sê:-

> ". . . dat dit belangrik en in belang van alle openbare verligtingsingenieurs en plaaslike owerhede wêreldwyd is om op hoogte van moderne ontwikkelinge te bly . . ."

Verskoon my mnr. die President as ek weereens terugkom na my vorige beroep dat die nie-lede van SANKV tog lidmaatskap van SANKV ernstig oorweeg en dat alle plaaslike besture lede van hulle personeel aanmoedig om dieper kennis van verligting op te doen.

And with that, Mr. President, I would like to propose the adoption of this report. Thank you, Mr. President.

MNR. J. A. LOUBSER, Benoni:

Mnr. die President, net een versoek aan ons nuwe President van die SANKV en dit is die vergaderdatums van die SANKV. Dit lewer vir my 'n bietjie probleme op en ek is seker vir baie van die ander lede ook. Vanjaar was die vergaderdatum van SANKV plus minus twee of drie weke gelede te Port Elizabeth. As ek reg onthou, vier jaar gelede het die SANKV vergader te Pietermaritzburg in die week net voor die VMEO-kongres. Dit het ons baie goed gepas, want dan kan ons net een afgevaardigde stuur om albei by te woon. Net in 'n poging om koste te bekamp, mnr. President, sal dit waardeer word as mnr. Von Ahlften dalk so iets vir ons kan reël in die toekoms. Baie dankie.

MNR. J. K. VON AHLFTEN, Springs:

Mnr. die President, die SANKV het verlede week op sy vergadering die besluit van die algemene vergadering oorweeg, nl. dat die kongresse in die toekoms in Septembermaand gehou sal word. 'n Verdere gedagte wil ek net in u midde gooi, sê maar 'n klip in die bos: om koste te bespaar is die gedagte ook uitgespreek — ons sal dit opvolg en miskien kan die Uitvoerende Raad dit ook opvolg in die lig van wat mnr. Van der Walt in sy verslag gesê het oor die vierdaagse en driedaagse konferensies — daar is miskien 'n moontlikheid dat ons dit kan oorweeg om ons VMEO-konvensie vir drie dae te hou, Maandag, Dinsdag en Woensdag en moontlik die SANKV s'n op Donderdag en Vrydag — dit sal almal gelyktydig bymekaar bring; dit sal altwee verenigings op sterkte bring, en dit sal nie probleme skep nie. Ek noem

dit net as 'n moontlikheid, maar die algemene vergadering van die SANKV het besluit om nie gelyktydig met die VMEO te vergader nie, maar in die tweede helfde van die jaar. Dit was die algemene konsensus van die vergadering. Maar daar is 'n moontlikheid dat ons dit kan oorweeg, miskien bespreek by die Raadsvergadering Vrydag, om moontlik 'n driedaagse Konvensie saam met 'n twee daagse SANKV-konferensie te verbind.

MNR. E. de C. PRETORIUS, Potchefstroom:

Mnr. die President, in verband met die oproep wat mnr. Fortmann gedoen het op plaaslike besture om by die SANKV aan te sluit, wil ek net noem dat die posisie in Transvaal is dat allenlik plaaslike Besture met 'n jaarlikse inkomste van twee miljoen rand en meer, lid van die SANKV mag word.

MNR. A. A. MIDDLECOTE, SABS:

By my bedanking van mnr. Von Ahlften vir sy uitstekende verslag oor die IEK wil ek ook graag my dank uitspreek teenoor die lede van die VMEO vir die hulp wat hulle aan die SABS verleen het met sy werksaamhede op internasionale vlak.

Enigeen wat kennis dra van die belangrike rol wat internasionale handel in die ontwikkeling van 'n land speel, sal besef hoe belangrik dit is dat ons aan die opstel van internasionale standaarde vir elektriese uitrusting kan deelneem. Ons voer nie alleen elektriese uitrusting in nie, maar het ook geweldig groot potensiaal vir uitvoer, wat sekerlik verwesenlik sal word sodra ons uit die huidige tydelik ongunstige politieke fase beweeg het. Dit moet eenvoudig vir ons moontlik wees om dit wat ons nodig het op die internasionale markte te koop en om dit te verkoop waarna ander lande vra.

Daarom is dit belangrik dat ons in daardie komitees verteenwoordig moet wees — (onthou daar is tans 87 tegniese komitees) — wat vir ons ekonomie van belang is. In hierdie verband moet ek noem dat ek verheug is oor VMEO se benadering van die probleem. Standaardisering in 'n vroeë stadium is altyd wys. Dit het ondervinding ons geleer. Indien daar in 'n later stadium probeer word om swaar en basiese elektrotegniese uitrusting soos motore, skakeltuig en kabels en begrippe soos spanningswaardes te standardiseer, bring dit uitgerekte samesprekings mee om 'n ooreenkoms oor 'n internasionale standaard te bereik, en selfs aan die einde is daar nog 'n mate van kompromie. Internasionale standaarde oor onlangse tegnologie, soos elektroniese komponente, vastetoestandtoestelle en laserapparate, is binne 'n kort tydperk na ontwikkeling afgehandel en het baie min kompromie meegebring.

Participation in the IEC is very rewarding. The IEC is the oldest International Standardisation Organisation, having been formed in 1904, over forty years before the International Standards' Organisation which covers the other branches of engineering and technilogy. We of course are not surprised since we are used to electrical engineers leading.

The first President of IEC was Lord Kelvin and he was followed by Professor Elihu Thompson. South Africa was represented at the first General Meeting held in 1906 by Mr. Lee Murray, and was one of 12 countries attending.

South Africans continued to attend meetings occasionally as a branch of the British Engineering Standards Association, but it was only in 1921 that the South African Electrical Sub-Committee of the British Engineering Standards' Association requested Professors Orr and Buchanan and Dr. Bernard Price to interview the Minister of Mines and Industry with a view to having South Africa represented through the Union Government paying the annual subscription of £100. What happy days when we realise that South Africa now pays R9 000 per year and the United Kingdom R65 000.

In spite of this low fee, in typical Civil Service fashion, it was only in 1938 — 17 years later — that the Minister of Commerce and Industries finally agreed. Dr. Bernard Price attended the Council Meeting of the IEC in Torquay in 1938 as the first President of the South African National Committee.

When the SABS was formed it became the official body responsible for the South African National Committee of the IEC.

The first AMEU delegate to an IEC Meeting was my old friend, "Harvey" Theron, of Vanderbijlpark, when he attended the 1971 Meeting in Brussels. Then Jules von Ahlften in Athens and Eugene Pretorius in The Hague — he did wonderful work on the International Standard.

One learns a lot about communication when attending these international meetings. At the risk of boring you I would like to recount three episodes.

The first concerns the importance of good international nomenclature in meetings. At one meeting, concerned with electrical heating of buildings, the considerable discussion regarding the installation included requirements for the cold tails. After long discussion one delegate innocently asked — but what is a cold tail? There was an ominous silence. It took me, the Chairman, to break the tension by saying: It is the north European version of hot pants.

The second one may be remembered by Emil de Villiers when at the Bucharest Meeting of TC 64 of which I am Chairman. I was having some difficulty understanding what the Russian delegation really meant. After some efforts the interpreter of the Russian delegation — a charming lady called Olga — said:-

"Mr. President! The USSR delegation does not wish to delay the work of the committee so please proceed. At the teabreak we will ask the South African delegation to express our thoughts in good English".

And this happened with the USSR delegation seated alphabetically at the back flanked by the United Kingdom and USA while the South African delegation under its French name Afrique du Sud was seated at the front.

The third happened at a select party for Presidents of National Committees outside Munich. There was beer, German Champagne, umpha-umpha band and dancing. I enjoy dancing and at one stage the President of the USSR delegation came to me and said, "Mr. Middlecote — if in Council tomorrow we vote on the vital question of the best dancer of the IEC, the USSR National Committee will vote for South Africa."

I'm pleased that you, President Ken Robson, will be accompanying me to Moscow next week. We have already decided on a suitable code to replace the conventional S.O.S — it is "Please send the pepper" — to match the salt we might be compelled to dig.

With those words may I thank Mr. Von Ahlften for his report.

Verslag van die WNNR se Advieskomitee Insake Elektrotegniese Ingenieurswese

Hierdie verslag dek die werksaamhede van die Nasionale Navorsingsinstituut insake Elektrotegniese Ingenieurswese (NNEI) vir die afgelope twee jaar, want geen jaarverslag is in 1976 aan die Tegniese Vergadering te Rustenburg voorgelê nie.

U verteenwoordiger het die vergadering van die Advieskomitee in November 1975 bygewoon, maar was in November 1976 afwesig, aangesien die halfjaarvergadering van die Uitvoerende Raad toe plaasgevind het.

Die Advieskomitee kom jaarliks onder die voorsitterskap van die Vise-president van die WNNR byeen. Die werksaamhede van die NNEI word dan in hersiening geneem en die voorgestelde navorsingsprogram vir die komende jaar word bespreek. Die jaarverslae word om die beurt in Engels en Afrikaans voorgelê en 'n beknopte oorsig van die werksaamhede van die Afdeling vir Elektrotegniese Kragingenieurswese onder leiding van dr. R. B. Anderson, wat moontlik vir munisipale elektrisiteitsondernemings van belang kan wees, word gegee.

1. **WEERLIGMETING**

Die lecue-aandeel van die werk wat die afgelope twee jaar in die Afdeling vir Elektrotegniese Kragingenieurswese gedoen is, is gewy aan weerlignavorsing. Onder die hoofdoelwitte tel die bestudering van die uitwerking van weerlig op transmissie- en distribusiekragdrade, op hoë radiomaste en op gevoelige halfgeleidingstoerusting.

'n Landswye opmeting van weerligdigtheid is derhalwe met die hulp van 'n aantal instansies, waaronder EVKOM, die SAS en H, die HPK, die SAUK, ens., op tou gesit. Dit het die aanskaf van 400 weerligtellers behels, waarvan ongeveer 310 teen die einde van die weerligseisoen deur die Republiek en Suidwes-Afrika versprei was, met enkeles ook in Lesotho.

Van al die maande het Januarie die hoogste gemiddelde weerligdigtheidswaarde, hoewel nie noodwendig die maksimum vir enige jaar nie. Uit onlangse ontledings wil dit voorkom asof die wisseling van die weerligpatroon op die lange duur die elfjarige sonstralingsiklus navolg: die gegewens wat tot dusver gein is, dui daarop dat die maksimum weerligdigtheid tussen 1970 en 1973 voorgekom het, terwyl die 1975/76-seisoen s'n die laagste is wat sover opgeteken is. Selfs op die kort termyn getuig dié verskynsel by benadering van soninvloed.

2. **WEERLIGSTUWING OP KRAGSTELSELS**

Ondersoek word ingestel na weerligstuwing op 11 kv-kragdrade. Onklaarrakings en onderbrekings word deur 'n opnamestasie onder 'n 11 kv-draad geregistreer en dan geboekstaaf, sodat die foutsyfer deur middel van weerligtellers wat in die nabyheid opgestel is, met die weerligdigtheid in verband gebring kan word. Die waarde van hierdie werk berus daarin dat die verbreiding van oorspanning deur opmetings bepaal kan word en dan na frekwensie van die oorsaak, d.w.s. weerlig, herlei kan word.

Die meting van weerligstuwings op EHS-drade is veral van waarde omdat die volledige verbreiding van die oorspanningsgroottes van sodanige stuwings daardeur bepaal kan word. Die inligting is van grondliggende belang vir insig in die weerliggedrag van die verskillende transmissiedraadontwerpe.

3. **STELSELSTROORNISSE**

Dié is 'n nuwe hofie wat deur die Koördinerende Komitee: Hoogspanning ingevoer is om items soos die oorgangsverskynsel in nywerheidstelsels (vanweë skakeling en kortsluitings, byvoorbeeld), magnetiese wanbalans, die kwessie van bofrekwensie, penne en elektromagnetiese steurnis (EMS) te dek. 'n Groot deel van hierdie werk word in medewerking met ander Afdelings gedoen, en 'n EMS-groep is bygevolg in wording.

Wat die Elektrotegniese Kragingenieursafdeling betref, is ses ad hoc-ondersoeke die afgelope jaar op 'n kontrakgrondslag in samewerking met verskeie lede van die nywerheidsektor gedoen. 'n Interessante verwikkeling in dié verband was die gebruik van spanningsantennas om die bofrekwensie van Cabora Bassa se HS-g.s.-draad en van 'n 220 kv-transmissiedraad van EVKOM in die Noord-Kaap te meet. Die groot voordeel van die antenna-tegniek in dié gevalle was die feit dat die meting sonder kontak geskied en dat die spanning op enige deel van die draad bepaal kan word sonder om die lewering op te skort.

Report on the CSIR Advisory Committee for Electrical Engineering

This report covers the activities of the National Electrical Engineering Research Institute (NEERI) over the past two years as no annual reports were submitted to the Technical Meeting in Rustenburg in 1976.

Your representative attended the Advisory Committee meeting in November, 1975, but was absent in November, 1976, as this coincided with the date of the mid-year Executive Council meeting.

The Advisory Committee meets once a year under the Chairmanship of the Vice-President of the CSIR, when the work of NEERI is reviewed and the proposed research programme for the following year is discussed. The annual reports are submitted alternatively in English and Afrikaans and the work being done in the Power Electrical Engineering Division under Dr. R. B. Anderson, which may be of interest to municipal electrical engineers, is briefly reviewed.

1. **LIGHTNING MEASUREMENTS**

The major portion of the work done in the Power Electrical Engineering Division over the past 2 years was devoted to research into lightning. The principle objectives included the study of the effects of lightning on transmission and distribution power lines, on tall radio masts, and also on sensitive semiconductor equipment.

A national survey on lightning density was instituted with the aid of organisations including ESCOM, the SAR and H, the GPO, the SABC, etc., which involved the purchase of 400 lightning flash counters and of these approximately 310 had been distributed throughout the Republic and South West Africa by the end of the lightning season with some also installed in Lesotho.

The month of January had the highest mean value of lightning density, although not necessarily the maximum for any year. There is some evidence from recent analysis that long-term variations in lightning activity from year to year may follow the 11-year solar radiation cycle: among the data so far available the maximum lightning density occurred between 1970 and 1973 whereas the 1975/76 season was the lowest on record to date, and this roughly fits the evidence of solar influence even in the short-term.

2. **LIGHTNING SURGES ON SYSTEMS**

Lightning surges on 11 kv power lines are being investigated and records of faults and interruptions as recorded in a recording station beneath an 11 kv power line are kept so that the fault incidence may be related to the frequency of occurrance of lightning in the area. The value of this work lies in the distributions of overvoltages which can be obtained from these measurements and which can be related to the frequency of the cause, i.e. lightning.

Lightning surge measurements on EHV lines are of particular value since these enable complete distributions of the overvoltage magnitudes of such surges to be determined and this information is of fundamental importance in giving an understanding of the lightning performance of various transmission line designs.

3. **SYSTEM DISTURBANCES**

This is a new heading introduced by the High-Voltage Co-ordinating Committee to cover such items as transients in industrial systems (due to switching and short-circuits, for example), magnetic imbalance, harmonics, spikes and electromagnetic interference (EMI). Much of this work is being undertaken in collaboration with other Divisions, and as a consequence an EMI group is in the process of being established.

As far as the Power Electrical Engineering Division is concerned, six ad hoc investigations were carried out during the past year on a contract basis with various organisations in the industrial sector. An interesting extension of this work has been the application of the voltage antenna measuring technique to the measurement of harmonics on the Cabora Bassa HV-dc line and on a 220V kv EXCOM transmission line in the northern Cape. The main advantage of the antenna technique in these cases has been the fact that it is an out-of-contact measuring technique and that the voltage measurements can be carried out at any position along the line without interruption of the service.

4. **ISOLERING**

Die werk op hierdie gebied brei bestendiglik uit, veral met betrekking tot die toepassing van isolasietoetse om die dienlikheid van die verskillende isolasie-stelsels van hoogspanningsmotore te bepaal onderwyl die motore in gebruik is.

5. **ELEKTRIESE VOERTUIE**

Die Komitee insake Battery-aangedrewe Voertuie

Die Hoof van die Afdeling en een van die personeellede dien op die Komitee insake Battery-aangedrewe Voertuie, wat, onder die voorsitterskap van die Direkteur van die Instituut, belas is met die administrasie van navorsing en die advisering van die Departement van Nywerhede oor alle tegniese sake rakende battery-aangedrewe voertuie. Die Komitee is ook verantwoordelik vir die evaluering van prototipes of battery-aangedrewe produksiemotors wat vir toetsing beskikbaar gestel word, en moet ooreenkomstig sy bevindinge verslag doen. Die werk behels teoretiese ondersoek soos die ontleding van die faktore en parameters wat die gebruiksafstand bepaal wat 'n battery-aangedrewe voertuig met een lading kan behaal. Tweedens het voertuig-taksering die doel om 'n geskikte toetsmetodiek vir battery-aangedrewe voertuie te skep en om die meriete van prototipes wat deur die vervaardigers of hul agente voorgelê word, vas te stel.

Wat die taksering van batterye betref, word daar besef dat die vermoë van 'n battery-aangedrewe voertuig afhang van die battery self se vermoë. In gevalle waar die battery se spesifikasies onvolledig, twyfelagtig of onbekend is, word sodanige battery getakseer. Tot dusver is een tipe battery vir evaluering aan die Suid-Afrikaanse Buro vir Standaarde voorgelê, wat ten volle toegerus is om toetse van hierdie aard, wat die bepaling van die energie-digtheid en die lewensiklus met snelle lading-ontladingsdiens behels, te doen.

6. **ALGEMEEN**

Buiten die Afdeling vir Elektrotegniese Kragingenieurswese, is die volgende afdelings van die NNEI werksaam: outomatisering, elektronika van die vaste toestand, sinjaalverwerking, opleiding en inligting en elektroniese instrumentasie.

Ten slotte wil ek die Direkteur van die NNEI graag 'n pluimpie gee vir die volgehoue knap werk wat, ten spyte van 'n personeeltekort en beperkte verblyfgeriewe, in al die afdelings van die Instituut verrig word.

4. **INSULATION**

The work in this field is steadily expanding, mainly in the direction of the application of insulation tests to the assessment of the performance of various insulation systems in high-voltage motors during service.

5. **ELECTRIC VEHICLES**

The Battery-Driven Vehicle Committee

The head of the Division and one staff member serve on the Battery-Driven Vehicle Committee which, under the chairmanship of the Director of the Institute, is charged with the responsibility of administering research and advising the Department of Industries on all technical matters regarding battery-electric vehicles. The Committee is also responsible for the evaluation of any prototypes or production battery-driven vehicles which become available for tests, and to report its findings accordingly.

This work involves theoretical investigations such as an analysis of the factors and parameters determining the range which a battery-driven vehicle can achieve on one battery charge. Secondly, vehicle assessment has the objective of devising suitable testing procedures for battery-driven vehicles and of assessing the performance of prototype vehicles submitted by manufacturers or agents.

Regarding battery assessment it is appreciated that the performance of a battery-driven vehicle hinges on the capability of the battery. In cases where battery specifications are incomplete, doubtful or unknown, assessment of such batteries is undertaken. So far, one type of battery has been submitted for evaluation by the South African Bureau of Standards, which is fully equipped to carry out such tests, which include an energy density evaluation and a life cycle test under fast charge-and-discharge duty.

6. **GENERAL**

In addition to the Power Electrical Engineering Division the following Divisions of NEERI are active:-

Automation,
Solid state electronics,
Signal processing,
Electronic instrumentation,
Training and information.

J. K. VON AHLFTEN,
Verteenwoordiger/Representative.

MNR. NAUDÉ VAN WYK, WNNR/CSIR:

Mnr. die President ek het vanoggend probeer besluit of hierdie byeenkoms sal bekend staan as „die Konvensie van die Dasse" of „die Konvensie van die Groot Brag van die Maties". Nou as 'n Ikey het ek die eerste een baie waardeer. Onder huidige ekonomiese toestande is 'n das natuurlik baie nuttig, maar die tweede een het ek bietjie dik vir 'n daler gevind. Ek het gemerk dat een van die oud-Maties (en hier is nou klem op die **oud**) het 'n bietjie gesukkel met sy bril daar bo-op die verhoog en ek wil net vir hom sê hy moet hom nou nie so blind staar op hierdie ou klein ongelukkie wat daar op Coetzenberg verlede Saterdag gebeur het nie. Mnr. die President, eerstens wil ek u graag gelukwens met u Presidentsrede en namens die WNNR wil ek u ook gelukwens met u verkiesing as President vir die volgende twee jaar en u die beste toewens. Ook aan mnr. Botes, nieteenstande die feit dat hy 'n Matie is, ook geluk met sy verkiesing as Aangewese President.

RESEARCH PROGRAMME AT THE NATIONAL ELECTRICAL ENGINEERING RESEARCH INSTITUTE

A. POWER ELECTRICAL ENGINEERING

The work of the Power Electrical Engineering Division is of most direct interest to your organisation and has been very adequately covered in the report by your representative, Mr. Jules von Ahlften. All I propose to do as far as this is concerned, is to up-date the report on aspects that have taken place since the Advisory Committee meeting in November last year and add a few remarks regarding background.

I. **Research on Lighting**

Our work concerns 3 aspects of lighting:

(1) Measurements of the parameters of the lighting stroke itself such as waveform and magnitude of the stroke, number of components in the stroke, polarity of the stroke and the striking distance. For this work we have a 60-meter metal tower, insulated from ground, suitably instrumented to measure all the required parameters and observed photographically by two cameras and a television video recording system.

(2) The effects of lighting on systems such as transmission lines, structures and even aircraft are studied. Observations on transmission lines are carried out on a 400 kV line at Appollo, an 11 kV rural distribution line near Pretoria and the 500 kV Cabora Bassa dc line. Recording surge characteristics over an extended period is required to give a statistically representative sample as to what can be expected under our conditions on the

Highveld.

(3) A national scheme of monitoring lightning flashes to ground, covering the whole of the RSA and SWA is in progress. Monthly maps displaying contours of equal numbers of strokes to ground per square kilometer for the period, are prepared by computer. It is expected to continue this work for about 10 years to include possible long-term variations. The assistance of all the bodies collaborating with this is very greatly appreciated.

It is our belief that sufficient statistics from the above three programmes would assist distribution engineers greatly in the planning of their protection systems in the future.

II. Insulation

The work being carried out jointly between this Institute and the Rand Water Board on the evaluation of insulation quality in high voltage motors continues. Some 80 motors are now regularly measured, 40 each year. It is hoped to expand the experiment to include possibly some 300 motors annually and negotiations are at present in progress with ESCOM, ISCOR and the Chamber of Mines. It is hoped that, by sharing the costs between these organisations and the CSIR, a much more meaningful programme can be carried out. This will immediately benefit the participating organisations in that they will have a continuous record of the insulation behaviour of their machines and, from the scientific point of view, the objective is to gather information to eventually derive a set of non-destructive measurements which can indicate when a machine should be rewound.

III. Battery-driven vehicles

As part of its contribution to the overall assessment as to the possible role that battery-driven vehicles can play in alleviating petrol shortage and air pollution problems in the country, this Institute has entered into a 2-year contract with the GES (Gesellschaft für Elektrischen Strassenverkehr) in West Germany to evaluate two vehicles, a minibus and a light delivery van in everyday use in the CSIR's transport fleet. We co-operate in South Africa with Siemens Limited which does the electrical maintenance, and we are assisted by United Car and Diesel Distributors and Volkswagen SA on mechanical aspects. The attached Press release gives the main point concerning the experiment. A big advantage to us is that we will be exchanging experience with the GES, which is conducting a much larger experiment.

Our Institute is still very anxious to test any vehicle for performance if it is made available to us, and we are adequately equipped to do so.

It is hoped that in the foreseeable future the South African Government would be able to give some clear directives as to the possible role these vehicles could play in our overall transport hierarchy.

B. OTHER ASPECTS OF THE PROGRAMME

There are many other fields in which we are active, not of a power engineering nature, but which might be of interest to you.

I. Electronic Instrumentation

We have a division for Electronic Instrumentation which undertakes ad hoc tasks of developing electronic instruments if these are not available on the commercial market. They also undertake small scale automation projects, often of a very simple nature but sometimes including microprocessors. The main aim here is using existing know-how to design for a specific requirement. The division also includes a calibration facility for calibrating electronic measuring instruments and the service includes the repair of the instrument if necessary.

Many of you may wish to make use of these facilities if by chance you cannot get the required help from your local agent or other commercial source.

In addition to our main group in Pretoria, we have small sub-groups in Cape Town and Durban.

II. Information services

We are running in our Training and Information Division, a service to interested parties on the availability of electronic equipment, agents, etc. We are also prepared to discuss with you your requirements and to make a recommendation as to possibly one or two items that should suit your problem best. This service is free of charge.

III. Integrated circuits

Perhaps not of much interest to you as municipal electrical engineers, but we are currently running a microcircuit facility which can produce integrated circuits from the basic concept through design to production.

The concept is particularly aimed at producing simpler circuits at low cost and quick turn around time.

C. CONCLUSION

In conclusion I would like to emphasise that you should never accept that your problem may be too trivial to bring to us. We are here to serve the South African industry. For this reason, we are most grateful for the contribution which your representative has made in the past on our Advisory Committee and we value the opportunity to keep in contact with you also by being invited to attend your Convention.

WNNR TOETS TWEE BATTERY-AANGEDREWE VOERTUIE / CSIR TESTS TWO BATTERY-DRIVEN CARS

Die Wetenskaplike en Nywerheidnavorsingsraad (WNNR) is tans besig om twee batteryaangedrewe voertuie te toets in samewerking met die Gesellschaft für Elektrischen Strassenverkehr (GES), die Wes-Duitse koördinerende liggaam vir navorsing op hierdie gebied, en Siemens Beperk.

Die voertuie, 'n Volkswagen-bakkie en 'n Mercedes Benz-mikrobus, is in Wes-Duitsland deur die betrokke twee motor-vervaardigers ontwerp en gebou. Soveel moontlik van die onderstelle van die oorspronklike petrolaangedrewe modelle is behou.

Die elektriese aandryfstelsels van die twee voertuie is deur Siemens AG ontwikkel terwyl Varta die batterye verskaf het.

Sowat 20 van die Volkswagen- en 30 van die Mercedes Benz-voertuie word tans in Europa deur die GES getoets. In die tweede fase van die Europese toetsprogram sal 70 Volkswagen- en 60 Mercedes Benz-eenhede gebruik word. Uiteindelik sal altesaam 500 voertuie by die toetsprogram ingesluit wees.

Die navorsingskontrak tussen die WNNR, Siemens en die GES maak voorsiening vir die toets van die voertuie as deel van die WNNR se voertuigvloot. Die WNNR dra ook finansieël tot die toetsprogram by en sal aan die GES verslag doen oor die gedrag van die voertuie onder Suid-Afrikaanse toestande. In ruil hiervoor sal Suid-Afrika insae kry in navorsingsresultate wat die GES versamel.

Siemens het die voertuie na hul aankoms in Suid-Afrika in werking gestel en sal die elektriese stelsels van albei versien.

Mnre United Car and Diesel Distributors (verspreiders van Mercedes Benz-voertuie in Suid-Afrika) en Volkswagen SA sal die voertuie meganies in stand hou. Onderhoudspersoneel is vir hierdie doel by die moedermaatskappye in Wes-Duitsland opgelei.

The Council for Scientific and Industrial Research (CSIR) is testing two electric vehicles in collaboration with the Gesellschaft für Elektrischen Strassenverkehr (GES), the West German co-ordinating body for research in this field, and Siemens Limited.

The battery-driven vehicles, a LDV and a microbus, were designed and built in West Germany by Volkswagen and Mercedes Benz respectively, retaining as much as possible of the chassis of the original petrol-driven models.

The electrical traction systems for these two vehicles were developed by Siemens AG and the battery packs are supplied by Varta.

About 20 of the Volkswagen and 30 of the Mercedes Benz vehicles are currently being tested by GES in Europe. The second phase of the programme which is now being planned, will expand the programme to 70 Volkswagen and 60 Mercedes Benz units and it is expected that finally it will include a total of 500 vehicles.

The research contract between the CSIR, Siemens and GES provides for testing the vehicles as part of the CSIR's transport fleet. The CSIR also contributes financially to the research project and will report to the GES on the performance of the vehicles under South African conditions and in return it will have access to research results gathered by the GES.

Siemens commissioned the vehicles after their arrival in South Africa and will maintain the electrical systems of both.

Messrs. United Car and Diesel Distributors (distributors of Mercedes Benz vehicles in South Africa) and Volkswagen of SA will carry out the mechanical service of the vehicles. Maintenance staff have been trained for this purpose at the parent companies in West Germany.

Die inisiatief vir die plaaslike toetsprogram, waarvan hierdie projek deel vorm, het uitgegaan van en word beheer deur die Suid-Afrikaanse Komitee vir Batteryaangedrewe Voertuie onder voorsitterskap van mnr. J. D. N. van Wyk, Direkteur van die WNNR se Nasionale Navorsingsinstituut vir Elektriese Ingenieurswese (NNEI).

Hierdie Komittee adviseer die Departement van Nywerheidswese oor die moontlike gebruik van batteryaangedrewe voertuie in Suid-Afrika en koördineer navorsing op dié gebied. Die komitee bestaan uit verteenwoordigers van universiteite, motor- en batteryvervaardigers, oliemaatskappye, Evkom, die Suid-Afrikaane Spoorweë, munisipaliteite en die Suid-Afrikaanse Buro vir Standaarde.

Die WNNR se navorsingskontrak met die GES strek aanvanklik oor twee jaar maar kan verleng word.

TEGNIESE BESONDERHEDE VAN VOERTUIE

Albei die voertuie gebruik loodsuurbatterye.

Twee batterye is saam met elke voertuig verskaf. Die een word ten volle gelaai op 'n spesiale rak gehou terwyl die ander een in die voertuig is. Die batterye kan binne sowat 5 minute met behulp van 'n hanteerwaentjie omgeruil word.

Die voertuie bestuur maklik aangesien daar geen koppelaarpedaal is nie maar slegs 'n versneller- en rempedaal soos in 'n outomatiese voertuig.

Albei rem gedeeltelik deur die elektriese motors in kragopwekkers om te skakel. Sodra die rempedaal getrap word, begin die motor om die batterye te laai. Hoe harder die rem getrap word, hoe meer krag word opgewek en hoe groter is die remaksie. Word die maksimum remvermoë van die motor bereik en die rem nog harder getrap, vul gewone meganiese remme die stelsel aan.

Indien die voertuie versigtig bestuur word, word die meganiese remme slegs gebruik wanneer stilgehou word en word die meeste van die remenergie na die batterye teruggestuur. In stadsverkeer, waar dikwels gerem word, kan die afstand per lading op hierdie wyse aansienlik vergroot word.

Die Mercedes Benz-voertuig herlaai die batterye ook as mens slegs jou voet van die versnellerpedaal aflig en die voertuig laat vryloop. Die voertuig hanteer dan soos 'n konvensionele voertuig wat teen kompressie rem.

A local testing programme of which this project forms part, was initiated and is being controlled by the South African Committee for Battery-Driven Vehicles, under the chairmanship of Mr. J. D. N. van Wyk, Director of the CSIR's National Electrical Engineering Research Institute (NEERI).

This committee advises the Department of Industries on the possible use of battery-driven vehicles in South Africa and co-ordinates research in this field. It consists of representatives from universities, vehicle and battery manufacturers, oil companies, Escom, the S.A Railways, municipalities and the SA Bureau of Standards.

The original research contract with GES is for a period of two years but can be extended.

TECHNICAL DETAILS OF VEHICLES

Both vehicles use lead acid batteries.

Two batteries were supplied with each vehicle, so that one can be kept on charge on a special rack, whilst the other one is in the vehicle. Change-over of batteries is performed with a handling trolley, in about 5 minutes.

Driving the vehicle is easy; there is no clutch, but only accelerator and brake pedals, similar to an automatic transmission vehicle.

The vehicles are braked by changing over their electric motors into generators. As soon as the brake pedal is depressed, the motor starts charging the batteries. The harder the brake pedal is depressed, the higher the current generated which results in an increased braking action. Should the braking limit of the motor be reached, and the brake pedal depressed even more, standard mechanical brakes augment the system.

If the vehicle is driven with care, the mechanical brakes come into operation only when stopping and most of the braking energy is thus returned to the batteries. In city driving where brakes are used quite often, the distance covered per charge can in this way be extended.

The Mercedes Benz vehicle also charges its battery whenever the accelerator pedal is released and the vehicle is allowed to "freewheel" with braking. The vehicle then handles like a conventional vehicle braking against compression.

Die battery-aangedrewe Mercedes Benz mikrobus (links) en Volkswagen bakkie wat tans deur die WNNR getoets word.

The battery-driven Mercedes Benz microbus (left and Volkswagen LDV which are at present being tested by the CSIR.

'n Spesiaal ontwerpte elektries aangedrewe hidrouliese waentjie word gebruik om die batterystelsels van die voertuie uit te haal en weer terug te plaas.

A specially-designed electrically-driven hydraulic cart is used to remove and replace the batery packs.

	Volkswagen	Mercedes Benz
Tara (massa sonder vrag met batterye) Tare (approximate mass of vehicle with batteries but without any load)	2 260 kg	2 970 kg
Massa van battery Mass of batteries	850 kg	1 060 kg
Vragdravermoë Load-carrying capacity	450 kg (800 kg 2de fase/ 2nd phase)	1 455 kg
Maksimum toelaatbare snelheid Maximum allowable speed	70 km/h	70 km/h
Klimvermoë met volle vrag Hill-climbing capacity loaded	20% helling/ gradient	13% helling gradient
Batteryspanning Battery voltage	144 V	180 V
Ligte, toeter, windskermweërs, ens. Lights, hooter, wipers, etc.	12 V	12 V
Maksimum energie in battery Maximum energy capacity of batteries	21,6 kWh	32,5 kWh
Vermoë van aandryfmotor Rated power of drive motor	16 kW	31 kW
Herlaaityd van batterye Recharging of batteries	± 8 uur/hrs	± 8 uur/hrs
Afstand per lading* Distance covered per charge*	60-80 km	30-80 km

*Hierdie afstand word bepaal deur die wyse waarop bestuur word en die roete, met ander woorde, stadsverkeer, of 'n oop pad en of die pad oorwegend gelyk is of nie.

*This distance is determined by the way in which the car is driven and the road, i.e. whether town driving or on the open road as well as the general gradient of the road.

MR. K. G. ROBSON, President:

Thank you, Mr. van Wyk. May I, on behalf of the AMEU, acknowledge with gratitude the contributions that you have made so painstakingly over so many years. One is struck by the fact that you are looking for results in ten years' time and one realises that this takes a lot of dedication to duty. Your contributions over a number of years at our Conventions are significant and are very much appreciated. Of particular interest to me is your work on the battery vehicle and we wish you well in this particular field.

MNR. E. de C. PRETORIUS, Potchefstroom:

Net 'n kort vragie in verband met elektriese voertuie, mnr. die President. Ek wil net van mnr. Van Wyk weet of daar alreeds 'n evaluering gemaak is van die invloed van die grootskaalse laai van batterye vir elektriese voertuie. Watter invloed dit gaan hê op krag-netwerke in verband met die opwerking van nuwe spitslaste en tweedens die opwerking van golfvorming in toevoerspanning.

MNR. J. D. N. VAN WYK:

Mnr. President, daardie Komitee wat omsien na die toekoms-beplanning van elektriese voertuie in die land, het 'n sub-komitee gehad wat na hierdie saak gekyk het. Die verhoging in spitslas glo ons nie is van groot belang nie, dis waarskynlik van die omvang van 5% of so, die rede is natuurlik dat, selfs as 'n mens tot 'n maksimum elektriese voertuie gebruik, is daar net 'n beperkte persentasie van die huidige voertuie wat jy kan vervang. Met ander woorde dit is nie 'n vervanging van 'n binnebrand-voertuig nie, dit is 'n bykomstige hulpmiddel. Daar is wel een saak wat miskien van groter belang is en waarna ons moet omsien, en dit is die moontlike besoedeling wat op die netwerke kan kom as gevolg van die gelykrigters van die laai-toestelle indien hulle nie behoorlik ontwerp is nie. Dit is in saak wat ons komitee na gekyk het en daar is nou as 'n staande item aan die hoogspannings-koördinerende komitee opgedra om na hierdie saak om te sien. My eie komitee het gevoel dat daar streng spesifikasies neergelê moet word waaraan hierdie laai-toestelle moet voldoen, voordat daar te veel in die land versprei is en groot probleme skep.

Verslag van die Nasionale Komitee van die Internasionale Elektrotegniese Komitee (IEK)

Voordat ek 'n beknopte verslag oor die werksaamhede van die Nasionale Komitee van die IEK die agelope twee jaar voorlê, wil ek noem dat die VMEO verteenwoordig is op die Suid-Afrikaanse afvaardiging wat hierdie Internasionale Konferensies onder leiding van die SABS bygewoon het.

Die Uitvoerende Raad is die mening toegedaan dat die VMEO se deelname aan konferensies van hierdie aard nie alleen uit 'n nasionale oogpunt wenslik is nie, maar van belang is om op die hoogte te bly met die internasionale vordering op die gebied van munisipale elektrisiteitsvoorsiening. As die senior woordvoerders van hierdie Vereniging word die Presidente van die VMEO die geleentheid gegun om dié internasionale konferensies saam met verteenwoordigers van Tegniese Komitees, soos TK 64 wat belas is met internasionale bedradingstandaarde, by te woon wanneer die Uitvoerende Raad dit nodig ag.

Die Konferensies van 1975 en 1976 is gevolglik deur mnr. E. de C. Pretorius as President van die VMEO, met mnr. P. J. Botes as die SABS se koördineringsverteenwoordiger, bygewoon. Laasgenoemde se verslag oor 1976 se Konferensie verskyn elders in die Verrigtinge.

Die agendas en notules van die onderskeie Internasionale Komitees van die IEK word gereeld aan u verteenwoordigers op die Nasionale Komitee voorgelê vir kommentaar en/of goedkeuring, en indien nodig vergader die Nasionale Komitee om sake wat hulle van belang ag, te bespreek.

Die verteenwoordiging deur die VMEO op die IEK se onderhawige nasionale komitees sien as volg daar uit:-

1. TK 64: Elektriese installasies in geboue.
   Verteenwoordiger: Mnr. J. A. Loubser.
   Toekomstige werk: Nog 'n klompie jare.
2. WK 23 C: Wêreldwye Prop-en-kontaksokstelsel.
   Verteenwoordiger: Niemand buiten mnr. L. B. Cumming, wat die Stad Johannesburg verteenwoordig, nie.
   Toekomstige werk: Nog een of moontlik twee jaar aan die dimensionele standaarde.
3. WK 23 B: Proppe, kontaksokke en skakelaars.
   Verteenwoordiger: Geen Nasionale Komitee van die IEK nie.

Report on the National Committee of the International Electrotechnical Commission (IEC)

Before submitting a brief report on the activities of the National Committee of the IEC over the past two years mention must be made of the fact that the AMEU has been represented on the South African delegation under leadership of the SABS attending these International Conferences of the IEC since 1970.

The Executive Council is of the opinion that participation by the AMEU in international conferences of this nature is not only desirable from a national point of view but also important to keep abreast of international developments as far as the municipal electricity supply industry is concerned. The President of the AMEU, as the senior spokesman of this Association, is thus afforded the opportunity to attend these international Conferences together with those representatives on Technical Committees, such as TC 64 dealing with international wiring standards, where the Executive Council is of the opinion that this is necessary.

The 1975 and 1976 IEC Conferences were attended by Mr. E. de C. Pretorius as President of the AMEU and Mr. P. J. Botes as SABS co-ordinating representative and the latter's report on the 1976 Conference appears elsewhere in the proceedings.

The agendas and minutes of the various international Committees of the IEC are regularly submitted to your representatives on the National Committee for comments and/or approval and when necessary the national committee convenes meetings to discuss those matters which it deems of importance.

As far as the AMEU representation on the IEC national committees under discussion is concerned the situation is as follows:-

1. TC 64: Electrical installations of buildings.
   Representative: Mr. J. A. Loubser.
   Future work: Another few years.
2. SC 23 C: World-wide plug and socket outlet system.
   Representative: None apart from Mr. L. B. Cumming representing the City of Johannesburg.
   Future work: One more year or probably two years on the dimensional standards.
3. SC 23 B: Plugs, socket outlets and switches.
   Representative: No IEC National Committee.

Toekomstige werk: Nog etlike jare. Hierdie Komitee behartig dimensionele Standaarde en tegniese spesifikasies.

4. TK 23: Elektriese toebehore.

   Verteenwoordiger: Geen.

   Toekomstige werk: Nog baie jare. Hierdie Komitee tree hoofsaaklik in 'n toesighoudende en koördinerende hoedanigheid op vir al sy komitees, met inbegrip van WK 23 B en WI 23 C.

Wanneer een van die IEK se internasionale komitees werk aanpak wat vir Suid-Afrika van belang is, kan die SABS 'n nasionale komitee van die IEK in die lewe roep om kommentaar te lewer oor die IEK se dokumentasie en om moontlik ook oorsese vergaderings by te woon. Aangesien die SABS geneig is om hierdie internasionale standaarde vir nasionale spesifikasies en gebruikskodes in te voer, is daar 'n hegte verband tussen die werk van die IEK en die opstel van die nasionale spesifikasies en kodes.

Die SABS teenpresteer die bostaande IEK-komitees met die volgende komitees:-

1. TC 64: Eweknie van Projek No. 0751/5001: Bedradingskode (Hersiening van die Bedradingsregulasies).

   Verteenwoordiging: Mnre. E. de C. Pretorius, J. K. von Ahlften, A. J. van den Berg en J. A. Loubser.

2. WK 23 C en WK 23 B: Eweknie van Projek No. 0751/5013: Internasionale Prop-en-kontaksokstelsel.

   Verteenwoordiging: Dié Komitee sal gevorm word wanneer die betrokke IEK-standaarde voltooiing nader. Vanweë in- en uitvoer moet die SABS-spesifikasie identies aan die IEK-standaarde wees.

3. WK 23 B: Eweknie van Projek No. 0751/5006: Hersiening van SABS 164: Tweepool- en aardingspenproppe en -kontaksokke.

   Verteenwoordiging: Mnre. J. A. Loubser en H. Barnard.

4. WK 23 B: Eweknie van Projek No. 0751/5005: Hersiening van SABS 163: Muur- en toestelskakelaars.

   Verteenwoordiging: Soos in (3) hierbo.

5. WK 23 B en die toekoms moontlik TK 23: Eweknie van Projek No. 0751/5009: Proppe, kontaksokke en koppelstukke vir nywerheidsgebruik.

   Verteenwoordiging: Soos in (3) hierbo.

Dit is derhalwe duidelik dat daar 'n hegte verband in die werksaamhede van die bostaande Komitees is. Items (3) en (4), wat bestaande spesifikasies is, verg nie so 'n noue ooreenkoms met die IEK-standaarde nie, maar items (2) en (3), en in die toekoms ook (1), sal die IEK-standaarde getrou navolg.

Daar is in detail oor die saak verslag gedoen, omdat dit die VMEO moontlik sal help om die bestek van die werk wat deur die onderskeie verteenwoordigers aangepak moet word, af te baken.

Die SABS het die volgende wenke aan die hand gedoen:-

(a) Die VMEO moet op grond van die projekte wat deur die SABS onderneem word, besluit watter IEK-komitees verteenwoordiging op die ekwivalente Nasionale Komitees van die IEK regverdig, met dien verstande dat die VMEO reeds meedoen aan die werk van die SABS-komitee.

(b) Verkieslik moet albei die funksies wat in (a) uiteengesit word, deur een persoon behartig word.

(c) Wat sake betref wat vir die VMEO, en op 'n nasionale grondslag ook vir die SABS, van minder belang is, sal bywoning van buitelandse vergaderings nie die moeite werd wees nie.

(d) Wat sake betref wat van groter belang is, moet die persoon wat die IEK se nasionale komitee dien, verkieslik ook die IEK-vergaderings bywoon, veral wanneer verteenwoordigers van ander afdelings dit nit kan bybring nie.

(e) Wanneer buitelandse vergaderings oor 'n bepaalde onderwerp bygewoon word, moet een persoon deurlopendheid handhaaf.

(f) Die werk kan waarskynlik gekoördineer word deur 'n VMEO lid wat met die SABS se koördinerende verteenwoordiger skakel, of deur laasgenoemde self.

Die bostaande sake en voorstelle sal gevolglik, saam met enige voorstelle wat op die Konvensie uit die bespreking van hierdie verslag voortspruit, aan die nuwe Uitvoerende Raad voorgelê word vir oorweging en aanbevelings. Die vorderingsverslae van die VMEO-verteenwoordigers oor die werksaamhede van die bostaande Komitees is vervat in die verslag van die SABS se koördinerende verteenwoordiger.

Future work: Several years. This Committee deals with dimensional standards and technical specifications.

4. TC 23: Electrical Accessories.

   Representative: None.

   Future work: Many years. This committee operates mainly in a supervisory and co-ordinating capacity for all its committees, including SC 23 and SC 23 C.

When an IEC international committee undertakes work which is of interest to South Africa an IEC National Committee may be formed by the SABS with a view to commenting on the IEC documentation and possibly attending overseas meetings. As the Bureau is tending to adopt these international standards in national specifications and codes of practice there is a close relationship between the IEC work and the work of drawing up the national specifications and codes.

The SABS Committees equivalent to the above IEC committees are as follows:-

1. TC 64 — Equivalent to Project No. 0751/5001: Wiring Code (Revision of the Wiring Regulations).

   Representation: Messrs. E. de C. Pretorius, J. K. von Ahlften, A. J. van den Berg and J. A. Loubser.

2. SC 23 C and SC 23 B: Equivalent to Project No. 0751/5013: International plug and socket outlet systems.

   Representation: This committee will be formed when the relevant IEC standards are near completion. Due to imports and exports the SABS specification must be identical to the IEC standards.

3. SC 23 B: Equivalent to Project No. 0751/5006: Revision of SABS 164: Two-pole and earthing-pin plugs and socket outlets.

   Representation: Messrs. J. A. Loubser and H. Barnard.

4. SC 23 B: Equivalent to Project No. 0751/5005: Revision of SABS 163: Wall and appliance switches.

   Representation: As in (3) above.

5. SC 23 B and possibly in future TC 23: Plugs, socket outlets and couplers for industrial purposes.

   Representation: As in (3) above.

It can be seen that there is a close relationship in the work between these committees in the above cases. Items (3) and (4), being existing specifications, do not call for such a close resemblance to the IEC standards but items (2) and (5) and, in future (1), will follow the IEC standards closely.

This matter has been reported in detail because this may assist the AMEU to define the extent of work to be undertaken by the various representatives and the SABS has put forward the following suggestions:-

(a) The AMEU should decide, from the projects being undertaken by the SABS, which IEC Committees warrant representation on the equivalent IEC National Committees, presuming that the AMEU is already participating in the work of the SABS Committee.

(b) It is better for the same person to undertake both functions as described in (a).

(c) For those subjects of lesser importance to the AMEU, and to the SABS on a national basis, attendance at IEC meetings overseas would not be worthwhile.

(d) For subjects of greater importance the person appointed to the IEC National Committee should ideally be in a position to attend IEC meetings, particularly when delegates from other sections are not able to do so.

(e) If overseas meetings on a specific subject are attended the representative should be unchanged in order to maintain continuity.

(f) This work could probably be co-ordinated by an AMEU member liasing with the SABS co-ordinating representative or by the latter himself.

The above matters and suggestions will be submitted to the incoming Executive Council for consideration and recommendations together with any suggestions which may be forthcoming from the discussions on this report at the Convention. The progress reports of the AMEU representatives on the activities of the above committees are contained in the report of the SABS co-ordinating representative.

J. K. VON AHLFTEN,
Verteenwoordiger/Representative.

41ste Vergadering van die IEK — Nice, 17 - 29 Mei 1976

1.00 **ALGEMEEN**

Dit was vir my 'n groot voorreg om die VMEO te verteenwoordig by bogenoemde vergadering. Ek het heelwat ondervinding opgedoen oor die internasionale opset.

Mnr. J. V. Grant en N. Bennett van die SABS het baie van die Komitees vergaderings bygewoon en albei dien as Sekretarisse van Sub-komitees. Mnr. A. A. Middlecote het op die Komitee van Aksie van IEK gedien, maar moet nou aftree na nege jaar diens en kan alleen herkies word na die verloop van n aantal jare. Ek het die voorreg gehad om met heelwat internasionale persoonlikhede te gesels en almal het 'n groot dunk van mnr. Middlecote se optrede in die Komitee van Aksie. Melding is gemaak dat hy moontlik een van die kandidate vir die Presidentskap kon gewees het as toestande anders was.

Ek het ook op uitnodiging van mnr. Middlecote die Algemene Vergadering van die IEK bygewoon. Alhoewel genoem word dat politiek nie enige rol speel in die verrigtinge nie, het Rusland geprotesteer teen die benoeming van verteenwoordigers van Duitsland, aangesien Oos-Duitsland blykbaar nie verteenwoordig is nie.

Die nuwe lede van die Komitee van Aksie wat verkies was, is Amerika, Australië en Turkye.

In Junie 1977 word die IEK byeenkoms, die „World Electrotechnical Congress" en „International Exhibition Electro-77", te Moskou gehou.

Ek wil net graag my dank uitspreek vir die geleentheid wat my gegun was om hierdie byeenkoms te kon bywoon. Die volgenoue bywoning van byeenkomste van hierdie aard, waar die verteenwoordiging van Suid-Afrika versterk word, word baie sterk deur my aanbeveel. Misverstande oor ons land kan uit die weg geruim word.

Ten slotte wil ek graag my dank teenoor die verteenwoordigers van die SABS betuig vir die hulp en leiding.

2.00 **BYWONING VAN KOMITEES**

Die VMEO, wat verbruikers verteenwoordig, stel belang in 'n hele aantal items wat by so 'n vergadering bespreek word.

Weens 'n gebrek aan ondervinding is 'n mens geneig om soveel subkomitee vergaderings as moontlik by te woon.

Ek was van voorneme om die volgende vergaderings by te woon:-

14D Klein kragtransformatore.
16 Aansluitmerke en ander herkenningstekens.
23B Kontakproppe, sokuitgange en skakelaars.
23C Internasionaal aanvaarbaare kontakprop- en sokuitgangstelsels.
28 Ko-ordinering van isolering.
28A Ko-ordinering van isolering vir laagspanning toerusting.
59 Werkverrigting van huishoudelike elektriese toestelle.
61 Veiligheid van huishoudelike elektriese toestelle.
61E Kommersiële verversingstoerusting.

Ek het byvoorbeeld uitgevind dat subkomitee 14D slegs met miniatuur transformatore wat in speelgoed, ens., gebruik word belas is en gevolglik het ek nie die vergadering bygewoon nie.

Ten einde tyd aan te vul in die begin het ek subkomiteevergaderings 59A Skottelgoedwassers en 59H Mikrogolftoestelle bygewoon weens oorvleueling met ander meer belangrike vergaderings.

Bo en behalwe bogenoemde het ek die Hoofkomitee TC23 Elektriese Toebehore bygewoon.

3.00 **SOSIALE BYEENKOMSTE**

Ek het die openingseremonie op Maandag 17 Mei 1976, die Presidentsaand op Donderdag 20 Mei 1976 en die puik tuinparty wat deur die Stad van Nice aangebied was in Arenes de Cimiez, bygewoon.

Die volgende is 'n uittreksel uit die toespraak van die President, Dr. V. I. Popkov van Rusland, by geleentheid van die openingseremonie:-

> "As we begin our work here today, in this 41st General Meeting of the IEC — it is perhaps well to reflect a moment on some of the values to be derived from assembling together for this kind of meeting. We are all specialists in one field or another, and it is therefore, only natural that we see the IEC from the standpoint of our own work, since the vast majority of contacts with IEC is through work in international standards related to our special interests. At these annual meetings, the IEC becomes a tangible entity, where engineers

41st IEC General Meeting — Nice, 17 - 29 May, 1976

1.00 **GENERAL**

It has been a great privilege to be able to represent the AMEU at the abovementioned meeting. I gained substantial experience regarding the international setup.

Messrs. J. V. Grant and N. Bennett of the SABS attended a lot of the Committee meetings and each serves as Secretary of Sub-Committees. Mr. A. A. Middlecote served on the Action Committee of the IEC, but must now retire after nine years' service and can only be re-elected after a number of years have elapsed. I had the privilege of talking to a number of international personalities and everybody held a high opinion of the action taken by Mr. Middlecote in the Action Committee. It was mentioned that he could possibly have been one of the candidates for Presidency if conditions were different.

On the invitation of Mr. Middlecote I also attended the General Meeting of the IEC. Although it is said that politics does not play any role in the proceedings, Russia protested against the nomination of representatives from Germany, the apparent reason being that East Germany is not represented.

The newly elected members of the Action Committee are America, Australia and Turkey.

In June, 1977, the IEC gathering, the "World Electrotechnical Congress" and "International Exhibition Electro-77" will be held in Moscow.

I wish to express my gratitude for the opportunity which I was afforded to attend this meeting. The sustained attendance of meetings of this nature, where representation of South Africa is strengthened, is strongly recommended by myself. Misconceptions about our country can be obviated.

In conclusion I wish to express my gratitude to the representatives of the SABS for their assistance and guidance.

2.00 **ATTENDANCE AT COMMITTEE MEETINGS**

The AMEU, which represents consumers, is interested in a great number of items to be discussed at such meetings.

Due to inexperience one is inclined to attend as many Sub-Committee meetings as possible.

I had intended to attend the following meetings:-

14D Small Power Transformers.
16 Terminal Markings and Other Identifications.
23B Plugs, Socket-outlets and Switches.
23C World-wide Plug-and-Socket-outlet systems.

28 Insulation Co-ordination.
28A Insulation Co-ordination for L.V. Equipment.
59 Performance of Household Electrical Appliances.
61 Safety of Household Electrical Appliances.
61E Commercial Catering Equipment.

I found out, for example, that sub-committee 14D, dealt only with miniature transformers used in toys, etc., and consequently did not attend the meeting.

In order to fill-in time in the beginning, Sub-Committee meetings 59A Dishwashers and 59H Microwave Appliances were attended, but the Main Committee meetings 59, 61 and 61E were not attended, due to overlapping with other more important meetings.

In addition to the above, the Main Committee Meeting, TC.23 Electrical Accessories, was attended.

3.00 **SOCIAL FUNCTIONS**

I attended the opening ceremony on Monday, 17th May, the President's evening on Thursday, 20th May, and the superb Garden Party held by the City of Nice at Arenes de Cimiez.

The following extract was taken from the speech of the President, Dr. V. I. Popkov, of the USSR, at the opening ceremony:-

> from many sectors of our world-wide industry have the opportunity to exchange ideas and opinions. It is here that becomes manifest the spirit of co-operation and teamwork that gives the IEC its powerful influence. It is, in many ways, the sum total of co-operation, compromise and teamwork that occurs every day in the scores of IEC Technical Committees and Working Groups meeting around the world. It points out to us again the importance of the basic unit of the IEC: the Technical Committee, in which the real work of the IEC is carried

on, where the spirit of the IEC originates — that compromise and co-operation that gives to all members the secure knowledge that they will have every opportunity to be heard equally. Without this confidence, the IEC could not exist.

"It is understandable, therefore, that good international standards take time to produce. They must represent a consensus; they must be technically correct; and they must have passed through the system that is open to all member countries, and they must have been examined carefully at each review point. This all takes time. In addition, there are other time consuming factors: the National Committees of the IEC speak between them a great many languages, and to present the national viewpoint or to vote on a standard, frequently means translation into the national language. To consider complex technical matters in detail, repeated meetings on the national level are required. Neither must we lose sight of the fact that the IEC relies for its technical expertise on the thousands of engineers and scientists around the world who give freely of their knowledge to help reach a common goal. If we had to pay these men and women for their contribution to our work, it is difficult to calculate how many tens of times our present modest budget would need to be multiplied. Each of these experts is an individual and I never fail to be astonished how it is that the IEC can motivate them to sink their differences for the common good. Moreover, implementation of IEC standards by national governments in some cases is not as rapid as many of us would like it to be, although, in nearly all these cases, there are understandable reasons for the delay: dislocation of an industry, conflicting legislation in other fields, or matters affecting international trade.

"In spite of these considerations, the IEC has maintained an outstanding record. I am sure that those of us who have been associated with the IEC would not hesitate to say that we have seen much progress over the years. The IEC today is a most efficient body for producing international standards at a low unit cost. Its administrative machinery allows flexible response to needs as they are generated by users. In the past five years alone, several new Technical Committees and Sub-Committees have been created to meet specific demands from consumers. The growth in the column of published IEC standards has been at the same rate as the growth in world trade in the electrical machinery and products sectors. IEC standards are being increasingly written into national rules without changes, and when there are changes, they tend to be minor. These are firm indications that the IEC "IS" doing the job for which it was created.

"Whilst the IEC functions effectively on a world-wide basis, we must remember that it IS just that: a world-wide and not a regional body, and we should take care to avoid the sometimes tempting comparison of the IEC with a regional organization. It is understandable that, at times, one might wish that we, too, could enjoy the advantages of a smaller group with its possibilities of swifter action.

"However, for the IEC to attempt to copy, even in part, the methods that are acceptable in a smaller more homogeneous group of nations, would call for sacrificing the central idea of the IEC — that of obtaining world-wide agreements.

"Of course, this is not to say that improvements cannot or should not be sought.

"Perhaps, one of the most important keys to continued improvement in the efficiency of the IEC lies with everyone of us here today. We alone can speed up our work and reduce costs — for example by not insisting on rediscussing the same matters time and time again. It is that spirit of co-operation, goodwill and teamwork on the Technical Committee and Working Group levels that is indispensable to our work. This spirit is the driving force of the IEC".

4.00 59H — MIKROGOLF TOESTELLE

Voorsitter: Mnr. P. O. Risman (Swede).
Sekretaris: Mnr. J. T. Weizeorick (V.S.A.).

Die V.S.A. en Japan het die meeste bydraes gelewer. Mikrogolf kragiewering meting het as 'n probleem na vore gekom as gevolg daarvan dat verskillende lande verskillende standaarde gebruik. Uiteindelik sal ladings van 2 000cc, 1 000cc, 500cc en 275cc water gebruik word in die toetse met 'n temperatuurstyging van die waterlading van 25°C ± 5°C.

Daar is egter ooreengekom dat bykomende studies nodig sal wees ten einde hierdie ingewikkelde probleem volledig op te los en dat toetse deur die gebruikmaking van werklike voedsel uitgevoer moet word. Daar is ooreengekom dat die volgende vergadering oor twee jaar gehou sal word.

4.00 59H — MICROWAVE APPLIANCES

Chairman: Mr. P. O. Risman (Sweden).
Secretary: Mr. J. T. Weizeorick (U.S.A.).

The U.S.A. and Japan made most contributions. Microwave power output measurements proved to be a problem, as different countries use different standards. Finally loads of 2 000cc, 1 000cc, 500cc and 275cc water will be used in the tests with a temperature rise of the water load of 25°C ± 5°C.

It was agreed, however, that additional studies are needed to fully solve this very complex problem, and tests should be conducted using actual foods. It was agreed that the next meeting should be held in two years' time.

5.00 SUBKOMITEE 59A — ELEKTRIESE SKOTTELGOEDWASSERS

Voorsitter: Mnr. M. Nasser (V.S.A.).
Sekretaris: Mnr. H. Phillips (V.S.A.).

Besprekings het meetsal gegaan oor die toestande soos „bevuil en graderingsprosedures vir toetsdoeleindes, verbeterde reinigingsmiddels, standaard formulerings", ens.

Ek het nie die oorblywende gedeelte van hierdie Subkomitee bygewoon nie.

5.00 SUB-COMMITTEE 59A — ELECTRIC DISHWASHERS

Chairman: Mr. M. Nasser (U.S.A.).
Secretary: Mr. H. Phillips (U.S.A.).

Discussions took place mostly on the condition such as "soiling and grading procedures for testing purposes, improved detergent standard formulations", etc.

The rest of the Sub-Committee meeting was not attended by me.

6.00 SUBKOMITEE 23C — INTERNASIONAAL AANVAARBARE KONTAKPROPPE EN SOKUITGANGSTELSELS

Voorsitter: Mnr. K. H. Schwarz (Duitsland).
Sekretaris: Mnr. J. V. Grant (R.S.A.).

Daar was vier voorstelle vir 'n internasionaal aanvaarbare stelsel, wat voorberei was deur:-

(a) Die Duitsers.
(b) Die Nederlanders.
(c) Werkgroep 1 voorstel.
(d) Switserse voorstel.

Hierdie Subkomitee kon selfs oor 'n aantal jare nog nie tot 'n besluit oor 'n internasionaal aanvaarbare stelsel kom nie, aangesien daar so 'n groot verskeidenheid stelsels in gebruik is. Die Algemene Raad van die IEK het druk op hierdie komitee uitgeoefen om tot 'n besluit te kom by Nice.

Na baie interessante besprekings van ander alternatiewe stelsels is gestem en die finale uitslag van die stemming was 43, 1, 2, 0 onderskeidelik ten gunste van bogenoemde voorstelle. Dit verteenwoordig 'n oorweldigende meerderheid vir die Duitse voorstel en is so aanvaar.

Dr. Popkov, President van die IEK, het die vergadering vir 'n kort periode bygewoon en sy tevredenheid met die resultate wat by die vergadering bereik is, uitgespreek.

6.00 SUB-COMMITTEE 23C — WORLD-WIDE PLUG AND SOCKET-OUTLET SYSTEMS

Chairman: Mr. K. H. Schwarz (Germany).
Secretary: Mr. J. V. Grant (S.A.).

There were four proposals for a world unified system, prepared by:-

(a) The Germans.
(b) The Netherlands.
(c) Working Group 1 Proposal.
(d) Swiss Proposal.

This Sub-Committee could over quite a number of years not reach a decision on "a world-wide" system, as there were so many different systems in use. The General Council of the IEC brought about pressure on this Committee to reach a decision at Nice.

After very interesting discussions on any alternate systems, voting took place and the final outcome of the voting was as follows: 43, 11, 2, 0 respectively on the above-mentioned proposals. As this represents an overwhelming majority, the German proposal was accepted. Dr. Popkov, President of the IEC, who had joined the meeting for a short while, expressed his satisfaction with the results reached at the meeting.

Daarna het besprekings oor minder belangrike aspekte van die stelsel gevolg. Sekere van die besluite wat geneem is was om te strewe na 25mm x 50mm module van ongeïsoleerde vierkantige pen (2mm x 7mm) kontakproppe.

Die diepte van randte of inlatings op sokuitgange sal 7mm wees vir veiligheidsredes. Hierdie kontakprop en sokuitgangstelsel sal aangeslaan wees vir 16A en 250V werking. Die insluiting van sluiters kan voorsien word indien benodig. Voorsiening is gemaak om toe te laat vir die ontwerp van toebehore vir die aansluiting van nie-standaard toerusting.

7.00 SUBKOMITEE 23B — KONTAKPROPPE, SOKUITGANGE EN SKAKELAARS

Voorsitter: Mnr. J. van Eeckhout (België).
Sekretaris: Mnr. G. Nazza (Italië).

Hierdie komitee handel met toetse wat op kontakproppe, sokuitgange en skakelaars, monteerkaste vir sokuitgange en skakelaars en elektroniese skakelaars vir huishoudelike doeleindes uitgevoer moet word.

Wat betref voorsiening vir aarding van kontakproppe, vir Klas 1 toebehore wat bedoel is vir die verbinding van buigsame koorde sal dit ontwerp word met voldoende spasie vir die huisvesting van slapte van die aardgeleiers op 'n manier dat indien die spanningsklamp sou faal die verbinding van die beskermgeleier onderwerp sal wees aan trekspanning ná die verbindings van die kragdraende geleiers en dat, ingeval van oormatige trekspanning die beskermgeleiers sal breek ná die kragdraende geleiers.

Hierdie komitee handel ook met kontakproppe en sokuitgange vir nywerheidsdoeleindes.

Lang besprekings het plaasgevind of dit nodig is al dan nie, vir toebehore wat nie voldoen aan die betrokke toetse vir breekvermoë en normale werking, 'n meganiese grendel behoort te bevat.

'n Werkgroep 7 is in die lewe geroep om veranderinge aan IEK publikasies 309 en 309A te bestudeer.

Die dokumente vir huishoudelike skakelaars sou by 'n vergadering wat in die herfs van 1976 gehou sou word, bespreek word.

8.00 TEGNIESE KOMITEE 23 — ELEKTRIESE TOEBEHORE

Voorsitter: Mnr. E. Yrjöla (Finland).
Sekretaris: Mnr. J. C. Deschampgs (België).

Hierdie komitee het die internasionaal aanvaarbare kontakprop en sokuitganstelsel, soos aanbeveel deur subkomitee 23C, goedgekeur, en ooreengekom om dit voor te lê aan die Aksiekomitee vir goedkeuring. Indien goedgekeur sal alle Nasionale Komitees ses maande tyd hê om kommentaar te lewer.

9.00 TEGNIESE KOMITEE 16 — AANSLUITMERKE EN ANDER UITKENNINGSTEKENS

Voorsitter: Mnr. H. D. Nunney (V.K.).
Sekretaris: Mnr. S. G. A. Heilbron (Nederland).

Die enigste interessante bespreking het gegaan oor flikkerligte, stroomoorbringers en syfer-aflesers. Dit was besluit dat daar onderskei word tussen stadige (40-60 flitse per minuut) en vinnige (120-180 flitse per minuut) flikkerings.

Die komitee het ook besluit om 'n Werkgroep te stig met die volgende taak „Om 'n konsep verslag op te stel oor die omskrywing van kleure wat gebruik moet word vir die identifikasie van kaal — en geïsoleerde geleiers, aanwysligte en drukknoppies".

10.00 SUBKOMITEE 28A — KO-ORDINERING VAN ISOLERING VIR LAAGSPANNING TOERUSTING

Voorsitter: Mnr. R. Michoudet (Frankryk).
Sekretaris: Mnr. F. Till (Duitsland).

Ek het hierdie subkomitee slegs vir 'n kort rukkie bygewoon en het geen verslag in dié verband nie.

Discussions thereafter took place on minor details of the system. Some of the decisions reached, were to aim at 25mm x 50mm module of uninsulated square pin (2mm x 7mm) plugs.

The depth of rims or recesses on socket-outlets to be 7mm for safety reasons. This plug and socket-outlet system will be rated at 16A and 250V.

The incorporation of shutters can be provided if required. Provision has been made to permit the design of accessories for the connection of non-ordinary equipment.

7.00 SUM-COMMITTEE 23B — PLUGS, SOCKET-OUTLETS AND SWITCHES

Chairman: Mr. J. van Eeckhout (Belgium).
Secretary: Mr. G. Nozza (Italy).

This committee deals with tests on plugs, socket-outlets and switches, mounting boxes for socket-outlets and switches and electronic switches for household purposes.

Regarding "provision for earthing" of plugs, for Class 1 accessories, intended for the connection of flexible external conductors, the design shall be such as to provide ample space for slack in the earth conductor so that if the strain relief should fail, the connection of the protective conductor will be subjected to strain after the connections of the current carrying conductors and that, in case of excessive stresses, the protective conductor will break after the current carrying conductors.

This Committee also deals with plugs and socket-outlets for industrial purposes.

Long discussions took place on the necessity for accessories not complying with the appropriate tests for breaking capacity and normal operation, to have incorporated a mechanical interlock.

A Working Group 7 was established to study amendments to IEC Publications 309 and 309A.

The documents for household switches will be discussed at a meeting to be held in the autumn of 1976.

8.00 TECHNICAL COMMITTEE 23 — ELECTRICAL ACCESSORIES

Chairman: Mr. E. Yrjöla (Finland).
Secretary: Mr. J. C. Deschampgs (Belgium).

This Committee approved the world-wide plug and socket-outlet systems as recommended by Sub-Committee 23C, and agreed to submit it to the Committee of Action for its approval.
If approved, all National Committees will have six months' time in which to comment.

9.00 TECHNICAL COMMITTEE 16 — TERMINAL MARKINGS AND OTHER IDENTIFICATIONS

Chairman: Mr. H. D. Nunney (U.K.).
Secretary: Mr. S. G. A. Heilbron (Netherlands).

The only interesting discussion was on flashing lights, communicators and digital readouts. It was decided that there be discrimination between slow (40 - 60 flashes per minute), and fast (120 - 180 flashes per minute) flashing.

The Committee also decided to appoint a Working Group with the task — "To prepare a draft report on the definition of colours to be used for the identification of bare and insulated conductors, indicator lights and push-buttons".

10.00 SUB-COMMITTEE 28A — INSULATION CO-ORDINATION FOR LOW VOLTAGE EQUIPMENT

Chairman: Mr. R. Michoudet (France).
Secretary: Mr. F. Till (Germany).

This Sub-Committee was attended for a short while by me, but I do not have anything to report.

P. J. BOTES,
VMEO-afgevaardigde/AMEU Delegate.

MR. K. G. ROBSON, President:

Ek wil graag mnr. Nortje van Germiston gelukwens met sy aanstelling as Elektrotegniese Stadsingenieur van Germiston. Hierdie is sy eerste Konvensie wat hy bywoon. Ons is baie bly daaroor.

Ek vra nou Raadslid Landman van George om ons toe te spreek.

RAADSLID S. H. LANDMAN, George:

Mnr. die President, baie dankie vir die gebaar. Ek wil graag 'n onbestrede mosie indien. In die opmerkings van Minister Botha in sy openingswoorde het hy iets gepraat van iets soortgelyk aan die Waterjaar wat ons gehad het, en ek wil graag die mosie dan so inlui, dat hierdie Konvensie dit opdra aan die Bestuur om die moontlikhede te ondersoek om so elektrisiteitsbesparingsjaar te reël in samewerking met Evkom en die myne, munisipaliteite, nywerhede en enige ander opwekkers van krag of ander mense wat mag belang hê in hierdie veld.

Ek dink dat uit die toesprake en die referate wat tot dusver gelewer is, is dit baie duidelik dat ons baie aandag aan besparing sal moet gee in die jare wat voorlê.

En die laaste is, mnr. die President, ek wil ook graag namens George en my Raad by u aanbeveel dat u in die toekoms George besoek om u Konvensie of Tegniese vergadering te hou. U weet dat ons fasiliteite van die beste is. Die plaaslike owerhede se tesouriers wat by die Konferensie was in Maart 1977 kan daarvan getuig. Ons open volgende Saterdag die nuwe lughawe, so your communications problems, gentlemen, will be solved and let me say, as julle van Oos-Londen en Port Elizabeth praat wat mooi is, there is no place like the Garden Route, it is the only one and there is not another like it. The climate is fantastic and, as far as the women folk are concerned Mr President, we will certainly lay it on for them. Thank you.

MR. K. G. ROBSON, President:

May I say, gentlemen, that our City Treasurer has recently been to George and he came back singing the praises of the Civic Centre there which, he says, is absolutely magnificent. They have every facility and they have a first class publicity officer in Councillor Landman.

Baie dankie Raadslid Landman — ons sal daardie voorstel voor die bestuursraad plaas om oor te besluit. Dankie.

MR. P. J. BOTES, Roodepoort:

Mnr. die President ek wil die Vereniging bedank vir die voorreg wat ek gehad het om IEK-vergadering in Nice te kon bywoon. Ek het my veral toegespits op TC23A — world wide plug and socket outlets system — waar mnr. Grant van die SABS as Sekretaris baie goeie werk doen vir ons land op internasionale vlak. Baie dankie, mnr. Grant.

Dis ook noodsaaklik vir ons om hierdie vergaderings gereeld by te woon. Mnr. die President u sal binnekort vertrek na Moskou om die IEK by te woon om die kontinuiteit te behou. Ons wil u alle sukses toewens en ek wil net graag vir u en mnr. Middlecote waarsku dat Podgorny uit is, en ons vertrou dat u met Bresjnev sal saamwerk, of it dit nou Olga.

Dankie.

MNR. J. K. VON AHLFTEN, Springs:

Eerstens moet ek mnr. Botes bedank vir 'n baie interessante verslag oor die verrigtinge van die IEK-vergadering in Nice wat hy namens die VMEO bygewoon het.

As die VMEO se ko-ordinerende verteenwoordiger in die Nasionale Komitee van die IEK kan ek mnr. Botes se dilemma verstaan dat hy, as gevolg van 'n gebrek aan ondervinding en voorbereiding, geneig was om te veel vergaderings by te woon. Soos u gesien het, is daar 'n menigte van IEK-komitees en is dit onmoontlik vir een persoon om op hoogte te wees van wat alles in hierdie komitees aangaan en derhalwe sal by die U.R. aanbeveel word dat toekomstige vergaderings van die IEK deur tenminste twee verteenwoordigers in die IEK Nasionale Komitee en SABS Ko-ordinerende Komitee, wat as een sub-komitee behoort te funksioneer, bygewoon word. Dit mag ook nodig word dat ander verteenwordigers in IEK sub-komitees waarin die VMEO werklike belang mag hê, die IEK-vergaderings moet bywoon.

Ek wil my dus voeg by mnr. Botes se bevinding dat volgehoue bywoning van byeenkomste van hierdie aard nodig is, veral waar die VMEO die belange van verbruikers moet beskerm en ook waar, met die goeie werk van die SABS, Suid-Afrika reeds hoë aansien in die IEK verwerf het.

Regarding the recommendation that the AMEU be represented on the IEC National Committee TC 23, SC 23B and SC 23C, this has already been attended to and the SABS informed accordingly.

In conclusion, I wish to compliment Mr. Botes on a very concise report on the proceedings and trust that he found his attendance at IEC of value in his work as the AMEU's co-ordinating representative on the SABS which was, in fact, the real reason why he was delegated to attend the IEC meeting. I also hope that you, Mr. President, will find attendance at the forthcoming meeting of the IEC in Moscow of interest and value to the AMEU, and that you will agree with us that continued participation by the AMEU at international meetings of this nature is desirable.

May I therefore wish you bon-voyage and a very successful and enjoyable stay overseas.

VERSLAG OOR DIE WERK VAN DIE HOOGSPANNINGS-KOORDINERENDE KOMITEE

Die Komitee het formeel op 26 November 1975 en 29 Oktober 1976 en informeel op 26 Mei 1975 en 29 April 1976 byeengekom.

(1) VERANDERING VAN NAAM EN SAMESTELLING

Op die 14de vergadering gehou op 26 November 1975 is daar besluit om die naam van die Komitee te verander van „Koördinerende Komitee vir Hoogspanningsnavorsing en toetsfasiliteite" na „Hoogspannings-koördinerende Komitee". Die bestel van die verskillende gespesialiseerde gebiede en die verantwoordelikhede van die sameroepers in elk van die gebiede is terselfdertyd heromskryf.

Die sameroepers is aangestel vir 'n tydperk van drie jaar vanaf 29 April 1976 en werksgroepe en die spesiale taakmagte van die Komitee is nou soos volg:-

Weerlig:

Dr. R. B. Anderson (NEERI, WNNR).

(a) Werksgroep oor weerlig.
(b) Taakmag oor die mislukking van stuwingsweerders.
(c) Taakmag oor die aanbring van weerligstraaltellers.

Isolasie:

Mnr. J. P. Reynders (Universiteit van die Witwatersrand).

(a) Werksgroep oor isolasie en interne ontledings.
(b) Werksgroep oor eksterne isolasie en besoedeling.

REPORT ON THE WORK OF THE HIGH VOLTAGE CO-ORDINATING COMMITTEE

The Committee met formally on 26 November, 1975, and 29 October, 1976, and informally on 26 May, 1975, and 29 April, 1976.

(1) CHANGE OF TITLE AND ORGANISATION

At the 14th meeting on 26 November, 1975, it was decided to change the title of the Committee from "Co-ordinating Committee for High Voltage Research and Testing Facilities" to "High Voltage Co-ordinating Committee". The scope of the various specialised fields and the responsibilities of the convenors appointed in each of these fields were redefined at the same time.

The convenors have been appointed for a period of three years from 29 April, 1976, and the working groups and ad hoc task forces of the Committee are now as follows:-

Lightning:

Dr. R. B. Anderson (NEERI, CSIR).

(a) Working group on lightning.
(b) Task Force on the failure of surge arresters.
(c) Task Force on the installation of lightning flash counters.

Insulation:

Mr. J. P. Reynders (University of the Witwatersrand).

(a) Working group on insulation and internal discharges.
(b) Working group on external insulation and pollution.

Stelselsteurings:

Mnr. E. F. Raynham (Evkom).

(a) Werksgroep oor stelselsteurings.
(b) Werksgroep oor neutrale aarding.

Elektromagnetiese verenigbaarheid:

Prof. F. G. Heyman (Universiteit van Pretoria).

(a) Werksgroep oor bronne en onderdrukking van interferensie.
(b) Werksgroep oor ontvangs en hulle beveiliging.

Aarding:

Mnr. J. C. van Alphen (SABS).

Werksgroep oor aardingsprobleme.

Draaimasjiene:

Mnr. J. P. Reynders en mnr. E. F. Raynham (gesamentlike sameroepers).
Werksgroep oor draaimasjiene.

Die sameroepers is verantwoordelik vir die vergemakliking van die koördinasie van navorsing in hulle gespesialiseerde gebiede en enige probleme wat verdere navorsing verdien behoort onder die aandag van die betrokke sameroeper gebring te word.

(2) VERSLAE VAN DIE SAMEROEPERS

Die hooftrekke uit die verslae van die sameroepers en die daaropvolgende bespreking op die vergadering is as volg:-

(a) Weerlig

Dr. Anderson het berig dat 310 van die 400 weerligstraaltellers opgerig is en dat die gegewens wat vir die 1975/76-seisoen versamel is, in die eerste gerekenariseerde isokeraunise kaart saamgevat is om die weerligslagdigtheid vir die seisoen aan te gee. Die syfers wat opgeteken is, het gewissel van minder as 1/km² langs die westelike kuslyn van die Republiek tot 9/km² langs die Natalse hooglande en die aanlope na die Drakensberge. Hierdie waardes val saam met die laagste digtheid wat in die Pretoria-gebied aangeteken is oor die afgelope agt jaar en is moontlik ook die laagste in die Republiek. Die tellers wat gebruik is, het internasionale erkenning verwerf omrede hulle voortreflike eienskappe en navrae is ontvang vanuit baie lande. Sekere wysigings aan die ontwerp is ook getoets en waar hulle opgeneem is in bestaande tellers, het aansienlike besparings in bedryfskoste gevolg.

Die WNNR se toring van 60m wat by Scientia opgerig is, is nog 13 keer getref in die afgelope twee seisoene en 'n spitswaarde van meer as 100kA is aangeteken. Beperkte metings word ook gemaak op 120m-maste in ander dele van die land. Een van die parameters wat by Scientia bestudeer word, is die „trefafstand" wat die getal slae bepaal wat op transmissielyne in 'n gebied van gegewe weerligstraaldigtheid kan plaasvind.

Stuwings word op Evkom se stelsel van 400 kV en op die Cabora Bassa-lyn asook op 'n lyn van 11 kV in die Pretoria-gebied gemeet. Laasgenoemde sluit die vasstelling van die stygtempo van spanning en oorspanningswaarskynlikheid vir verskillende peile van weerligstraaldigtheid in. 'n Goeie korrelasie tussen weerligdigtheid en lynonderbrekings is ook bepaal.

Daar word in die veld en in die laboratorium ondersoek ingestel na die werkverrigting van stuwingweerders. Benewens die meet van stuwingweerderstroom wat by vier Evkom-stasies aan die gang is, word daar beoog om 'n foutaanmeldstelsel in te stel en om gespesialiseerde toetsuitrusting by die SABS te ontwerp en te installeer ten einde die vermoë van weerders om meervoudige ontladings te weerstaan te bewys.

(b) Isolering

Mnr. Reynders het verslag gedoen dat baie van die werk wat ten opsigte van buite-isolering gedoen word, nodig is vanweë die lae lugdruk en lae humiditeit wat in Suid-Afrika ondervind word. Dit word nie algemeen in ander nywerheidsgebiede van die wêreld aangetref nie en toetsuitslae wat elders verkry word, kan dus nie met plaaslike toestande vergelyk word nie. Daar is 'n behoefte daaraan om die uitwerking van uiterste toestande op „RIV"-spanning en oorvonkspanningspeile meer akkuraat te bepaal en om 'n betekenisvolle verband tussen laboratoriumtoetse en die werkverrigting van isolators in besoedelde omgewings vas te stel. 'n Fasiliteit wat geskik is vir die hanteer van lang isolatorstringe word vir die WNNR se nuwe laboratoriumkompleks beplan, maar tans kan die SABS net enkelisolators en baie kort stringe toets. Die meeste van die werk met besoedelde isolators word in die veld gedoen aangesien dit noodsaaklik was om die aard van die besoedeling op elke terrein vas te stel.

System Disturbances:

Mr. E. E. Raynham (ESCOM).

(a) Working group on system disturbances.
(b) Working group on neutral earthing.

Electromagnetic Compatibility (EMC):

Professor F. G. Heyman (University of Pretoria).

(a) Working group on sources and suppression of interference.
(b) Working group on receptors and their protection.

Earthing:

Mr. J. C. van Alphen (SABS).

Working group on earthing problems.

Rotating Machines:

Mr. J. P. Reynders and Mr. E. F. Raynham (joint convenors).
Working group on rotating machines.

The convenors are responsible for facilitating the co-ordination of research in their specialised fields and any problems which merit further research should be brought to the attention of the convenor concerned.

(2) REPORTS OF THE CONVENORS

The main points arising from the reports of the convenors and the ensuing discussion at the meeting are as follows:-

(a) Lightning

Dr. Anderson reported that 310 of the 400 lightning flash counters had been installed and that the data accumulated for the 1975/6 season had been compiled into the first computerised isokeraunic map indicating the lightning flash density for the season. The figures recorded varied from less than 1/km² on the western coast line of the Republic to 9/km² on the highlands of Natal and the approaches to the Drakensberg. These values coincide with the lowest density recorded in the Pretoria area over the last eight years and could also be the lowest for the Republic. The Counters used had gained international recognition because of their superior characteristics and enquiries had been received from many countries. Some modifications to the design had also been tested and where these are incorporated into existing counters, significant savings in operating costs result.

The CSIR's 60 meter tower erected at Scientia was struck a further 13 times in the past two seasons and a peak value of more than 100kA was recorded. Limited measurements are also being made on 120m masts in other parts of the country. One of the parameters being studied at Scientia is the "striking distance" which determines the number of strikes that can occur to transmission lines operating in an area of given lightning flash density.

Measurements of surges are being undertaken on Escom's 400 kV system and on the Cabora Bassa line as well as on an 11 kV line in the Pretoria area. The latter includes determination of rates of rise of voltage and of overvoltage probability for different levels of lightning flash density. A good correlation between lightning density and line outage performance has also been established.

The performance of surge arresters is being investigated in the field and in the laboratory. In addition to the measurements of surge arrester currently being made at four operational Escom stations, it is proposed to inaugurate a fault reporting scheme and to design and install specialised test equipment at the SABS to prove the ability of arresters to withstand multiple discharges.

(b) Insulation

Mr. Reynders reported that much of the work being done on external insulation was necessary because of the conditions of low pressure and low humidity encountered in South Africa which are not commonly encountered in other industrialised areas of the world and test results obtained elsewhere could therefore not be related to local conditions. There was a need to establish the effect of extreme conditions on RIV levels and flashover voltage levels more accurately and to obtain a meaningful correlation between laboratory tests and the performance of insulators in polluted environments.

A facility suitable for handling long insulator strings is planned for the CSIR's new laboratory complex but at present only single insulators and very short strings could be tested by the SABS. Most of the work with polluted insulators is being done in the field since it was essential to establish the characteristics of the pollution at each site.

Evkom het 71 stofneerslagmeters oor die hele land geïnstalleer met die doel om 'n besoedelingsindeks vir elke terrein op te stel. Daar is ook van Koeberg af berig ontvang dat die besoedelstofafwerpeienskappe van die isolatorprofiel net so belangrik as die kruipafstand blyk te wees. Die toetse is tot dusver met onbekragte isolatorstringe uitgevoer maar die terrein is amper gereed vir die aanvang van lewendige toetse.

Johannesburg het vanweë probleme om geskikte uitrusting te kry geen vordering gemaak met sy planne om lekstrome in sy transmissiestelsel van 88 kV buitekant Kelvin- en Orlandokragsentrale te moniteer nie. Evkom het egter ingestem om stofaanpakmeters te leen ten einde stofbesoedelingsindekse vir dié terreine te kry.

Mnr. Reynders het ook verslag gedoen dat daar vroeg in 1977 met die nasionale foutverslaggewingskema vir draaiende hoogspanningsmasjinerie begin sal word. Een van die hoofprobleme is egter die gebrek aan inligting oor die isolering van bestaande werkende masjiene en omvattende gegewens oor isoleerstelsels sonder gebreke sal vir 'n geruime tyd nie beskikbaar wees nie.

Die WNNR het 'n stelsel ontwikkel waarvolgens hoogspanningsmotorisolasie bepaal kan word deur 'n aantal verskillende parameters te meet en die uitslae hou groot belofte in. Dit het ook egter duidelik geword dat dit net so belangrik is om die hewigheid van die stuwing op die gebruiker se stelsel te bepaal ten einde 'n betekenisvolle interpretasie te kan gee.

(c) Stelselsteurings

Mnr. Raynham het verslag gedoen dat die WNNR baie ondersoeke vir verskeie organisasies gedoen het om spesifieke probleme wat stuwings en golfvormsteurings veroorsaak, op te los. Die WNNR het op versoek van die Komitee onderneem om 'n verslag wat al die bevindings tot op hede saamvat, op te stel.

Dit uitwerkings van nulgeleieraarding op bestendige en oorgangoorspannings, veral weens die herstel van aardfoute, is ook bespreek en die Komitee het besluit om 'n werkgroep te vorm om dié probleem te bestudeer.

Evkom het 'n skema vir die aanmeld van foute begin. Die Komitee is voornemens om die VMEO te nader met die oog daarop om daaraan deel te neem sodra die interne organisasie en die rekenaarprogramme afgehandel is.

(d) Elektromagnetiese aanpasbaarheid

Professor Heyman het die voorgestelde samestelling van die twee werkgroepe en die omvang van hulle ondersoekwerk in hooftrekke beskrywe. Die werksaamhede van die tweede groep sal die beveiliging van kommunikasie data- en meetstelsels asook rekenaars insluit.

(e) Aarding

Mnr. van Alphen het verslag gedoen dat twee vergaderings van die SABS-komitee wat verantwoordelik is vir die opstel van 'n gebruikskode oor aarding, reeds gehou is. Probleemgebiede wat reeds uitgewys is, behels aardingsgebruike in gewapendebetongeboue, die impedansiegedrag van aardverbindings en die temperatuurstyging van ondergrondse geleistamme.

Uit ondersoeke wat Evkom gedoen het, blyk dit dat dit nodig is om die aardverbindings van huishoudelike toevoer van dié van groot substasies en kragsentrales te skei ten einde hoë oordragpotensiale gedurende aardfoute te vermy. Waar ondergrondse kabels die substasie verlaat, is die een of ander vorm van bloklaswerk soms nodig. Die toenemende gebruik om die toevoere van verbruikers van huishoudelike water elektries te isoleer ten einde elektrolitiese korrosie van hoofwaterleidings en die uitwerking van elektrolitiese korrosie op aardstelsels teen te werk, is ook bespreek. Die Komitee het die samestelling van 'n werkgroep goedgekeur om ondermeer aan dié probleem aandag te skenk.

(f) Draaimasjiene

Mnr. Meyer (GEC) het as Voorsitter van die werkgroep verslag gedoen dat daar met 'n ondersoek na die onderwerp van ongebalanseerde magnetiese trekkrag met behulp van 'n sleepringmotor van 1 300 kW begin is. Ander onderwerpe wat bespreek is, het die uitwerking van asstrome op laers, die uitkies van stuwingweerders en toevoerkontaminasie wat spesifiek op draaimasjiene van toepassing is, behels.

Escom has installed 71 dust deposit gauges throughout the country with the object of obtaining a pollution index for each site. It was also reported from Koeberg that the pollution shedding characteristics of the insulator profile had been shown to be as important as the creepage distance. The tests so far had been performed with unenergised insulator strings but the site was almost ready for live testing to commence.

Johannesburg has made no progress with its plans to monitor leakage currents on its 88 kV transmission system outside Kelvin and Orlando Power Stations because of difficulty in obtaining suitable equipment. Escom has however agreed to provide dust deposit gauges on loan in order to obtain dust pollution indices on these sites.

Mr. Reynders also reported that the national fault reporting scheme for HV rotating machinery is due to be launched early in 1977. One of the major problems, however, is the lack of information on the insulation of existing healthy machines and comprehensive data on sound insulation systems will not become available for some time.

The CSIR has developed a system for assessing HV motor insulation by measuring a number of different parameters and the results have shown considerable promise. It has also become evident however, that it is equally important to assess the severity of the surges on the user's system in order to make meaningful interpretations.

(c) System Disturbances

Mr. Raynham reported that a large number of investigations had been carried out by the CSIR for various organisations to solve specific problems caused by surges and wave form distortion. At the request of the Committee, the CSIR undertook to prepare a report summarising the findings to date.

The effects of neutral earthing on steady and transient overvoltages, especially as a result of clearing earth faults, was also discussed and the Committee decided to form a working group to study this problem.

A scheme for reporting faults on HV power systems has been initiated by Escom. The Committee intends to approach the AMEU with a view to participation once the internal organisation and the necessary computer programmes have been finalised.

(d) Electromagnetic Compatability

Professor Heymann outlined the proposed composition of the two working groups and the scope of their investigations. The activities of the second group will include the protection of communication, data and measuring systems and computers.

(e) Earthing

Mr. van Alphen reported that two meetings of the SABS committee responsible for drawing up a code of practice on earthing had already been held. Problem areas which had already been identified included earthing practices in reinforced concrete buildings, the surge impedance behaviour of earth connections and the temperature rise of buried busbars.

Investigations undertaken by Escom had shown the need for isolating the earth connections of domestic supplies from those of large sub-stations and power stations in order to avoid high transfer potentials during earth faults. Where buried cables leave the sub-station some form of block jointing is sometimes required. The increasing tendency to electrically isolate the supplies of domestic water consumers in order to counteract electrolytic corrosion of water mains and the effect of electrolytic corrosion on earthing systems was also discussed and the Committee approved the formation of a working group to investigate these along with other allied problems.

(f) Rotating Machines

Mr. Meyer (GEC) as Chairman of the working group, reported that a co-operative investigation into the subject of unbalanced magnetic pull had been initiated using a 1 300 kW slip ring motor. Other subjects being discussed included the effect of shaft currents on bearings, the selection of surge arresters and supply contamination applied specifically to rotating machines.

W. BARNARD,
Verteenwoordiger/Representative.

GESAMENTLIKE DIENSSERWITUTE IN NUWE DORPSGEBIEDE

Op aanbeveling van u uitvoerende bestuur is mnr. G. C. Theron deur die VMB benoem om tesame met 'n ingenieur aangewys deur die Stadsingenieurs, te dien op 'n komitee deur die Department van Telekommunikasie aangevra om die gebruikskode vir gemeenskaplike diensserwitute te hersien.

Twee vergaderings is tot einde 1976 gehou. Die eerste was ondersoekend en op die tweede is 'n konsepkode gebaseer op ondervinding te Secunda dorpsgebied, bespreek.

Die Poskantoor het dit nou in beginsel aanvaar om in nuwe dorpsgebiede alle telekommunikasie-dienste in pype aan te bring, in plaas van kabels direk in die grond te lê. Die kode dek dus hoofsaaklik die lê van waterpype en telekommunikasiepype in een voor. Dit kan egter ook deur onderlinge ooreenkoms saam met ander dienste gedoen word.

Die kode maak voorsiening vir drie metodes van uitvoering van die werk:-

1. Geheel-en-al departementeel deur die plaaslike owerheid.
2. Gesamentlik deur die onderskeie departemente van die plaaslike owerheid en telekommunikasie.
3. Deur kontrakteurs.

Die konsepkode is nou na die VMB gestuur met 'n aanbeveling dat dit vir algemene bespreking oopgestel moet word. Eenstemmigheid moet bereik word oor die relatiewe horisontale plasing van serwitute en die beginsel om metodes te vind om die algemene koste van dienste in nuwe dorpsgebied oor die breë spektrum gesien, so laag as moontlik te hou.

COMMON SERVICE SERVITUTES IN NEW TOWNSHIPS

On the recommendation of your Executive Council, Mr. G. C. Theron was nominated by the UME, together with an engineer nominated by the town engineers to serve on a committee requested by the Department of Telecommunications to review the code of practice for common service servitutes.

Two meetings were held up till the end of 1976. The first was exploratory and at the second meeting a draft code based on experience at Secunda Township was discussed.

The Post Office has now accepted the principle of installing all telecommunication services in conduit instead of laying the cables directly in the ground. The code therefore mainly covers the installation of water pipes and telecommunication pipes in a common trench. It can, however, also be done with other services by mutual agreement.

The code covers three methods of doing the work:-

1. Entirely departmentally by the local authority.
2. Mutually by the departments of the local authority and telecommunications.
3. By contractors.

The draft code has now been forwarded to the UME with a recommendation that it be circulated for general comment. Consensus must be reached on the relative lateral placing of servitutes and the principle of keeping the general cost of services in new townships as low as possible when viewed over a broad spectrum.

G. C. THERON,
Verteenwoordiger/Representative.

MR. K. G. ROBSON, President:

I think that is all we need to say on this particular item and we will move on to Report No. 10. May I draw your attention to the change in the name of this Committee to "High Voltage Co-ordinating Committee". It met in November 1975 and is in fact referred to in one of the reports.

MR. W. BARNARD, Johannesburg:

I consider that the importance to the AMEU of the High Voltage Co-ordinating Committee lies mainly in the field of Applied Research.

It appears as if the involvement of this Committee has moved in recent times away from basic research to applied research. This is illustrated by the number of task forces and working groups that have been established and are co-operating with the Manufacturing Industry, the SABS, municipalities and Escom.

I feel that it is unfortunate that the municipalities have not participated more in the activities of this organisation and that it is important that they should make a greater contribution.

I would therefore appeal to members of the AMEU to give this field of research their support and to come forward where problems are experienced with new equipment or applications.

Thank you.

MR. D. C. PALSER, Cape Town:

Mr. President, the Committee and its specialist members are to be congratulated on the scope of their studies and the amount of detailed work they have already undertaken.

Considering firstly lightning research, I think it is generally conceded internationally that South Africa is in the forefront in this field. It is therefore gratifying indeed to note that the lightning flash counter, developed locally, has won international recognition for its superior characteristics.

With the rapid development of Escom's transmission system and attendant transference of ever increasing blocks of load at high voltage across the country, adequate protection against lightning is assuming considerably greater importance. Of particular interest would be details of the work undertaken into the effect of lightning surges on high voltage overhead lines. I might mention here that the importance of this particular aspect was brought home most forcibly to us in Cape Town earlier this year, when the whole of the City was blacked out because of the failure of a single surge arrestor on one of Escom's 400 kV lines from the north.

Another matter of considerable interest and increasing concern is the problem of external pollution on high voltage overhead lines, again because of the disrupting effect of large blocks of load. It is pleasing to note, therefore, that this problem is being investigated and that particular attention is being given to the unique local weather conditions that are not commonly encountered elsewhere in the world.

Atmospheric pollution is not a problem only in the Transvaal. It is also a problem in the Cape, particularly Cape Town, because of the unusual local weather conditions. In the summer the prevailing wind, the South-Easter, builds up an appreciable salt deposit on insulators over a period of time without flash-over occurring. But, when followed later by a north-west fog, the flash-over rate rises rapidly.

This problem has assumed considerable importance in recent years with the increasing number of 132kV overhead lines being constructed.

One important new local line will be the 132 kV dual-circuit overhead line interconnecting Cape Town's transmission system with the City's 180 MW Steenbras hydro-electric pumped storage power station now under construction 50 km across the Cape Flats at Gordon's Bay. Despite considerable investigation, insufficient information is available to predict with any degree of certainty the pollution performance of this line. It has accordingly been decided to grease the insulators on one circuit but not the other in order to assess the relative performance of these two alternatives over a period of time and thereby, hopefully, determine the most satisfactory solution.

Concerning investigations into system disturbances, I note with considerable interest that a national computerised scheme for reporting high voltage faults has been initiated by Escom and that the AMEU has been approached with a view to participating. Such a scheme can only prove to be to the mutual advantage of all concerned and is to be welcomed as a positive step towards collecting and collating the relevant statistical data.

The question of electromagnetic compatibility is another area that requires investigation, particularly when viewed in the light of the rapidly rising fault levels on Escom's high voltage system. We in Cape Town have experienced a number of failures on metering and electronic equipment connected to pilot cables that have been attributed to this factor. We have also had to bear the cost of screening post office underground telephone cables running parallel to 132kV overhead lines by having these cables drawn into steel pipes.

The impression one gains is that there is an apparent lack of adequate information on matters relating to interaction between overhead power lines and underground telephone cables. This, accordingly, is an area that could possibly well warrant further investigation and research.

The subject of earthing is one that has always provoked much debate as to the most satisfactory and economic manner in which this can be achieved. Many divergent views and opinions have been expressed and the absence of an SABS Code of Practice is in itself indicative of the problems involved and the complexity of the subject. Such a Code of Practice would, I am sure, be greatly welcomed by all since individual practices vary so widely.

With the rapid rise in fault levels on high voltage interconnected systems, the question of earthing is assuming ever increasing importance in the interests of safety to personnel. Where many parallel feeds exist, additional precautions are necessary when working on high voltage cables that are isolated and earthed in the conventional manner, in order to limit dangerous overvoltages that may arise by induction from adjacent circuits under fault conditions.

This problem is particularly important today when considering both cross-bonded systems and the more conventional fully insulated system.

In Cape Town we have adopted a procedure of earthing while working and jointing on extra high voltage cables similar to that employed by large electricity supply authorities and major international supertension cable companies overseas. It is a system that is well worth adopting and is something, I think, the Bureau of Standards could look into.

Mention was made in Mr. Barnard's report of certain investigations undertaken by Escom that indicated the need for isolating the earth connections of domestic supplies from those of large substations and power stations in order to avoid high transfer potentials during earth faults. Further details of the arrangements adopted would, I am sure, be of general interest.

In conclusion, Mr. President, I would like once again to thank the Committee for the work they have undertaken during the past year and to congratulate them on the excellent progress they have made to date.

Thank you Mr. President.

MR. K . G. ROBSON, President:

Thank you Mr. Palser. May I say your contribution is a valuable addition to this report.

Dr. Anderson, would you like to bring us up to date on some of your work.

DR. R. B. ANDERSON, CSIR:

Thank you Mr. President. I would like to mention two task forces which may be of interest to the AMEU.

One is on the Lightning Flash Counters. The task force is responsible for measuring the lightning flash density throughout the Republic and its membership is drawn from operating authorities such as Escom, the Post Office and others helping to run these counters, of which there are 310 scattered all over the Republic. Unfortunately many of these counters are run by the Post Office and the question has been raised how one can obtain information on what the lightning density is in a particular area. I can suggest two approaches, firstly, find out which organisation is operating the counter in the area in question and it should be responsible for giving the day-to-day data on the lightning flash counter.

Secondly, we hope that the Committee will publish its results. There is two years of data now available — two maps showing the flash density for the last two years. These will be distributed to the members of the committee on which the AMEU is represented and we hope they will be published so that anybody who wishes to do so can obtain this information.

An annual publication of the results is also contemplated.

It may be of interest to know that the lightning season just passed was more severe than that of the previous year, which was the lowest since recording with counters began in Pretoria eight years ago. If, as is expected, activity follows the 11-year sunspot activity cycle, lightning may increase in severity for the next four to five years with another peak around 1982.

The second task force of possible interest is that on the future of lightning arresters — or surge arresters as they now tend to be called. The work stems from the experience, not only of Escom but also of users in other countries, of the high rate of failure of arresters in the 10kV to 22 kV distribution class. The figures range from 2% of arresters installed per annum to as high as 6%, depending upon the type of arrester and its construction and upon where it is installed. The causes are not established yet — this is one of the research objectives — but they may be due to faulty design or to more severe lightning conditions than envisaged in the specification, for example higher lightning currents or — more likely — the higher incidence of multiple strokes occurring in tropical lightning storms.

Thus the task force, presently under the chairmanship of Mr. Penman of Escom, is investigating lightning currents and voltages on 11kV arresters in service at three Escom subbstations and overvoltages and wave forms at one 11 kV research station run by the CSIR. The development of possible revised test methods is being considered in collaboration with the SABS.

The task force is particularly interested in seeing statistics of the future performance of surge arresters and transformers on systems in the Republic and Rhodesia and, in particular, it is concerned with the possibility of improved design of 11kV to 22kV systems to provide a more reliable service to rural consumers than has been possible in the past. Thus the AMEU is urged to contribute information on past or future experiences in this field with a view to improving the lightning performance of these systems in the future.

Thank you, Mr President.

MR. K. G. ROBSON, President:

Thank you Dr. Anderson.

Are there any further contributions. Then may we move on to Committee Report No. 11. Mr. Barnard, the convenor.

SUID-AFRIKAANSE HOOFKOMITEE INSAKE ELEKTROLITIESE KORROSIE — 1975

Die negende vergadering is op 24 September 1975 in die kantoor van die Stelselbestuurder, Suid-Afrikaanse Spoorweë, gehou.

STREEKSKOMITEES

Die verteenwoordigers van die vier streekskomitees het hulle verslae voorgelê. Uit die Witwatersrand het mnr. Marks berig dat onderkomitees in die lewe geroep is om in te gaan op korrosie in die Salosburgse omgewing en om gerekenariseerde kartografie te oorweeg. 'n Nuusbrief word aan lede en plaaslike munisipaliteite omgestuur en is baie goed ontvang. Namens die Wes-Kaapse komitee het mnr. Gilmour berig dat die Kaapse Provinsiale Raad 'n uitnodiging aanvaar het om op die komitee verteenwoordig te wees, ten einde in voeling te bly met munisipaliteite wat nie andersins verteenwoordig is nie. Mnr. Macey vir die Noord-Kaapse en mnr. Rogers vir die Natalse komitee berig dat hulle onderskeie probleme in die proses van bevredigende oplossing is.

GEBRUIKSKODES

Die SABS-gebruikskode vir die Beskerming van Staalpypplyne teen Korrosie is deur die betrokke komitee gefinaliseer, maar die finale uitgawe word nog deur die vertaling vertraag. Deel 3 van die SABS-gebruikskode vir die Katodiese Beskerming van Ondergrondse Strukture is vir kommentaar gesirkuleer en aangesien die Komiteewerk afgehandel is, is die verwagting dat hierdie kode binnekort uitgereik sal word.

Wysigings van die SAKEK-gebruikskode vir kabels en pypplyne wat onder spoorlyne deurloop om voorsiening te maak vir die gebruik van pype met staalvoerings en om die maksimale negatiewe potensiaal vir kabelhulse te bepaal, is bespreek en aangeneem.

GEREKENARISEERDE KARTOGRAFIE

'n Skema om 'n rekenoutomaat in te span om te help met die opstel van sleuteldiensleidingplanne is deur die WNNR voorgestel. 'n Gidsprojek is op tou gesit om die voordele van so 'n skema te bepaal.

SPOORLYNDREINERINGSVERBINDINGS

Die prosedure wat deur alle liggame wat 'n spoorlyndreineringsverbinding nodig het, gevolg moet word, is bespreek en goedgekeur.

SOUTH AFRICAN ELECTROLYTIC CORROSION MAIN COMMITTEE — 1975

The ninth meeting was held in the office of the System Manager, South African Railways, on 24 September, 1975.

REGIONAL FIELD COMMITTEES

Reports were received from the representatives of the four regional field committees. For the Witwatersrand, Mr. Marks reported that sub-committees had been formed to deal with corrosion in the Sasolburg area and to consider a computerised cartography scheme. A monthly news-letter was being circulated to members and local municipalities and was being well received. For the Cape Western committee, Mr. Gilmour stated that the Cape Provincial Government had accepted an invitation to be represented on the committee to maintain contact with municipalities not otherwise represented. Mr. Macey, for the Cape Northern, and Mr. Rogers for the Natal committee reported that their respective problems were being solved satisfactorily.

CODES OF PRACTICE

The SABS Code of Practice for Corrosion Protection of Steel Pipelines had been finalised by the committee concerned but final issue was being delayed by translation requirements. Part 3 of the SABS Code of Practice for Cathodic Protection of Buried Structures had been circulated for comment and as the committee work had also been completed it was expected that this code would be issued shortly.

Amendments to the SAECC Code of Practice for cables and pipelines crossing beneath railway tracks to allow for the use of steel sleeve pipes and to fix the maximum acceptable negative potential for lead cable sheaths, were discussed and accepted.

COMPUTERISED CARTOGRAPHY

A scheme to assist in the preparation of master plans of services by means of a computer was proposed by the CSIR. A pilot scheme was in hand to assess the benefits to be derived from the scheme.

DRAINAGE BONDS TO RAIL

The procedure to be adopted by all bodies requiring a drainage bond to rail was discussed and approved.

W. BARNARD,
Verteenwoordiger/Representative.

MR. W. BARNARD, Johannesburg:

Mr. President,

From the reports it will be seen that the AMEU representatives have all been active on the various committees.

I am sure the importance of co-operation and co-ordination in this field is fully appreciated and is being effectively dealt with by the AMEU's representatives, both on the Regional and on the main Electrolytic Corrosion Committees.

It is however of interest to note some of the unique problems which arise from the Cabora Bassa/Apollo d.c. link.

Thank you.

MR. K. G. ROBSON, President:

Thank you Mr. Barnard. Mr Denis Fraser who is the representative for the Natal area.

MR. D. H. FRASER, Durban:

Mr. President,

The reports of the Main and Regional Electrolytic Corrosion Committees indicate that a considerable amount of useful discussion between the interested parties has taken place during the past two years and solutions found to a number of corrosion problems. It is impossible to evaluate the consequent financial benefit to the community through the preservation of water pipes, gas mains, fuel pipelines, cable sheaths etc., but this must be considerable.

Municipalities have an enormous investment in buried metal in the form of underground services of various types and it is vital that they should have an effective channel of communication on corrosion problems, which may be attributable to the influence of stray direct currents. Representation on the Electrolytic Corrosion Committees provides the necesary opportunity to discuss such problems with other authorities involved and it appears that a good measure of consensus and co-operation is achieved at the regular meetings which are held at various regional centres.

In order to keep the size of the Regional Committees at a reasonable level the AMEU has only one representative and an alternate on each of these and other members of the AMEU should therefore refer electrolytic corrosion problems requiring consideration by the Committee, through their Branch representative. In most cases the AMEU member will also have an advisory or direct responsibility in respect of electrolytic corrosion problems on other municipal services, such as water mains.

Considering the extent of underground cable electricity distribution networks in areas where d.c. traction and cathodically protected pipelines exist, it is remarkable that the incidence of damage to electric cable sheaths which may be attributable to electrolysis is so low, even though relatively little cable in service has a special anti-corrosion sheath. It has been indicated that at least 70% of the problems dealt with by the Natal Regional Committee were related to G.P.O. and water services.

It is probable that the relative immunity to electrolytic corrosion of electric cable sheaths is provided by the effective bonding and earthing of these at frequent intervals, that is where cables enter substations. Any stray direct currents present in the cable sheaths will tend to leave via the low resistance substation earth mat in preference to the comparatively high resistance path through the serving of the cable, to earth. Loss of metal must of course take place where the current leaves the anodic earth electrodes. This, according to Faraday's Law, is given by the expression:

$$W = Z\,I\,t \text{ grams}$$

where:

Z is the Electro-chemical Equivalent
I is the current in amperes
t is the time in seconds.

For the metals usually involved in problems of this nature, the following values emerge

	Valency	Equivalent Z Electro-Chemical mg. per coloumb	Density g. per c/cm.	Vol. loss coloumb c/cm per
Aluminium	3	0,09316	2,700	$3,45 \times 10-5$
Copper (Cupric)	2	0,32936	8,890	$9,76 \times 10-5$
Lead	2	1,07363	11,005	$3,71 \times 10-5$

It is seen that for the same quantity of electricity passed, the loss of volume for lead is nearly three times that of copper. Furthermore, the erosion of the metal in the case of a copper earth rod is likely to be fairly evenly distributed over the surface, whereas current leaving the sheath direct to the ground will concentrate in the lower resistance areas causing pitting and thus allowing entry of moisture, leading to failure.

The multiple earthing of the electricity reticulation can introduce problems in regard to corrosion of domestic water mains. The Regional Field Committee reports reflect that such a problem at Merrievale, Natal, is presently under investigation. Stray direct currents travelling along the supply authority's earth conductor are apparently leaving through the consumer's water piping, causing their destruction. It is understood that certain suppliers do not provide earth connections to consumer's premises from their distribution system and rely entirely on the consumer's own earth electrode backed by earth leakage protection for the safety of persons. This would overcome the difficulty, but it is questioned whether it represents sound engineering practice due to the unreliability of the consumer's own earth electrode and the fact that compulsory earth leakage protection is restricted to socket-outlet circuits only. It would be interesting to hear comments from delegates in this regard.

Another matter which has featured prominently in the deliberations of the Corrosion Committees since the commissioning of the Escom Apollo Substation, is the serious corrosion arising from earth return direct currents which flow when the D.C. Cabora Bassa link is operating in the single pole mode. In the light of experience gained by Escom on this project and the cost of mitigating measures likely to be required, is the practice of deliberately channeling high value direct currents through the earth justified, bearing in mind that the problems may be aggravated with the inevitable installation of more and more underground services along the route of the line in future?

Perhaps representatives of Escom would be prepared to comment on this.

Thank you Mr. President.

SUID-AFRIKAANSE HOOFKOMITEE INSAKE ELEKTROLITIESE KORROSIE — 1976

Die tiende vergadering van hierdie komitee is op 29 September 1976 in die kantoor van die Randse Waterraad, Johannesburg, gehou.

STREEKSKOMITEES

Die verteenwoordigers van die vier streekskomitees het verslae ingedien oor die vorige jaar se bedrywighede. Sake wat elders nie in groter besonderhede bespreek is nie, is die moontlike stigting van nog 'n streekskomitee en verteenwoordiging op die streekskomitees deur die Provinsiale owerhede.

Wat betref die stigting van nog 'n komitee om sommige van die verantwoordelikhede van die Witwatersrandse Komitee oor te neem, is daar besluit om die status quo te handaaf tot tyd en wyl die behoefte dringender geword het.

Die Wes-Kaapse Streekskomitee het 'n verteenwoordiger van die Kaapse Provinsiale Raad aangestel en beskou sodanige verteenwoordiging as nuttig om sowel 'n groter besef van probleme op die Provinsiale vlak mee te bring as om 'n „wakende oog" vir die kleiner plaaslike besture te bied.

GEBRUIKSKODES

Daar is geen verdere vordering gemaak met die SABS se „Gebruikskode vir die Beveiliging van Staalpypleidings teen Korrosie" en „Gebruikskode vir die Katodiese Beskerming van Ondergrondse Strukture" nie. Wat laasgenoemde betref, is 'n wysiging aangeneem wat deur die Hoofposkantoor voorgestel is, naamlik dat leidings wat vir toetspunte voorsien word se dwarsdeursneeoppervlak groot genoeg moet wees om waar nodig voorsiening te maak vir deurverbindings tussen die diensleidings.

DIE APOLLO-AARDSTELSEL

Oor hierdie onderwerp is 'n spesiale algemene vergadering op 19 Mei 1976 gehou, waartydens die probleme met die aardelektrode vir Cabora Bassa se GS-koppeling bespreek is. Die betrokke instansies het almal met groot ywer stappe gedoen om hierdie probleme te beperk en Evkom het onderneem om met daad en krag te probeer om die ongebalanseerde werkingstyd en die lasgrootte gedurende hierdie toestand te verminder tot die minimum wat ooreenkom met veilige kragvoorsiening.

ALGEMEEN

Evkom se verteenwoordiger het navraag gedoen oor die moontlikheid om bestaande en voorgestelde skemas se boekstawing te kollasioneer om die onderskeie owerhede se beplanning te vergemaklik en om moontlike probleme en botsings in die toekoms te verhoed. Daar is besluit om hierdie saak ter oorweging na die Departement van Beplanning te verwys.

SOUTH AFRICAN ELECTROLYTIC CORROSION MAIN COMMITTEE — 1976

The tenth meeting of this Committee was held in the offices of the Rand Water Board, Johannesburg, on 29 September, 1976.

REGIONAL FIELD COMMITTEES

The reports were received from the representatives of the four Regional Field Committees on the activities of the previous year. Points arising which were not discussed in greater detail elsewhere were the possibility of forming another regional committee and representation by the Provincial authorities on the regional committees.

With regard to the formation of another committee to take over some of the responsibilities of the Witwatersrand Committee, it had been decided to maintain the status quo until the need became more urgent.

The Cape Western Committee has appointed a representative from the Cape Provincial Administration and considers such representation useful both in spreading awareness of problems at the Provincial level and in providing a "watchdog" for the smaller Local Authorities.

CODES OF PRACTICE

No further progress had been made with the SABS code for the "Corrosion Protection of Steel Pipelines" or "Cathodic Protection of Buried Structures". With regard to the latter, an amendment was proposed by the General Post Office and accepted to the effect that leads provided for test points should be of sufficient cross-sectional area to provide bonding connections between services where this proves to be necessary.

APOLLO EARTHING SYSTEM

This was the subject of a Special General Meeting held on 19 May, 1976, at which the problems associated with the earthing electrode for the Cabora Bassa D.C. link were discussed. Energetic steps are being taken by all parties concerned to minimise these problems and Escom undertook to make every effort to reduce the time for unbalanced operation and the magnitude of the load in this condition to the minimum consistent with safety of supply.

GENERAL

The Escom representative enquired whether records of existing and proposed schemes could be collated to assist the various authorities with their forward planning and avoid possible future conflicts and problems. It was decided to refer this matter to the Department of Planning for consideration.

W. BARNARD,
Verteenwoordiger/Representative.

MR. W. BARNARD

WITWATERSRANDSE STREEKSKOMITEE INSAKE ELEKTROLITIESE KORROSIE — VERSLAG OOR WERKSAAMHEDE 1975/76

Die Witwatersrandse Komitee het gedurende 1975 en 1976 vier keer vergader. Onder die roetine-sake wat bespreek is, was versoeke vir altesaam tien dreineringsverbindings en vier versonke stroom-afvoerstelsels, kennisgewings van diensleidings wat onder spoorlyne deurloop en klagtes oor korrosie van ondergrondse diensleidings.

GEREKENARISEERDE KARTOGRAFIE

Die WNNR het voorgestel dat die werk verbonde aan die instandhouding van die sleutelplan van al die ondergrondse diensleidings grootliks verminder kan word deur al die ter sake gegewens in 'n rekenoutomaat op te neem; die rekenoutomaat kan dan besonderhede oor die bepaalde streek wat oorweeg word, verskaf. Na langdurige bespreking is daar besluit dat dit nie bewys kan word dat die rekenoutomaat dieselfde hoeveelheid besonderhede kan verstrek as die bestaande sleutelplan nie en dat dit in die huidige ekonomiese klimaat uiters moelik sou wees om so 'n onderneming te finansier.

APOLLO-ONDERKOMITEE

'n Spesiale onderkomitee is aangewys om ondersoek in te stel na die uitwerking wat die aardelektrode van die Cabora Bassa HS-GS-transmissielyn op nabygeleë diensleidings het; die diensleidings wat hoofsaaklik nierdeur geraak word, is 'n hoofwaterleiding van die Randse Waterraad en die Suid-Afrikaanse Spoorweë se petroleum-pyplyn. Hierdie aardelektrode is normaalweg gebruik slegs wanneer een van die GS-transmissielyne buite werking was; dit kon dan as of negatiewe of positiewe pool ingespan word. Die steuring van ander diensleidings het afgenang van die grootte van die aardstroom en die polariteit, aangesien dit aansienlik erger was wanneer die elektrode katodies was.

Geen oplossing kon vir die probleem gevind word nie en elke instansie moes regstellingsmaatreëls tref. Die Suid-Afrikaanse Spoorweë het sy pyplyn verdeel en die transformator-gelykrigters wat vir katodiese beskerming gebruik word, hoer aangeslaan. Evkom het ook onderneem om die tydperk waarin die leiding in die ongebalanseerde toestand gebruik word, sover doenlik in te perk, en het daarop gewys dat die toestand wat gedurende die toets- en ingebruiknemingstydperk ondervind is, nie die gewone werksomstandighede verteenwoordig nie.

SWERFSTROME OP AARDDRADE

Afskrifte van die korrespondensie tussen die Suid-Afrikaanse Spoorweë en Evkom se Natalse Onderneming is vir kommentaar aan die komitee voorgelê. Die probleem kom kortliks daarop neer dat die waterleidings in die woonbuurt Merrivale vanweë elektrolise korrodeer. Toe die waterleidings met asbes-sementpype vervang is, is die probleem oorgeskuif na die verbruikerspype, wat via Evkom se aardverbinding by elke huis onderverbind is.

Daar is tot geen besluit geraak oor moontlike regstellingsmaatreëls nie, en die VMEO-verteenwoordiger is gevra om voorstelle te formuleer wat vir kommentaar aan die betrokke owerhede voorgelê kan word.

WITWATERSRAND AREA ELECTROLYTIC CORROSION FIELD COMMITTEE — REPORT ON ACTIVITIES 1975/76

Four meetings were held by the Witwatersrand Field Committee during 1975 and 1976. Among the routine matters discussed were requests for a total of ten drainage bonds and four impressed current drainage systems, advices of services crossing under railway lines and complaints of corrosion of buried services.

COMPUTERISED CARTOGRAPHY

A proposal was put forward by the CSIR that the labour of maintaining the master plan showing all buried services could be greatly reduced by having all the relevant data stored in a computer and by then generating a computer print-out covering the specific area under consideration. After considerable discussion the final decision was that it could not be demonstrated that the computer print-out would provide sufficient detail to be equal to the existing master plan and that financing the project would be very difficult in the present economic climate.

APOLLO SUB-COMMITTEE

A special Sub-Committee was appointed to consider the effects on neighbouring services of the earth electrode for the Apollo terminal of the Cabora-Bassa HVDC transmission line, the services principally affected being a Rand Water Board water main and the South African Railways petroleum products pipeline. This earth electrode was normally only used during periods when one of the DC transmission lines was out of commission and could then act as either the negative or positive pole. The disturbing effect on other services depended on magnitude of earth current and the polarity, being considerably worse when the electrode was cathodic.

No single solution to the problem could be found and each party had to take remedial action. Escom were investigating the provision of very deep electrodes at another site. The South African Railways were sectionalising their pipeline and uprating the transformer-rectifier sets used for cathodic protection. Escom also undertook to reduce the length of time that the line operated in the unbalanced condition as far as possible, and pointed out that the conditions obtained during the test and commissioning period were not representative of normal operating conditions.

STRAY CURRENTS ON EARTH WIRES

Copies of correspondence between the South African Railways and Escom's Natal Undertaking were laid before the committee for comment. Briefly, the problem was that corrosion was being experienced on the water mains in Merrivale Township due to electrolysis. Replacement of the mains with asbestos-cement pipes transferred the problem to consumers' pipes which were mutually interconnected via Escom's earth connection at each house.

No decision was reached on what remedial steps could be taken and the AMEU representative was asked to formulate proposals which could be forwarded to the appropriate authorities for comment.

W. BARNARD,
Verteenwoordiger/Representative.

NATALSE STREEKSKOMITEE INSAKE ELEKTROLITIESE KORROSIE — 1975/76 VERSLAG

My verslag oor die werksaamhede van die bostaande Komitee gedurende die tydperk 1975 tot 1976 volg hieronder.

Die Natalse Streekskomitee bestaan uit verteenwoordigers van die volgende organisasies:-

Suid-Afrikaanse Spoorwegadministrasie.
Vereniging van Munisipale Elektrisiteitsondernemings.
Elektrisiteitsvoorsieningskomissie.
Departement van Waterwese.
Suid-Afrikaanse Steenkool-, Olie- en Gaskorporasie.
Die Olienywerheid se Korrosiebeheergroep.
Fuel Glow SFF.
Hoofposkantoor.
A.E.&C.I.

Die huidige ampsdraers is:-

Voorsitter: Mnr. C. R. Stafford — S.A. Spoorweë.
Ondervoorsitter: Mnr. D. H. Fraser — VMEO.

Gedurende die twee jaar is vier vergaderings gehou, waartydens korrosieaangeleenthede tot onderlinge voordeel bespreek en in sommige gevalle bevredigend opgelos is. Hieronder tel:-

(a) Departement van Waterwese se Pyplyn.
(b) Gebruikskode vir die Katodiese Beskerming van Ondergrondse Strukture.
(c) Merrivale: Korrosie van Huishoudelike Waterpype.
(d) Durbanse Munisipaliteit: Verswakking van Kabelomhulsel: Ongewing van Albertpark en Maydonweg.
(e) Durbanse Munisipaliteit: Beskerming van see-uitlooppyp.
(f) Korrosie van koaksiale HPK-kabel: Westville.
(g) Korrosie van HPK-kabel: Malvern.
(h) Korrosie van HPK-kabel: Montclair-omgewing.
(i) Katodiese beskerming van A.E.&C.I.-gaspypleiding by die Umbogintwinirivierbrug.
(j) Korrosie van HPK-kabel — Wentworthweg.
(k) Katodiese beskerming: P&D Oil and Chemical Storage.
(l) Korrosie van HPK-koppelkabel tussen die Overport- en Reservoir Hills-sentrale.
(m) Pietermaritzburg: Korrosie van kabels en gegalvaniseerde waterpype.
(n) Korrosie van HPK-kabel: Kloof-omgewing.
(o) Stanger: Korrosie van Koaksiale Kabel.
(p) Northdene: Plastiekpypleidings in Huise.

Afskrifte van die Suid-Afrikaanse Komitee insake Elektrolitiese Korrosie se gewysigde Gebruikskode, Nr. SAKEK/1, vir kabels en pypleidings onder spoorlyne, is ter insae aan lede van die Natalse Streekskomitee verskaf.

Die probleem van die korrosie van waterpype by Merrivale is indringend bespreek en die pypleidingsgesagsliggaam en die Elektrisiteitsvoorsieningskomissie het tot 'n vergelyk geraak.

Die verslag oor die probleme met die Elektrisiteitsvoorsieningskomissie se distribusiesubstasie by die afsluiting van die HS-GS-transmissielyne wat van die hidro-elektriese kragstasie by Cabora Bassa af loop, is bespreek.

Die Durbanse Munisipaliteit het 'n verslag oor die onklaarraking van die diepput-anode by die Suidelike see-uitloop voorgelê, asook twee verslae, wat geruime tyd gelede geskryf is, oor die aarding van laespanningsdistribusiestelsels en verbruikers se elektriese installasies.

Die komitee het akkoord gegaan met mnr. Stafford se voorstel dat mnr. M. L. Whitehead van die Suid-Afrikaanse Spoorweë se Durbanse kantoor as plaasvervanger optree wanneer hy nie in staat is om komiteevergaderings by te woon nie.

Ek is daarvan oortuig dat verteenwoordiging deur die VMEO op hierdie liggaam steeds voordelig bly en, hoewel betreklik min probleme met elektrolitiese korrosie van elektriese diensleidings gedurende die verslagtydperk ondervind is, is lede van die Natalse tak op die hoogte van die Komitee se werksaamhede gehou deur die omsending van die Notules van die tweejaarlikse vergaderings.

NATAL ELECTROLYTIC CORROSION REGIONAL FIELD COMMITTEE — 1975/76 REPORT

I set out below my report on the activities of the above Committee during the period 1975 to1976.

The Natal Regional Field Committee comprises representatives of the following organisations:-

South African Railways Administration.
Association of Municipal Electricity Undertakings.
Electricity Supply Commission.
Department of Water Affairs.
S.A. Coal, Oil and Gas Corporation.
Oil Industries Corrosion Control Group.
Fuel Flow SFF.
General Post Office.
A.E.&C.I.

The present office-bearers are:-

Chairman: Mr. C. R. Stafford — S.A. Railways.
Deputy Chairman: Mr. D. H. Fraser — AMEU.

Four meetings were held during the two-year period at which matters relating to corrosion were discussed to mutual advantage and in some cases satisfactorily resolved. Amongst these were:-

(a) Department of Water Affairs pipeline.
(b) Code of Practice for Cathodic Protection of Buried Structures.
(c) Merrivale: Corrosion of domestic water pipes.
(d) Durban Corporation cable sheath deterioration — Albert Park and Maydon Road area.
(e) Durban Corporation sea outfall pipeline protection.
(f) Corrosion of G.P.O. co-axial cable — Westville.
(g) Corrosion of G.P.O. cable — Malvern.
(h) Corrosion of G.P.O. cable — Montclair area.
(i) Cathodic protection A.E.&C.I. gas pipeline at Umbogintwini River bridge.
(j) Corrosion of G.P.O. cable — Wentworth Road.
(k) Cathodic protection P&D Oil and Chemical Storage.
(l) Corrosion of G.P.O. junction cable between Overport and Reservoir Hills Exchanges.
(m) Pietermaritzburg — Corrosion of cables and galvanised water pipes.
(n) Corrosion of G.P.O. cable — Kloof area.
(o) Stanger — Corrosion of co-axial cable.
(p) Northdene — Plastic piping in houses.

Copies of the South African Electrolytic Corrosion Committee's amended Code of Practice, No. SAECC/1 for cables and pipelines beneath railway tracks were made available to members of the Natal Regional Committee.

The problem of water pipe corrosion at Merrivale was discussed in depth and an agreement was reached between the pipeline authority and the Electricity Supply Commission.

Discussion took place on the report concerned with the problems associated with the Electricity Supply Commission's distribution sub-station at the termination of the H.V.D.C. transmission lines from Cabora-Bassa hydro-electric generating station.

The Durban Corporation submitted a report dealing with the failure of the deep well anode at the Southern sea outfall as well as two reports, which were written some time ago, on the subject of earthing of low voltage distribution systems and consumer's electrical installations.

The Committee agreed to the suggestion made by Mr. Stafford that Mr. M. L. Whitehead of the S.A. Railways Durban office, act as his alternate on the Committee when he was unable to attend.

I am satisfied that AMEU representation on this body continues to be beneficial and, while relatively few problems of electrolytic corrosion affecting electricity services have arisen during the review period, members of the Natal Branch have been kept informed of the activities of the Committee through circulation of the Minutes of the bi-annual meetings.

D. H. FRASER,
Verteenwoordiger/Representative.

MR. K. G. ROBSON, President:

Thank you Mr. Fraser. It's possible that there are delegates here who are worried about the possiblity of Eletrolytic Corrosion so this is your opportunity to raise the matter.

Are there any further contributions or questions. Mnr. de Villiers.

NOORD-KAAPLANDSE STREEKSKOMITEE INSAKE ELEKTROLITIESE KORROSIE — VERSLAG VIR 1975 EN 1976

Die Komitee is deur sy konstituent lede op hoogte van verslae oor elektrolitiese korrosie gebring en het die stappe wat geneem of beoog is, oorweeg. Die posisie van gedwonge of natuurlike dreineringsverbindings wat in pypleidings aangebring is, is teen die datum waarop hulle in werking gestel is, in kaart gebring, en daar word 'n ogie gehou op die uitwerking, indien enige, op ander diensleidings.

Toetse wat gedoen is op die pypleidings wat van die Riverton-pompstasie, wat Kimberley van water voorsien, af loop, het aan die lig gebring dat elektrolitiese korrosie plaasvind waar die pype onder 'n driehoek van geëlektrifiseerde spoorlyne van die Suid-Afrikaanse Spoorweë deursny. Hoewel die korrosie tot dusver nog nie ernstig is nie, sal dit met verloop van tyd tot lekkasies in die pypleidings lei.

Die Stadsingenieur van Kimberley, onder wie die watertoevoer ressorteer, is in kennis gestel en aanbevelings is in verband met die beskerming van die pype gedoen. Die saak is nog nie afgehandel nie.

Die SAS se Elektrotegniese Ingenieur het 'n plan opgetrek wat alle diensleidings wat SAS spore kruis, aantoon. Die betrokke partye is versoek om hulle onderskeie diensleidings ter wille van maklike uitkenning volgens die kleur- en identifikasiekode wat deur die Hoofkomitee uitgereik is, aan te dui.

'n Ondersoek is gedoen om te bepaal of huishoudelike diensverbindings (pype of kabels) deur elektrolitiese korrosie aangetas is. Hoewel geen geval hiervan binne die stadsgebied voorgekom het nie, berig die Spoorweë se Stelselingenieur dat dit wel gebeur het op spoorwegdiensleidings in die algemene gebied wat deur die Noord Kaaplandse stelsel bedien word. Die korrosie het voorgekom op waterpypleidings, wat deur asbessementpype vervang is. Die toestand word noukeurig dopgehou met die oog op verdere reaksie.

Noue samewerking is deur die Departement van Waterwese, die Departement van Pos- en Telekommunikasiewese, die Suid-Afrikaanse Spoorweë, die Elektrisiteitsvoorsieningskommissie, die De Beers Consolidated-myngroep en die Munisipaliteit van Kimberley gehandhaaf. Laasgenoemde verteenwoordig terloops kleiner munisipaliteite in die omgewing, onder wie die gees van samewerking kennelik heers.

NORTHERN CAPE ELECTROLYTIC CORROSION REGIONAL FIELD COMMITTEE — REPORT FOR 1975 AND 1976

The Committee has received notice through its constituent members of various electrolytic corrosion reports and considered the action taken or to be taken. The positions of forced or natural drainage bonds installed on pipelines have been plotted against the dates when these were brought into operation and the effect, if any, on other services is being watched.

Tests carried out on pipelines from the Riverton Pumping Station which supplies water to Kimberley, have revealed that where these pipes cross a triangle of electrified tracks of the South African Railways, electrolytic corrosion is taking place. Although the corrosion is not serious at present, it will eventually lead to punctures of the pipeline.

The Kimberley City Engineer, under whose juricdiction the water supply falls, has been notified and recommendations made for the protection of these pipes. This matter has not yet been finalised.

The SAR Electrical Engineer has prepared a plan showing all services crossing the SAR tracks and all parties concerned have been requested to mark their respective services according to the colour and identification code issued by the Main Committee for easy identification.

An investigation has been carried out to determine whether service connections (pipes or cables) to domestic consumers have been affected by electrolytic corrosion. Although none have been noted within the City's confines, the Railway System Electrical Engineer reports that this has occurred on railway services in the general area served by the Northern Cape System. These occurrences were on water pipelines which have been replaced by asbestos-cement pipes. Further reaction is being closely looked for.

Close liaison has been observed between the Department of Water Affairs, the Post and Telecommunications Department, the South African Railways, Electricity Supply Commission, De Beers Consolidated Mines and the Kimberley Municipality, which incidentally represents small municipalities in the area and the spirit of co-operation between these bodies is marked.

D. A. EDEN, p.p. **H. G. FORBES**,
Verteenwoordiger/Representative.

WES-KAAPLANDSE STREEKSKOMITEE INSAKE ELEKTROLITIESE VERWERING — 1975 EN 1976 VERSLAG

Dit is met genoeë dat ek hiermee my verslag van die aktiwiteite van bogenoemde komitee gedurende 1975 en 1976 voorlê.

Die Wes-Kaaplandse Streekkomitee bestaan uit verteenwoordigers van die volgende organisasies:-

S.A. Spoorweg Administrasie.
Die Stadsraad van Kaapstad.
EVKOM.
Afdeling Pos en Telekommunikasiewese.
Die Verweringsbeheergroep van die Olienywerheid.
Cape Gas Beperk.
Die Kaapse Provinsiale Administrasie.
Die Stadsraad van Kaapstad Ingenieursafdeling (Chemiese Tak).
Die Vereniging van Munisipale Elektrisiteitsondernemings.

Vergaderings is gedurende 1975 en 1976 onder die bekwame Voorsitterskap van mnr. R. R. Gilmour van die Stadsraad van Kaapstad gehou.

Daar is gedurende 1975 besluit om die aantal vergaderings van 4 na 3 per jaar te verminder, aangesien verwering in die Wes-Kaaplandse streek blykbaar goed onder beheer is.

Gedurende die tydperk onder oorsig het die Provinsiale Administrasie 'n uitnodiging aanvaar om verteenwoordig te word op die komitee en mnr. R. J. N. Mackay het komiteevergaderings bygewoon om, onder andere, in voeling te bly met Munisipaliteite wat nie verteenwoordig word nie.

Vergaderings was in die algemeen goed bygewoon en probleme met betrekking tot elektrolitiese verwering en die beskerming van onderaardse installasies teen elektrolitiese verwering is bespreek tot die voordeel van alle geaffilieerde organisasies.

CAPE WESTERN ELECTROLYTIC CORROSION REGIONAL FIELD COMMITTEE — 1975 AND 1976 REPORT

I take pleasure in submitting herewith my report on the activities of the above Committee during 1975 and 1976.

The Cape Western Electrolytic Corrosion Regional Field Committee comprises representatives of the following organisations:-

South African Railways Administration.
Cape Town City Council.
Electricity Supply Commission.
Department of Posts and Telecommunications.
Oil Industry Corrosion Control Group.
Cape Gas Limited.
Cape Provincial Administration.
Cape Town City Engineer's Department (Chemical Branch).
Association of Municipal Electricity Undertakings.

Meetings were held during 1975 and 1976 under the able chairmanship of Mr. R. R. Gilmour of Cape Town City Council.

In 1975 it was decided to reduce the number of meetings held annually from 4 to 3 as corrosion in the Cape Western Region appeared to be well under control.

During the period under review the Cape Provincial Administration accepted an invitation to be represented on the Committee and Mr. J. R. N. Mackay attended Committee meetings to, inter alia, maintain contact with Municipalities not represented.

Meetings were generally very well attended and problems related to electrolytic corrosion and the protection of underground installations against electrolytic corrosion discussed to the advantage of all organisation represented.

Afgesien van die kennisname van notules van ander komitees, is verslag ook gereeld gedoen deur mnr. N. J. Kemp van die S.A. Spoorweë en mnr. G. B. Rodgers van die Verweringsbeheergroep van die Olienywerheid, wat ook die vergaderings van ander verweringskomitees, gehou in ander streke, bywoon.

Die Voorsitter, mnr. R. R. Gilmour, het die 1976 Algemene Jaarvergadering van die Hoofkomitee bygewoon en sy verslag oor die werksaamhede van die tak voorgelê.

Ek het by die Algemene Jaarvergadering van die VMEO, Goeie Hoop Tak, aanbeveel dat 'n ander lid die geleentheid gegun word om die vergaderings van die komitee by te woon en mnr. T. Pollock, Elektrotegniese Stadsingenieur van Gordonsbaai, is as die nuwe verteenwoordiger van die VMEO vir die Wes-Kaaplandse streek verkies.

Dit was 'n eer om die VMEO te verteenwoordig op die komitee en ek is oortuig daarvan dat voorgesette verteenwoordiging in die algemene belang van alle elektrisiteitsondernemings is.

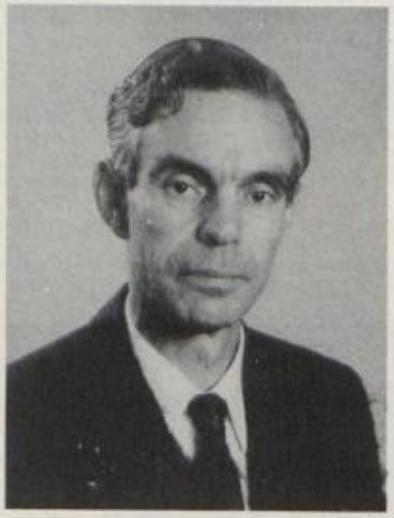
Apart from noting the minutes of other Committees, reports on their activities were made by Mr. N. J. Kemp of the South African Railways and Mr. G. B. Rodgers of the Oil Industry Corrosion group who also attend the meetings of Corrosion Committees held in other regions.

The Chairman, Mr. R. R. Gilmour, attended the 1976 annual meeting of the Main Committee submitting his report on the activities of the Branch.

At the AGM of the AMEU Good Hope Branch, I recommended that another member be given the opportunity to attend the meetings of this Committee and Mr. T. Pollock, Town Electrical Engineer of Gordons Bay, was elected as the new AMEU representative for Cape Western Region.

Representing the AMEU on this Committee has been an honour and I am convinced that continued representation thereon is in the interest of all Electricity Undertakings.

K. J. MURPHY,
Verteenwoordiger/Representative.



MR. K. J. MURPHY

DIE SUID-AFRIKAANSE NASIONALE KOMITEE INSAKE DIE WERELDENERGIEKONFERENSIE (SANKWEK)

Die komitee het op 20 Februarie 1976 in Johannesburg vergader. Die notule kan soos volg saamgevat word:-

CIGRE-STUDIEKOMITEES (Conferende International des Grandes Réseaux Electriques).

Veertien studiekomitees is in die lewe geroep om in te gaan op bepaalde aspekte van hoogspanningstransmissie. Suid-Afrika is verteenwoordig op drie van die komitees, waarvan twee in Oktober 1975 in die Republiek vergader het. Verskeie lande het afgevaardigdes gestuur en meeste van die referate is deur Evkom-ingenieurs gelewer.

DIE INTERNASIONALE KOMMISSIE VIR GROOT DAMME (IKGD)

'n Vergadering sal gedurende 1977 in Oostenryk gehou word.

INTERNASIONALE KONFERENSIE OOR STEENKOOLNAVORSING

'n Vergadering is in Januarie 1976 in Suid-Afrika gehou en deur verteenwoordigers uit verskeie lande bygewoon. Referate oor steenkoolnavorsing en -mynbou en die benutting van steenkool is gelewer en die afgewoordigers het steenkool-, goud- en diamantmyne, verskeie nywerhede, Sasol en die Brandstofnavorsingsinstituut besoek.

ENERGIEKONFERENSIE

'n Konferensie wat deur 250 mense bygewoon is, is in April 1975 in Kaapstad gehou. SANKWEK is deur vyf van sy lede verteenwoordig. Die referate wat gelewer is, is in verskeie tegniese blaaie herdruk.

KONFERENSIE OOR GRONDSTOWWE IN SUIDELIKE AFRIKA

Professor Dutkiewicz berig dat die bywoning van die konferensie wat in September 1975 in Johannesburg gehou is, teleurstellend was.

Syns insiens was die probleem dat daar te veel onderafdelings in die program was, van energie tot mensemateriaal. Mnr. D. C. Ion, Raadgewer by die Hersiening van die Wereldenergiekonferensie se Oorsig oor Energiebronne, 1974, het 'n referaat voor die Konferensie gelewer.

VERGADERINGS VAN DIE IEK

'n Vergadering is in Mei 1975 in Kopenhagen, Denemarke, gehou.

Dr. R. L. Straszacker, Voorsitter van SANKWEK, het onderwyl hy in Europa was die indruk gekry dat die vraag na elektriese krag afgeneem het, gedeeltelik vanweë 'n geringe ekonomiese insinking en deels danksy 'n daadkragtige beleid van besuiniging met die gebruik van elektrisiteit.

Op die Europese kernfront is aktiewe navorsing oor hoë-temperatuurreaktors aan die gang, maar die aanduidings is dat daar in die nabye toekoms 'n vraag na urban vir ligte-waterreaktors sal wees. In Denemarke word navorsing gedoen oor die gebruik van sonenergie vir huishoudelike kook- en waterverhittingsdoeleindes.

SOUTH AFRICAN NATIONAL COMMITTEE OF THE WORLD ENERGY CONFERENCE (SANCWEC)

A meeting of the Committee was held in Johannesburg on 20 February, 1976, and a summary of the minutes follows:-

CIGRE STUDY COMMITTEES (Conference International des Grandes Réseaux Electriques).

Fourteen study committees have been formed to deal with specific aspects of high voltage transmission. South Africa is represented on three committees, two of which held meetings in South Africa in October, 1975. Many countries were represented and most of the papers presented came from Escom engineers.

INTERNATIONAL COMMISSION ON LARGE DAMS (ICOLD)

A meeting will be held in Austria during 1977.

INTERNATIONAL CONFERENCE ON COAL RESEARCH

A meeting was held in South Africa in January, 1976, attended by representatives from many other countries. Papers on coal research, the mining of coal and the application of coal were presented and delegates visited coal, gold and diamond mines, various industries, Sasol and the Fuel Research Institute.

ENERGY CONFERENCE

A conference attended by 250 people was held in Cape Town in April, 1975, and SANCWEC was represented by five of its members. The papers presented have been reprinted in various technical journals.

CONFERENCE ON RESOURCES IN SOUTHERN AFRICA

Professor Dutkiewicz reported that the attendance at the conference held in Johannesburg in September, 1975, was disappointing.

He thought the problem was that there were too many divisions in the programme ranging from energy to human resources. Mr. D. C. Ion, Adviser to the Revision of the World Energy Conference 1974 Survey of Energy Resources presented a paper at the Conference.

MEETINGS OF THE IEC

A meeting was held in Copenhagen, Denmark, in May, 1975. Dr. R. L. Straszacker, Chairman of SANCWEC, who attended the meeting, gained the impression while in Europe that the demand for electricity has decreased due partly to a slight economic recession and partly to an active policy of economising in the use of electricity.

On the nuclear front in Europe, active research was proceeding on high temperature reactors, but indications were that in the immediate future there would be a demand for uranium for light water reactors.

A research project in Denmark was dealing with solar energy for domestic cooking and water heating.

W. BARNARD,
Verteenwoordiger/Representative.

MR. W. BARNARD, Johannesburg:

Mr. President, it is of interest to note that the World Energy Conference, previously called the World Power Conference, has a general meeting every three years. The themes of this Conference have ranged over a very wide field with the emphasis shifting in the direction of energy conservation and new unconventional sources of energy. The South African Committee plays a very important role in determining the country's policy in regard to energy resources, utilisation and conservation. As stated in my report, the general meeting of the World Energy Conference will take place in Istanbul this year and South Africa has two papers accepted for presentation, which I consider to be of tremendous credit to this country if one takes cognisance of the fact that virtually all the developed countries are members and this even includes the communist countries.

Thank you.

MR. R. W. BARTON, Welkom:

Mr. President, thank you for inviting me to contribute. There is surely no subject more topical or of greater interest than Energy. For years past the public media and technical Press have tried to bring home to the world what is in store for us as a result of the steadily increasing consumption of natural fuels such as gas, oil and coal, the supplies of which are just as steadily becoming exhausted. The replacement of these fuels by atomic energy, although inevitable, is being received with less than enthusiasm by conservationists, who see in its use only a blueprint for disaster. These worthy people see our only salvation as regards energy in the use of sunlight, wind and wave power.

Of more immediate concern to us here today, I think, is the inordinate escalation in the price of energy, out of all proportion even to the general runaway rate of inflation to which we are subjected. This was brought home to me very forcibly when I received my last account for electricity. The modest consumption for March, 1977 of 314 kWh cost R14,62. When by chance I came across the account for June, 1976 I found that I had paid R14,93 for 910kWh.

This threefold increase in less than a year, although to some extent due to the tariff structure, was a heavy blow right where it hurts most — in the pocket, and showed in no uncertain manner the sort of problem that we all have to face now and in the future.

The heating of water by the use of solar energy, for both domestic and industral consumption is receiving a lot of attention. Its popularity will increase even further when the new electricity tariff increases strike home. Although we must sympathise with anyone trying to beat the rise in the cost of living by installing a solar heater on his

root, we should remember that these units, when combined with a standby electric supply, possess a very poor load factor. We will have to consider seriously their effect on the economics of our distribution systems, and no doubt devise a special tariff for them.

Mr. President, the World Energy Conference is an organisation which ranges widely in the energy field and yet delves in great depth into the scientific and technical problems which beset the world.

This is shown by the number and variety of papers delivered at their plenary sessions. These papers are purchased and filed by Escom and are available by courtesy of the Commission to any of our members who wish to see them. We are indeed indebted to the South frican National Committee of the World Energy Conference for keeping us in touch with this body of knowledge and endeavour, and particularly to its Chairman over many years, Dr. Straszacker, who has regularly attended the annual meetings overseas and brought us news of the proceedings.

We are indebted also to Mr. Barnard for representing us on the National Committee, and I have much pleasure in proposing a hearty vote of thanks to him for his report.

Thank you Mr. President.

MR. W. BARNARD, Johannesburg:

Mr. President, I felt I should just let delegates know that I have, in fact, put forward a recommendation to the Executive Council for consideration on Friday that the AMEU should send a representative to the meeting of the World Energy Conference in September 1977.

DR. R. L. STRASZACKER, Escom:

Mr. President I would like to say a few words in support of what Mr. Barnard has just told the meeting. I believe that attendance at these World Energy Conference meetings will be very useful for anyone interested in the field of energy as a whole. It is, as we find at your own Convention here, not only the official part of the meeting which is of value, but the personal contacts that one makes and the ideas exchanged with othere people moving in the same field which are most useful. At these Conferences it is normal for the representatives to bring their wives along as well. This always involves extra expense but I personally believe that this is most valuable because the wives move, shall we say, in a different sphere. They make contacts which eventually reflect back on the men and in this way you meet people whom you otherwise would not meet, partly for the reason that there are 1 500 delegates at these meetings, and I should very much welcome it if the AMEU could see its way clear to send a representative and his wife to these meetings.

Thank you Mr. President.

MR. K. G. ROBSON, President:

Thank you Dr. Straszacker for your words of advice.

On the question of the more attractive part of the delegation to an AMEU Convention, the Mayor, at the Civic Lunch on Monday, did make quite an interesting comment, viz. that here, in 1977, with a packed City Hall and a number of women in the gallery, there wasn't a single woman in the delegation on the floor. It is really shattering that there was not one woman in any of the official delegations.

Thank you Dr. Straszacker for a very nicely made point about the contribution that our womenfolk make at these conventions. I think that sometimes we tend to overlook their influence.

May we now turn to Mr. D. H. Fraser's report on the proceedings of the Technical Training Sub-Committee.

Verslag van die Onderkomitee Insake Tegniese Opleiding vir die tydperk 1975-77

1. **SAMESTELLING VAN DIE VMEO-ONDERKOMITEE**

Tydens sy vergadering van 23 Mei 1975 het die Uitvoerende Raad die volgende lede op hierdie onderkomitee aangestel:-

D. H. Fraser	(Durban) Saamroeper.
W. Barnard	(Johannesburg).
A. J. van den Berg	(Krugersdorp).
J. D. Dawson	(Uitenhage).

Die onderkomitee het nog een keer vergader, maar sekere bykomende sake is gedurende die verslagtydperk per telefoon of brief afgehandel.

2. **ONDERKOMITEE VAN DIE INSTITUUT VAN STADSKLERKE**

2.1 In die verslag wat mnr. D. C. Plowden, voormalige saamroeper van die VMEO se Onderkomitee insake Tegniese Opleiding, aan die vorige Konvensie voorgelê het, maak hy melding van die ondersoek deur 'n onderkomitee wat op versoek van die Verenigde Munisipale Dagbestuur deur die Instituut van Stadsklerke in die lewe geroep is om verslag te doen oor die „Opleiding en Behoud van Plaaslikebestuurspersoneel".

Die VMEO is tot Mei 1975 deur mnre. Plowden en Botes op hierdie onderkomitee verteenwoordig, en hierna deur mnre. Fraser en A. J. van den Berg. Die Instituut van Munisipale Tesouriers en Rekenmeesters en die Instituut van Munisipale Ingenieurs is ook verteenwoordig.

2.2 'n Afskrif (in Engels) van die finale verslag van die Onderkomitee van die Instituut van Stadsklerke, wat op 22 Oktober 1975 uitgereik is, word aangeheg. Deel C van die verslag handel oor die opleiding van vakleerlinge en verklaar, onder meer, "The Sub-Committee cannot stress too strongly the great need which exists for the establishment by local authorities of more basic training centres for apprentices and the important role which the Provincial Municipal Associations can play in this connection should

Report of the Technical Training Sub-Committee for the period 1975-77

1. **COMPOSITION OF AMEU SUB-COMMITTEE**

The following members were appointed to this sub-committee by the Executive Council at its meeting held on 23rd May, 1975:-

D. H. Fraser	(Durban) Convenor.
W. Barnard	(Johannesburg).
A. J. van den Berg	(Krugersdorp)
J. D. Dawson	(Uitenhage).

The sub-committee has met on only one occasion but certain additional matters were resolved by telephonic communication or correspondence during the period under review.

2. **INSTITUTE OF TOWN CLERKS' SUB-COMMITTEE**

2.1 In his report to the last Convention, Mr. D. C. Plowden, then convenor of the AMEU Technical Training Sub-Committee, referred to investigations being undertaken by a sub-committee established by the Institute of Town Clerks at the request of the United Municipal Executive to report on the "Training and Retention of Local Government Staff'.' The AMEU was represented on this sub-committee by Messrs. Plowden and Botes up to May, 1975, and subsequently by Messrs. Fraser and A. J. van den Berg. The Institute of Municipal Engineers was also represented.

2.2 A copy of the final report of the Institute of Town Clerks Sub-Committee issued on the 22nd October, 1975, is annexed hereto. Part "C" of the report deals with the training of apprentices and states, inter-alia: "The Sub-Committee cannot stress too strongly the great need which exists for the establishment by local authorities of more basic training centres for apprentices and the important role which the Provincial Municipal Association can play in this connection should not be overlooked". In respect of the

not be overlooked". Wat betref die finansiering van die basiese opleidingsentra, het die onderkomitee voorgestel dat bestaande geriewe in die groot stede waar moontlik deur onderlinge ooreenkoms tot die beskikking van die plaaslike besture van kleiner buurdorpe gestel word, of dat twee of meer plaaslike besture gemeenskaplike opleidingsentra stig en die onkoste deel.

2.3 Dis verblydend om te kan berig dat daar reeds 'n mate van gesamentlike gebruik van geriewe is om die opleiding van munisipale vakleerlingelektrisiëns te verbeter, byvoorbeeld:-

(i) 'n Nuwe basiese opleidingsentrum is in Roodepoort gestig.

(ii) Krugersdorp het gereël dat sy vakleerlinge by die Myngroepopleidingskool basiese opleiding ontvang; nulle toon reeds groter welslae met die ambagstoetse.

(iii) Sewe Oos-Randse munisipaliteite het ooreengekom om 'n gemeenskaplike basiese opleidingssentrum, wat in 'n omgeboude biblioteekgebou in Benoni ingerig sal word, te steun. Die Elektrotegniese Ingenieur wat vir die personeel en bedryf van die sentrum verantwoordelik sal wees, mnr. J. A. Loubser, verwag dat die sentrum teen Januarie 1978 op dreef sal wees. Hy swaai mnr. A. H. L. Fortman lof toe as die kragbron van die proefneming. Hierdie inrigting sal aanvanklik sowat 90 Elektrotegniese en Motorwerktuigkundige vakleerlinge per jaar hanteer, in vier groepe wat elk drie maande lank opleiding ontvang. Die munisipaliteite sal die vaste en bedryfskoste gesamentlik dra, pro rata met die aantal leerlinge wat elk inskryf.

2.4 Dit is interessant om te let op die klem wat die "Manifesto of Firm Undertakings Accepted by the Government and the Private Sector Organisations of the Republic of South Africa Involved in Order to Launch a Collective Campaign Against Inflation", wat op 7 Oktober 1975 uitgereik is, lê op die belangrikheid van die opleiding van nywerheidspersoneel.

Ek is nie bewus van enige verwikkelinge wat voortgespruit het uit die verklaring "the Government undertakes to expedite the consideration of the proposals for the possible erection of more training institutions on the pattern of that established at Westlake", wat in paragraaf B(iii)(1)(a) van die bylae tot die Manifesto vervat is nie (kyk aanhangsel „A").

Dis in hierdie verband ter sake om te meld dat die Goeie Hoop-tak dit op sy vergadering van 24 November 1976 bepleit het dat die Regering genader word om beter opleidingsgeriewe vir vakleerling-elektrisiëns en -draadwerkers te verskaf.

3. DIE NATALTAK SE OPLEIDINGSKEMA VIR VAKLEERLING-ELEKTRISIENS

3.1 In oorleg met verteenwoordigers van die Natalse Munisipale Vereniging en die Munisipaliteite van Pietermaritzburg en Durban, het die Onderkomitee insake Tegniese Opleiding van die Nataltak onder Voorsitterskap van mnr. M. P. P. Clarke 'n skema voorgestel om die opleiding van munisipale vakleerling-elektrisiëns aan te moedig. Ten tyde van die skrywe hiervan was die finale besonderhede van die skema nog nie uitgewerk nie, derhalwe sou dit voorbarig wees om dit in meer as net die breë trekke te omskryf.

3.2 Die omvang van die bekende tekort aan elektrotegniese vaklui is bepaal deur opnames by munisipale elektrisiteitsondernemings in Natal. Hierdeur het aan die lig gekom dat 35 en 20 persent van die goedgekeurde vakmansposte in die kleiner dorpies gedurende onderskeidelik 1975 en 1976 ongevul was, vergeleke met 12 en 13 persent in die stede Pietermaritzburg en Durban. Die getal vakleerlinge wat besig sou moes wees met opleiding en verliese is bepaal. Dit het 'n leerlingtekort van 43 en 35 persent vir 1975 en 1976 onderskeidelik aan die lig gebring.

3.3 Daar is van die veronderstelling uitgegaan dat elke werkgewer die morele verpligting aanvaar dat hy óf self die personeel wat hy nodig het, moet oplei, óf finansieel moet bydra tot die opleiding wat deur ander instansies aan sodanige personeel gegee word.

financing of the costs of the basic training scheme, the Sub-Committee suggested that, where possible, existing facilities in the larger cities be made available by mutual agreement to neighbouring local authorities or that joint training centres be established by two or more local authorities on a shared cost basis.

2.3 It is gratifying to record that a measure of progress has already been made in the sharing of facilities in order to improve the training of municipal apprentice electricians, e.g.:-

(i) A new basic training centre has been established in Roodepoort.

(ii) Krugersdorp has arranged for its apprentices to receive basic training in the Mines Group Training School with improved successes in trade tests.

(iii) Seven municipalities on the East Rand have agreed to support a joint basic training centre to be established in a converted library building in Benoni. The Electrical Engineer, Mr. J. A. Loubser, who will be responsible for the staffing and running of the centre, expects this to open in January, 1978, and gives credit to Mr. A. H. L. Fortman as being the driving force behind the experiment. This establishment will initially cater for approximately 90 Electrician and Motor Mechanic apprentices a year in four groups for three months at a stretch.
Fixed and operational costs will be shared proportionately according to the number of apprentices sent by each local authority.

2.4 It is interesting to note the stress laid on the importance of staff training in industry in the "Manifesto of Firm Undertakings Accepted by the Government and the Private Sector Organisations of the Republic of South Africa Involved in Order to Launch a Collective Campaign Against Inflation" released on the 7th October, 1975.

I am not aware of any subsequent developments in respect of the statement, "the Government undertakes to expedite the consideration of the proposals for the possible erection of more training institutions on the pattern of that established at Westlake" contained in paragraph B(iii)(1)(a) of the annexure to the Manifesto. (Refer Annexure "A"). In this regard it is relevant to record that the Good Hope Branch, at a meeting held on 24th November, 1976, advocated an approach to the Government for the provision of better training facilities for apprentice electricians and wiremen.

3. NATAL BRANCH APPRENTICE ELECTRICIAN TRAINING SCHEME

3.1 The Technical Training Sub-Committee of the Natal Branch, under the chairmanship of Mr. M. P. P. Clarke, has, in conjunction with representatives of the Natal Municipal Association and the Pietermaritzburg and Durban Municipalities, proposed a scheme to encourage the training of municipal apprentice electricians. At the time of writing, final details of the scheme had not been worked out and it would therefore be premature to give more than just the broad concept of the scheme.

3.2 The extent of the known shortage of artisan electricians was established through surveys conducted among municipal electricity supply undertakings in Natal. This revealed vacancies in the smaller towns in 1975 and 1976 amounting to 35-percent and 20-percent respectively of their approved artisan establishment compared with 12-percent and 13-percent in the cities of Pietermaritzburg and Durban. The number of apprentices required to be in training to meet the shortfall and allow for growth and losses was assessed and this revealed a shortfall in trainees of 43-percent and 35-percent for 1975 and 1976 respectively.

3.3 It has been assumed that every employer acknowledges a moral obligation either to train the staff he requires or to make some financial contribution towards the training of such staff by others.

3.4 Wat die Munisipale Elektrisiteitsondernemings in Natal betref, word daar in artikel 313 en 315 van die Ordonnansie op Plaaslike Besture, Nr. 25 van 1974, voorsiening gemaak dat plaaslike besture vrywilliglik kan saamwerk om personeel op te lei, op voorwaardes waaroor hulle onderling ooreengekom het.

3.5 Die voorgestelde skema voorsien dat elke deelnemende munisipaliteit 'n voorafbepaalde bedrag maandeliks bydra ten opsigte van elke vakman in sy diens. Hierdie bydraes sal gebruik word om 'n fonds daar te stel waaruit toepaslike vergoeding aan elke plaaslike bestuur wat opleidingsgeriewe verskaf, betaal sal word. Hierdie betalings sal geskied op voorwaarde dat die opleiding van elke vakleerling ooreenkomstig die standaard wat deur die skema voorgeskryf word, voltooi word.

3.6 Die grootte van die heffings en vergoedingsbetalings waarna in 3.5 verwys word, moet nog vasgestel word, maar die voorneme is dat laasgenoemde die plaaslike bestuur wat die vakleerling opgelei het, voldoende moet vergoed vir die onkoste daaraan verbonde, om munisipaliteite sodoende aan te moedig om mee te doen aan die opleiding van personeel.

3.7 Dit blyk duidelik dat die skema wat tans deur die Nataltak voorgestel word, berus op vrywillige medewerking kragtens die bestaande Provinsiale wetgewing en daar moet op gelet word dat bevoegdheid soortgelyk aan dié wat deur artikel 313 en 315 van die Natalse Ordonnansie op Plaaslike Besture, Nr. 24 van 1974, voorsien word, ook in die Ordonnansies van die ander provinsies bestaan, met name:-

Oranje Vrystaat	Artikel 145 A van Ord. 8/1952.
Kaap	Artikel 186(3) en 215 van Ord. 20/1974.
Transvaal	Artikel 79/(54) en 171 van Ord. 17/1939.

Sou daar niks van die beoogde vrywillige samewerking van al die plaaslike besture kom nie, sal dit waarskynlik nodig wees om bykomende wetgewing aan te moedig, mits die konsep dat alle indiensnemers van munisipale elektrisiëns gesamentlik vir hulle opleiding verantwoordelik is, aanvaar word.

3.8 Die gesamentlike Onderkomitee waarna in 3.1 verwys word, sal 'n memorandum oor die voorgestelde skema in die nabye toekoms ter oorweging aan die Natalse Munisipale Vereniging voorlê.

4. WET OP VAKLEERLINGE, 1944

4.1 Ek vestig u aandag op Kennisgewing Nr. R2473, gepubliseer in Staatskoerant Nr. 5361 van 17 Desember 1975 wat hersiene vakleerlingskapvoorwaardes vir ambagte wat onder die regsbevoegdheid van die Nasionale Vakleerlingskapskomitee vir die metaalnywerheid val, van krag maak.

4.2 Die mees beduidende wysiging van die voorwaardes is die vermindering van die vakleerlingskapstermyn van 'n maksimum van vyf jaar tot vier jaar. Die kortste tydperk waarin, onderhewig aan die slaag van 'n ambagstoets, wat afgelê kan word nadat NTS II in Ambagsteorie behaal is en 93 weke praktiese opleiding voltooi is, gekwalifiseer kan word, is tans sowat twee jaar, vergeleke met 2½ jaar voorheen.

4.3 Die nuwe voorwaardes spesifiseer die omvang van die praktiese opleiding wat gegee moet word, asook die aanbevole onderrigtyd vir elke werksklas van die benoemde ambagte. Voorbeelde van die aanbevole onderrigtyd is:-

Ambag	Totale aanbevole onderrigtyd: Ure	Totale aanbevole onderrigtyd: Ingedeel in weke van 44 uur elk
12 Elektrotegniese draadwerker (10)	3 645	83
13 Elektrisiën (6)	3 605	82
14 Ingenieurselektrisiën (7)	3 960	90

Die res van die vakleerlingskapstermyn word benut om werkservaring op te doen en onafhanklik te werk. U sal oplet dat die elektrisiën met so min as elf weke se werkservaring kan kwalifiseer, maar dit is waarskynlik dat 'n redelike deel van die aanbevole onderrig juis in daadwerklike werksomstandighede sal plaasvins.

3.4 In respect of Municipal Electricity Supply Undertakings in Natal, provision exists in sections 313 and 315 of the Local Authorities Ordinance 25 — 1974 for local authorities to voluntarily co-operate in setting up a joint venture for the training of staff upon terms mutually agreed.

3.5 The proposed scheme envisages that each participating municipality should contribute a predetermined monthly amount in respect of each artisan electrician in its employ. These contributions would be used to establish a fund from which appropriate compensatory payments would be made to each local authority providing training facilities. Such payments would be contingent upon the completion of the training of each apprentice to standards prescribed in the scheme.

3.6 The amounts of the levy and the compensatory payments referred to in 3.5 have yet to be determined, but it is proposed that the latter should adequately reimburse the local authority that has undertaken the training of the apprentice with the cost involved and thereby encourage municipalities to participate in the training of staff.

3.7 It will be clear that the scheme presently proposed by the Natal Branch is based on voluntary participation in terms of existing Provincial legislation and it should be noted that enabling powers similar to those provided in Sections 313 and 315 of the Natal Local Authorities Ordinance 25/1974 are contained in the ordinances of the other Provinces as follows:-

Orange Free State	Section 145A of Ord. 8/1952.
Cape	Sections 186(3) and 215 of Ord. 20/1974.
Transvaal	Sections 79(54) and 171 of Ord. 17/1939.

Should the anticipated voluntary participation of all local authorities not be forthcoming, it will presumably be necessary to promote further legislation, if the concept of joint responsibility of all employers of Municipal electricians for training, is accepted.

3.8 The joint Sub-Committee, referred to in 3.1, will submit a memorandum on the proposed scheme for consideration by the Natal Municipal Association in the near future.

4. APPRENTICESHIP ACT 1944

4.1 Attention is drawn to the Notice No. R2473 published in Government Gazette No. 5361 on the 17th December, 1975, giving effect to revised conditions of apprenticeship for trades falling under the jurisdiction of the National Apprenticeship Committee for the Metal Industry.

4.2 The most significant change in the conditions is the reduction of the period of apprenticeship from a maximum of five to four years. The minimum possible qualifying period subject to the passing of a trade test, which may be taken after attaining NTC II standard in the subject of Trade Theory and completing 93 weeks of practical training, is now about two years as compared with 2½ years previously.

4.3 The new conditions specify the scope of practical training to be given and in addition the recommended instruction time for the various classes of work in each designated trade. Examples of recommended instruction time are given below:-

Trade	Total Recommended Instruction Time: Hours	Total Recommended Instruction Time: Equiv. Weeks of 44 Hours
12 Electrical Wireman (10)	3 645	83
13 Electrician (6)	3 605	82
14 Electrician (Engineering) (7)	3 960	90

The remaining period of apprenticeship is given to on the job experience and independent work. It will be noted that in the trade of electrician this "on the job" experience before qualifying could be as little as eleven weeks, but it is probable that a reasonable portion of the recommended instruction would, in fact, be "on the job".

4.4 Die nuwe voorwaardes hersien ook vergoedingskale en toelaes vir opvoedkundige kwalifikasies.

5. **DIE OPLEIDING VAN BEROEPSINGENIEURS**

Ek vestig u aandag op die wenslikheid daarvan dat Munisipaliteite wat beroepsingenieurs aanstel om opleiding te ontvang, hulle opleidsprogramme vooraf deur die Suid-Afrikaanse Raad vir Professionele Ingenieurs laat goedkeur. Sodoende sal probleme met die registrasie, waartydens die toereikenheid van die opleiding wat die Ingenieur ondergaan het, moontlik bevraagteken kan word, uitgeskakel word. Die Johannesburgse Elektrisiteitsafdeling het goedkeuring vir so 'n opleidingsprogram verkry.

4.4 The new conditions revise rates of pay and allowances for educational qualifications.

5. **TRAINING OF PROFESSIONAL ENGINEERS**

Attention is drawn to the desirability of Municipalities, which employ Professional Engineers in Training, having their programmes of training approved in advance by the South African Council for Professional Engineers. This will obviate problems at the time of application for registration, when queries may otherwise arise concerning the adequacy of the training which the Engineer has undergone. The Johannesburg Electricity Department has had such a training programme approved.

D. H. FRASER,
Saamroeper/Convenor.

MR. DENNIS FRASER

MR. W. BOZYCZKO, Estcourt:

Mr. President, Ladies and Gentlemen, I thank you for allowing me the privilege to speak on the report so ably prepared by Mr. Fraser and members of his sub-Committee.

The report and the contribution by the Institute of Town Clerks indicates clearly the concern of responsible minds in regard to the retention and training of personnel in Local Government service.

The problem of personnel retention is particularly acute when the economy is bouyant and I trust that the present problems in the economy will not dampen the enthusiasm with which Mr. Fraser and his sub-committee tackled the initial investigations. I believe the long term benefits will be substantial.

Ons verwag reservering van sekere van die kleinere plaaslike owerhede, weens die koste daaraan verbond. Sommige mag selfs poog om hul eie ambagslui self op te lei, om sodoende betaling van hul verpligting te ontduik.

Ondervinding het egter getoon dat die resultate minder as die gemiddelde is in sulke gevalle, ten spyte van die streng vereistes soos neergelê deur die betrokke wetgewing.

Allow me Mr. President, to appeal to the Local Authorities who are not yet convinved by the reports before us, to reconsider very seriously the problems of artisan training with emphasis on the Municipal needs. Local Authorities can no longer afford to be the transit camps for migrants whose ambition is rather more quantitive in Rands and Cents and less qualititive in effort, and it is high time that the municipal artisans earned recognition for their productivity and quality work, and were remunerated competitively.

Dit is moontlik, mnr. die President, dat die beskermde maatreëls van vandag, moontlik môre iets van die verlede kan wees, en ook dit plaas 'n swaar las op ons om te verseker dat ons seuns hul plek kan volstaan in die veranderende omstandighede wat kan ontstaan in die toekoms.

I hope Mr. President, that the report will be discussed thoroughly by this Convention and that, at the conclusion of these discussions, we will all stand united in support of the objects of the report. Thank you Mr. President.

MR. L. H. HARE, Olifantsfontein:

Mr. President, Gentlemen, at this juncture I would like to place on the record the congratulations of the Central Organisation for Trade Testing to the President on his election. For many years past there has existed a rather special kind of co-operative relationship between Mr. Robson and his staff and COTT, and we feel that this has been of mutual benefit to both organisations. We have valued this co-operation and are most pleased to see him occupying the Presidential chair at this Convention. Regarding the Report of the Technical Training Committee, I was pleased to see the positive approach adopted by the sub-committee, as evidenced by paragraph 2.3 of the report and also the proposed scheme outlined in the Report by Natal. Roodepoort's Training Centre has achieved a marked success

and, knowing the type of training given by the Mines Group in Krugersdorp, I have no hesitation in commending that Municipality on its vision in making use of this opportunity of providing proper training for apprentices.

Mr. President, I would like to point out that, immediately an employer signs a contract with an apprentice in terms of the Apprenticeship Act, he is legally bound to train that apprentice in terms of the Gazeted Schedule of Training.

Also the trade test is a practical examination based on these schedules as a frame of reference. Of particular importance is the fact that COTT does not draw up these training schedules. These are drawn up by organised industry with both employer and employee organisations doing the preparation. The schedules are finally approved by the National Apprenticeship Board and then gazetted, at which time they become part of the law as it applies to the relationship between the employer and the apprentice.

Each year this Organisation conducts between 16 000 and 18 000 trade tests in almost 200 trades. Every apprentice indentured in terms of the Act must come to COTT at least once during his apprenticeship for a trade test.Of the total number tested last year about 11 000 were apprentices (excluding electrical wiremen, with whom I shall deal with under the report on the Electrical Wiremen's Registration Board).

Mr. President, I cannot stress in strong enough terms that it is the employer's responsibility to train the apprentice in terms of the Act. It is no use coming with the excuse that the apprentice wasn't interested, or he wouldn't learn; to that I have only one answer, who is in charge, the apprentice or the employer? Also there is the common excuse that firm X or firm Y gets results because they "train for the trade test". Mr. President this trade test is an examination based on a legal syllabus and of course the employer must train them in accordance with the syllabus or schedule.

Nobody would even think of teaching a pupil at school or technical college unless it was to prepare him for the final examination. This is also valid for the training of doctors and engineers.

We at COTT are only too acutely aware of the difference between the employer who trains correctly and the one who couldn't care less, who allows an apprentice to loaf or waste his time. We want to have contact with the vital link between the employer and the apprentice — that is the instructor, we want to see him at COTT, so that he can see what we are looking for, why we are looking for it and how we are looking for it. Unless the instructor is fully aware of the requirements of the trade test the employer is paying the apprentices' wages and posibly the instructor's to no avail.

We welcome visits to COTT by anybody concerned with apprentice training — we want top-line management so that they can then siupport the instructor, and enable him to turn the apprentice into an investment, instead of a financial burden, and possibly an incompetent, so-called artisan.

Mr. President, I am heartened to read in paragraph 2.3 (iii) of the Report that Mr. Fortmann is described as the driving force behind the attempt to get organised training for municipal apprentices off the launching pad. More power to him, because we need men of vision, dedicated to this ideal of making the most of our manpower, by training correctly from the start. I would like to state categorically that if I, or the Organisation I represent, can be of any assistance in this matter, we will be only too pleased to support Mr. Fortmann and Mr. Loubser to the fullest extent in this venture, which is vital to our future trained manpower needs on the Reef. Mr. President, may I through you, remark that Mr. Futcher, of Kempton Park, has had much success lately in training his apprentices; also Mr. Bornman, of Pretoria Municipality (which previously had a zero percent pass rate at the trade tests) tells me he has now succeeded in obtaining 5 passes out of 8. Escom last year had an 87% pass rate (that is in all trades). Two weeks ago the Colliery Training Centre of Witbank sent up 6 electrical apprentices, three of whom obtained between 80 and 90% and three obtained 90% and higher (the highest being 92%).

Mr. President, gentlemen, if a training programme can be drawn up to motivate a candidate to achieve this type of result, you can imagine my utter dismay and shock when ann employer reports that the apprentice was to blame for the poor trade test result of 18-20%. We are not over concerned about a 40-50% failure — but we get results as low as 8-10%, the employer having had the youngster in his employ for 4-5 years, and he shrugs off this type of result as the fault of the apprentice.

In conclusion I can only re-iterate that we at COTT welcome visitors, are prepared to discuss any aspect of apprentice training or trade testing and welcome healthy constructive criticism. We are prepared to communicate, but must point out that communication is a two-way traffic.

Mr. President, gentlemen, I thank you for the privilege of allowing me to contribute to the discussion on this subject and I wish your Association well in its efforts to put municipal apprentice training on a sound footing. Thank you.

MR. K. G. ROBSON, President:

Thank you Mr. Hare for your very kind remarks to me — I appreciate these. We congratulate you on your abiding dedication and enthusiasm at Olifantsfontein. You have maintained this throughout the years of our association and we congratulate you on the results you are beginning to achieve. May I make an appeal to delegates here to take this opportunity of getting Mr. Hare in a corner and use this opportunity to talk to him. He is out to help you, that I can assure you.

MR. JOHN GAMBLE, Greytown:

Mr. President, about 90% of the membership of the AMEU is from small and medium sized undertakings, maybe the Transvaal might quibble with me on this, but my figures are based on the Cape and Natal. I criticise the Convention on the grounds that 90% of the Papers and documentation is prepared by the large undertakings, whereas about 90% of the membership is made up of small and medium size undertakings. I would like to say that in my town of Greytown, 50% of our electrical staff consists of apprentices and when they go on block release to Pietermaritzburg Technical College, our Electricity Department is down to half strength, which causes considerable embarrassment.

What I would suggest Mr. President, is that possibly you should do to other representatives of small undertakings what you have done to me and make them speak, whether they like it or not, because I feel that the small undertakings have a contribution to make, but everybody is bashful about getting up and saying aything in the august presence of members from Escom, Johannesburg, Pretoria, Durban, Cape Town, East London and Port Elizabeth. They may talk to you privately but they won't speak in public.

Thank you.

MR. K. G. ROBSON, President:

Thank you Mr. Gamble for coming up to the microphone. I believe that this point should have been made during the opening session, particularly in the light of our discussion last night, which I found enjoyable and interesting.

One tries to give the opportunity to everybody to participate actively at Conventions by first sending out forms and endeavouring to compel people to say "I am going to put my name down"; this is not always the easiest thing to do and I do believe that it is important at our Conventions to make sure that everybody feels free to speak, but not everybody has the courage of Mr. Gamble to come into the aisle and approach the microphone. I did say to Mr. Gamble also that we must not look at conventions only — there are also the Regional Branches where tremendous opportunity to advance the aims of the AMEU exists. We must also bear in mind that this is a National Convention. It is a Convention of considerable standing in South Africa and, for that reason, we have to endeavour to maintain a high standard in its deliberations. But by no means does that indicate that only the people who happen to come from the cities should contribute to that high standing. Thank you very much.

MR. A. H. L. FORTMANN, Boksburg:

Mr. President, I would like to direct my comments mainly to our group on the East Rand.

Last year we started off by planning a basic training centre to cater for apprentices on the East Rand. We originally had 11 municipalities in mind but, for good reasons, Heidelberg withdrew, followed by Bedfordview, where apprentices are not employed, leaving us with 9 participating municipalities. This appeared to me to be a good working group. It will be of interest for Mr. Fraser to tell us when the AMEU started investigating the problem of training apprentices — it must be many years ago. Eventually the AMEU's Technical Training Sub-committee came forward with the idea of establishing regional basic training centres to serve groups of municipalities which could not individually justify the expense of establishing their own centres.

This proposal received the support of a sub-committee appointed by the Institute of Town Clerks at the request of

the United Municipal Executive to investigate the training and retention of staff by local authorities.

We on the East Rand thought this was a good idea as there are a number of municipalities sufficiently close together to make the scheme practical and not unduly expensive. Unfortunately, to date, one or two municipalities have indicated they are not prepared to participate. If Mr. Pretorius of Nigel is here, I would ask him to endeavour to persuade his Council to reconsider its decision. The Government has stressed that apprentices should be properly trained and I think it is up to all municipalities including Nigel, and those others which are still considering this matter to give the scheme their active support. We all want good artisans, but to give them a good training, we must establish basic training centres and we should all contribute towards this, lets not leave it to somebody else. This is my appeal to my colleagues to please give the matter serious consideration. Mr Fraser in his report (item 2.4) says it is interesting to note the stress laid on the importance of staff training in industry in a manifesto accepted by the Government anr private sector organisations. Mr. Hare has also stressed this, so you will see it is not just a fantasy shared by some of us. Thank you.

MR. K. G. ROBSON, President:

Thank you Mr. Fortmann we congratulate you on your leadership in your area.

MNR. J. A. LOUBSER, Benoni:

Mnr. die President u weet ek het al voorheen beswaar gemaak dat 'n mens die goed altyd vooraf moet neerskryf voordat jy werklik toegelaat was om te praat. Dit is nou so dat mnr. Fortmann het meeste van die dinge wat ek wou sê reeds gesê. Ek is eintlik baie spyt dat al die raadslede van die munisipaliteite nie vandag hier verteenwoordig is nie. Eintlik besonder spyt in die geval van Germiston sodat hulle kon hoor dat ons noem hul naam. Dit is een van die stede waarop ons staat gemaak het om ons poging in die Oos-Rand te steun. Ek weet mnr. Nortje is die skema goedgevind maar dit sou so goed gewees het as hier 'n raadslid van Germiston was om te hoor hoe ons omtrent die saak voel. Ek moet net vir mnr. Fortmann sê dat ek stem nie heeltemaal met hom saam dat sommige van die plaaslike besture nie die moedigheid het om vakleerlinge op te laat lei by hierdie opleidingssentrum nie. Ek wil graag aan Nigel, Heidelberg en Bedfordview weereens 'n uitnodiging rig dat hulle asseblief ook kom deelneem aan hierdie poging van ons daar in die Oos-Rand. Dit is eintlik verkeerd om nie vakleerlinge te hê nie, want as jy 'n ambagsman het dan moet jy vakleerlinge ook hê. Ek wil graag ook net vir u die voorbeeld noem van Kempton Park.

Mnr. Hare het vir ons hier genoem dat hulle vakleerlinge pragtig slaag in die ambagstoetse. Ek weet dat mnr. Futcher 'n opleidingsbeampte aangestel het en ten spyte van al dit was Kempton Park een van die eerste plaaslike besture wat vir ons geantwoord het dat hulle sal deelneem aan hierdie poging van ons in die Oos-Rand. Ons sê vir hule net baie dankie daarvoor. Dankie.

MNR. J. K. VON AHLFTEN, Springs:

Mnr. die President ek is bietjie in die moeilikheid hier want ek verstaan nie mooi wat nou aangaan met die opleidingstorie nie. Soos ons die storie ken, kom dit van die Instituut van Stadsklerke af deur die VMB. Uiteindelik word die probleem op plaaslike bestuursvlak terug verwys na die TMV. En ons moes in die diepte val. Ek verstaan dat die rede was, dat Johannesburg moontlik iets soos 'n opleidingsentrum gaan aanbied want hulle is teen verbrokkeling van opleiding en die saak moet blykbaar nou weer terug verwys word na die Raad van die Randse Munisipaliteite. Nou weet ek regtig nie meer wat daar aangaan nie want ons sit in die middel, om van bo af weer terug onder toe en weer terug boontoe, so ek moet met mnr. Fortmann saamstem, ons moet êrens nou 'n lyn trek, ons gaan of voort cf ons lts die hele ding.

MNR. BENNIE VAN DER WALT, Sekretaris:

Mnr. die President, ek wil net toelig dat die Raad van Randse Munisipaliteite onlangs vergader het en die Oos-Randse munisipaliteite goedkeuring verleen het om voort te gaan met die projek. Dus as die Munisipaliteite saam staan en saamwerk dan kan hul volgende jaar met die opleidingsentrum in Benoni begin.

MNR. R. J. FULS, Orbar:

Mnr. die President dit is interessant vir my hierdie opleiding en dit lê ook na aan my hart. Ek merk egter op dat daar feitlik niks van Bantoeopleiding gepraat word nie. Dit is moontlik so dat u reken die opleiding van Bantoe behoort by die Bantoeadministrasie rade. Ongelukkig weet u seker beter as ek dat die Bantoeadministrasie Rade net nie oor tegniese personeel beskik nie. Daarom wil ek vreeslik graag 'n beroep doen op die stadsrade om hier behulpsaam te wees. Ek wil dit ook verder beklemtoon deur die feit dat die NVM statistiek in 1972 vrygestel het waarin hulle aantoon dat in 1980 daar 'n tekort van 3¼ miljoen geskoolde werkers in Suid-Afrika sal wees as ons 'n groeikoers van 51/2% wil handhaaf. Nou ons het dit natuurlik nie gehandhaaf nie en dit is duidelik in hierdie tyd dat ons vêr agter is. Ek dink op 'n stadium het ons 'n negatiewe grocikoers gehad en die rede daarvoor is natuurlik ook ontoereikende opleiding. Hulle het ook vasgestel dat as die volle arbeidsmag, die volle sterkte van geskoolde werkers wat uit dit blanke gebied tot die aarbeidsmag toetree, hulle almal as geskoolde werkers gebruik kan word teen 1980 gaan daar 'n tekort wees van nog steeds 1¼ miloen en dit nadat die Kleurlinge en Asiate ook reeds toegetree het. Ek noem dit maar net om te wys dat die behoefde aan Bantoe geskoolde werk baie groot is en sonder die blankes se hulp sal hulle nooit vooruit kom uie, en ons hele land gaan daaronder ly. Dankie.

MR. K. I. ANDREWS, Somerset East:

Ladies and gentlemen, there are two aspects regarding technical college training. The first is that you can take the horse to the water but you can't always make him drink. The other, in my experience in Pietermaritzburg, is that between block release and military call-up, it is only now and then that you see the apprentices. Thank you

MR. W. BARNARD, Johannesburg:

Mr. President, I would like to refer very briefly to the training of Blacks if I may, it might be of interest to the members here. We in Johannesburg have been training Blacks for a number of years, at the moment we have approximately 60 in different stages of training and we have about 15 who are qualified electricians, we have also approximately 20 who are qualified wiremen. These trainees have been sent to the Poloquanie Training chool at Pietersburg in the past, where they received their theoretical training. They were then brought back to Soweto for practical training. Roughly they spend 6 months at Poloquanie and 6 months at Soweto each year. Last year I found that this was completely unsatisfactory, we were unhappy with the training they were receiving and I recently put up a recommendation to my Council that we should do all the training in Soweto. This created quite a problem, because there were no Technical College facilities in Soweto and, much against our better judgment, we embarked on a correspondence course for them and got our own staff to supplement these courses. Just before I came to this Convention, I had a meeting with the Department of Bantu Education and they have asked for our co-operation in that they are taking over training facilities in Soweto, where we have agreed that they will establish a type of Trade School. My thinking in this regard is that students would be at the school for 2 years on a full time basis, sponsored by the employer. We are planning to award bursaries which would cover their tuition costs.

During the first two years, they would do theoretical and practical training at this school. During the third year, we have in mind that they would spend part of their time in the field to get on-the-job training. In the fourth year they would probably spend half the day with us and half the day in the school and in the fifth year virtually completely in the field, going back to school for supplementary technical training. We expect to be able to embark on this project by the 1st July this year on a preliminary basis. The Bantu Education Department has indicated that it would be prepared to accept trainees from all local authorities. At this stage the Department is not prepared to take trainees from private enterprise. I think that this will probably meet our needs. We have planned this particularly to meet the considerable needs we are going to have in the very near future with the electrification of Soweto.

MNR. J. A. LOUBSER, Benoni:

Mnr. President, ek is dankbaar om te kan sê dat daar in Benoni se industriele gebied 'n stuk grond opsy gesit is vir die oprigting van 'n indiensopleidingsentrum vir Ban-

toe. Die gedagte is dat die nywerhede in Benoni hul Bantoe daarheen sal stuur vir opleiding. Dit is 'n splinternuwe sentrum wat tans daar opgerig word, en hopelik behoort die sentrum eersdaags oopgestel te word.

RAADSLID N. J. VAN ZYL, Vereeniging:

Mnr. die President, ondervinding van Bantoe opleiding is dat hulle al baie jare opgelei word; dat die meeste werk al vandag deur hulle gedoen word, maar net onder 'n dekmantel. Ons privaat elegtriesekontrakteurs, en in ander sektore ook, laai die Bantoe by die verskillende huise af om werk te verrig en tel hulle weer saans op. Die eerste keer wat die kontrakteur weer by daardie huis te lande kom is wanneer hy die inspekteur bring om die inspeksie te doen. So eintlik dink ek dat ons maar net die mantel so 'n bietjie moet lig, ons sal uitvind dat ons baie semi-gekwalifiseerde swart mense in ons midde het, en as ons hulle bymekaar trek en 'n vinnige opleiding gee, dink ek gaan ons die grootste krisis te bowe kom. Dankie.

MR. K. A. H. ADAMS, Johannesburg, S.A.I.E.E.:

May I give you some idea as to where apprentice training is and is not possible. If your artisan group under a foreman is of size 'N', then the foreman's salary must be the cube root of 'N' times the artisan wage otherwise you can not close the group. If the salary is below that level you will not be able to train apprentices or, if you do train them, you will not retain them. Now most of your engineers are earning less than that factor so you have a hopeless situation and the only way is to go to Black employees or raise your own top salaries. Thank you.

MNR. R. J. FULS, Orbar:

Mnr. die President ek wil nie te veel praat nie ek wil net verwys na wat mnr. Loubser gesê het van die opleidingsentrum. Daar is baie sulke sentrums oor die hele land en ons sal beslis daarvan gebruik maak. En ek vra ook dat die munisipaliteite dalk ook namens ons daarvan gebruik sal maak maar die groot probleem lê by die teoretiese opleiding. Hulle is nie teoretiese onderleg nie, hulle is ook nie van die formaat dat 'n mens hulle verder teoreties kan oplei nie. Maar daar is 'n aantal van die Bantoes was baie bekwaam is, om die waarheid te sê ek het 'n hele paar by my in diens wat akademies hoër gekwalifiseerd is as hul blanke toesighouers. Hulle bestaan dus maar hulle moet ontgin word en die Bantoerade alleen is te min om dit te doen.

Die probleem is nog steeds by my ook dat ons die Bantoes nie so ver opgelei het dat hulle met vertroue hoogspanningwerk kan verrig nie en ons moet in daardie rigting dink. Dankie.

COUNCILLOR A. K. L. SHEPSTONE, Durban:

Mr. President I would like to offer a word of advice to your Undertakings. In doing this, I am speaking as one who went through an Apprentice's Training School myself and was trained at a Technical College. About 5 years ago I was running an Engineering service and, whenever we advertised for apprentices, we would get applications from one European, about 15 Indians and the remainder were from Bantu. That was about 5 or 6 years ago, when you just could not train these people. I think today the opportunity is here for us to do this, there are lots of young people of all colours who are looking for this sort of training. I was a bit disappointed to note from one of the reports that something is going to happen only in 12 to 18 months' time: my advice is to do it now, while you have these people looking for training, because later on, if another boom comes, you won't have them. Thank you.

MR. D. H. FRASER, Durban:

Mr. President, the interest which has been shown in this subject by the wide range of discussion that has taken place is indeed most encouraging and I think, as Councillor Shepstone has said, we should try to keep the ball rolling and so to obtain some positive results. I am particularly encouraged by such people as Mr. Bozyczko, Mr. Fortmann and Mr. Loubser, who represent the smaller local authorities and I commend them for the initiative and the support which they are providing. The smaller municipalities are the ones of course with the biggest problem so far as the provision of training facilities is concerned.

I am not suggesting that we have something that is acceptable as final, but at least it is the basis of a mutually co-operative venture and I would support — I think Mr. Fortmann stresed this — that it is necesary for us all to work together if we are going to make progress. Now we are putting the scheme forward purely on a voluntary basis, because we don't have legislation which compels any Local Authority to take part in this scheme, but the provision does exist in the ordinance for us to work together and for each to contribute. The scheme envisages a levy and a rebate. A levy based on the number of artisans employed and a rebate based on the number of artisans produced from the ranks of apprentices. We hope that this is going to work, but if it doesn't, if we don t get voluntary support, then it may become necessary to consider possible amending legislation. The matter of the training of non-Whites is also extremely important. I haven't covered this in the report of the Training Committee because in fact we didn't give this any consideration. I was very interested to hear Mr. Barnard's coments, because I have been wondering, in the light of proposals to provide full electrical facilities in Soweto, who would operate and maintain the installation when it is completed. Obviously this matter is receiving attention. We in Durban have also recognised the need to train Bantu and we started off with 60 trainees. We are now left with 45 who have completed the five-year training period. We have a Vocational Training School at the Umlazi Bantu Township, where theoretical training has been provided. There is now a new concept on theoretical training, which has been evolved by the Bantu Administration Officials. It comprises the provision of a three-year full time attendance at the Vocational Training School, followed by a two-year full time period of practical training. This is being tried because it was found that, after six months of practical training, the Bantu was not able to retain the theoretical knowledge acquired during the preceding six months at the school. Thus, when he went back to the school, he had difficulty in picking up the threads again. A reversal of this was experienced when the trainee returned from the school to practical training. I think perseverance in this is justified because the people we have trained are reasonably competent and are presently engaged in the same sort of work as the White artisan. One of our concerns is to provide continuity of work for them and we are endeavouring to bring about the same situation that is developing in Soweto by getting acceptance of the need for full electrification in our Bantu areas. This was something that I mentioned in responding to the President's Address, namely that we must recognise this as an absolute necessity and somehow or other find the money for the provision of electricity at the time when houses are being built, rather than allow enormous backlogs to develop, which will take years and massive financial expenditure to overcome.

I would therefore appeal to all who are able to influence the situation to try and ensure that money is available at the outset for this purpose. There is another important aspect currently in motion that will, I am sure, be of interest to all the delegates and that is the matter of the examination for the Government Certificate of Competency. I have spoken to Mr. Weich and he is willing to give some information to this Convention concerning changes which are taking place.

MR. A. A. WEICH, Chief Inspector of Factories:

Mr. President, thank you for the opportunity to speak to the Convention on this particular subject. The announcement about the Certificate of Competency is rather an important one and is made now for the first time in public. It is that the Certificate of Competency examinations have been integrated with the national examinations. The Government Mining Engineer and myself have accepted as an entrance qualification to the examination the National Higher Certificate for Technicians in Mechanical Engineering and Electrical Engineering (Heavy Current). The National Diplomas for Technicians in Mechanical Engineering and Electrical Engineering (Heavy Current) are of course accepted as superior qualifications. Thus the present system of examination is to be phased out over a 5-year period to accommodate those people now in the pipeline and those who still want to take the examination through the existing channel. There-after study for the Certificate will have to be undertaken through the Department of National Education, i.e. at Colleges of Advanced Technical Education and so, people commencing their studies now are recommended to do so through the new avenue. Correspondence courses are also available.

We feel that this approach has many advantages because in the past anyone who studied for the examination and failed had nothing to show for his efforts. With the new arrangement, a person who studies for the Certificate of Competency at a College of Advanced Technical Education but fails the final examination will at least get recognition for what he has achieved. For instance he may only get as far as the National Certificate, but he will then have this certificate to his credit.

I think it is a sound move to adopt examinations that are conducted and controlled by the Department of National Education through its Colleges of Advanced Technical Education.

ANNEXURE "A"

EXTRACT FROM:

MANIFESTO OF FIRM UNDERTAKINGS ACCEPTED BY THE GOVERNMENT AND THE PRIVATE SECTOR ORGANISATIONS OF THE REPUBLIC OF SOUTH AFRICA INVOLVED IN ORDER TO LAUNCH A COLLECTIVE CAMPAIGN AGAINST INFLATION.

Dated 7th October, 1975.

(iii) **TRAINING OF WORKERS**

(1) **WHITES**

(a) In the light of the urgent necessity for the further training of white workers in industry, particularly because of the technological changes and the possibility of the replacement of white workers by non-whites, the Government undertakes to expedite the consideration writing, all firms affiliated to their respective organisations to devote attention on a continuing basis to the training of semi-skilled white workers and, in view of the substantial success achieved by the upgrading of semi-skilled white in the metal and engineering industries by means of the Journeymen's Recognition Scheme, to propagate the introduction of similar schemes amongst industrialists. It is the intention that industrialists should themselves undertake this kind of training.

(c) **The employer organisations undertake** to request, in writing, all firms affiliated to their respective organisations to promote the training of apprentices by the systamatic exchange, through the medium of the Economic Advisory Council's Sub-Committee on the Better Utilisation of Manpower, of the experience acquired by various sectors of industry in the field of the improvement and acceleration of training.

(d) **The employer organisations undertake** to request, in writing, all firms affiliated to their respective organisations to make better use of the facilities for the training of technicians and to alleviate in this manner the pressure on engineers and technical middle management in industry, and to encourage industrialists also to release their employees for, and to support financially such training.

(2) **COLOUREDS AND INDIANS**

(e) In addition to the progress already achieved by the Government with the establishment of training centres for Coloureds as skilled or semi-skilled workers in various sectors of industry, **the Government undertakes** to enable them to establish their own training centres in cases where training facilities for such industrial workers are not already in existence. This applies also to the training of Indians.

(For action by the Departments of Labour, Coloured Relations and Indian Affairs)

(3) **BANTU**

(f) In view of the fact that prospective industrialists in the Homelands and in the Border Areas are apparently not always aware of the training facilities which exist for the training of Bantu for employment in the Homelands and Border Areas, **the employer organisations undertake** to encourage existing and prospective industrialists to bring their needs to the attention of the Homeland Governments and the Department of Bantu Education who are prepared to assist them.

(g) **The Government undertakes** to furnish, through the medium of employer organisations, information to exist industrialists on the pattern of that established at Westlake and, in addition to the introduction of courses for artisans to provide also for the further training of workers in semi-skilled categories.

(For action by the Departments of Labour and National Education)

(b) **The employer organisations undertake** to request, in isting industrialists and prospective industrialists on the opportunities available to them in Border Areas for the introduction and utilisation of ad hoc training schemes for their workers.

(For action by the Department of Bantu Education)

(h) **The Government undertakes** to expedite, as much as possible, the completion and consideration of the report on the training of Bantu workers in the Homelands and the Border Areas.

(For action by the Department of Bantu Education)

(i) **The employer organisations undertake** to invite the attention of industrialists in Border and other white areas to the fact that, in addition to the concessions applicable to Decentralised Areas, they are also entitled to tax concessions in respect to current costs in connection with in-service training of workers.

(j) In view of the good progress which is now being made with the establishment of private industrial training centres for Bantu in White urban areas, **the Government and the employer organisations undertake** to propagate the utilisation of these centres amongst industrialists.

(For action by the Departments of Labour, National Education and Bantu Education)

(k) **The Government undertakes** to expand, as far as possible, the training facilities in urban areas where Bantu secondary school pupils receive regular industrial and technical training with a view to employment in industry. The Governments of the Homelands will be encouraged to establish similar training facilities.

(For action by the Department of Bantu Education)

(4) **BETTER UTILISATION OF FEMALE LABOUR IN METROPOLITAN AREAS**

(l) **The Government undertakes** to investigate, in consultation with all interested parties, the desirability of extending the existing facilities for the care of pre-school children and the after-school care of school-going children in order to enable more mothers to perform productive work.

(For action by the Department of National Education, Social Welfare and Pensions and the Provincial Administration)

(m) The employer organisations undertake to bring to the attention of their members the advantages of institutions for the care of children of working mothers and to encourage their members to establish such facilities. They will also bring to the attention of business undertakings the advantages of créches **on** or **near** the premises where mothers are employed.

ANNEXURE "B"

INSTITUTE OF TOWN CLERKS OF SOUTHERN AFRICA

(Incorporated Association Not for Gain)

TRAINING AND RETENTION OF LOCAL GOVERNMENT STAFF

FINAL REPORT

In the Third and Fourth Reports submitted by the Sub-Committee consisting of representatives of the Institute of Town Clerks, the Institute of Municipal Treasurers and Accountants, the Association of Municipal Electricity Undertakings of South Africa and the Institution of Municipal Engineers on the subject of the Training and Retention of Local Government Staff, recommendations were put forward in regard to the following aspects relating thereto:-

(i) The establishment of an Institute of Advanced Local Government Training in South Africa;

(ii) The appointment of a representative committee to make a thorough investigation of the feasibility of instituting organized training facilities and a bursary scheme, and

(iii) The training of apprentices.

The establishment of a South African Institute of Advanced Local Government Training was supported in principle by the United Municipal Executive, which asked the Sub-Committee to proceed with its investigation in this connection and to report further hereon particularly in regard to the financial implications involved in the implementation thereof.

The Sub-Committee to make a thorough investigation of the feasibility of instituting organized training facilities for local government staff and a bursary scheme was also supported in principle by the United Municipal Executive which felt, however, that it was not in a position to appoint such a committee, as had been recommended, as it had neither the staff nor the resources to conduct a comprehensive investigation as that envisaged, and decided to seek an interview with the Minister of National Education in order, in the first instance, to discuss the matter with him. The Secretary for National Education advised the United Municipal Executive, however, that the Department was of the opinion that a discussion with the Minister at this stage would not serve any useful purpose and suggested that the Executive should first determine the need for the training of local government staff on an organized basis and should, thereafter, discuss the matter with the Association of Colleges of Advanced Technical Education with a view to the institution of a diploma course similar to the National Diploma in Public Administration and other diploma courses. The United Municipal Executive asked the sub-committee for its views and comments on the aforementioned reply from the Secretary for National Education.

Regarding the suggestion that the training of apprentices should be organized on a regional basis, the United Municipal Executive asked the Sub-Committee to indicate how it considered the Provincial Municipal Associations should proceed and what practical steps they should take in the matter.

The views and comments of the Sub-Committee concerning the aspects relating to the Training and Retention of Local Government Staff mentioned above are set out hereunder.

(a) THE ESTABLISHMENT OF A SOUTH AFRICAN INSTITUTE OF ADVANCED LOCAL GOVERNMENT TRAINING

1. Rapid urbanization has caused a need for the special training of local government officials in certain highly involved aspects of local government.

2. The aspects arise in the technical as well as in the administrative and financial/economic fields of city government. Examples of subjects for training would be the programmed budget, transportation (including the traffic problem), modern forms of mass public passenger transport, civil defence in the large city, environmental study, fire protection and fire fighting related to high rise buildings, advanced use of the computer, valuation of property in the large city, local government economics, and advanced public administration in the local government sphere (including the use of the multi-disciplinary approach to solve problems involving several professions). Another example would be preparation of a Transportation Plan as envisaged by the Driessen Committee.

3. It is submitted that local government itself should provide this kind of training in an organized manner to ensure that the training is closely related to the practical needs of local government. Probably only local government itself can in fact provide this training because the people who would plan and conduct the courses would have to be drawn to a major extent from the staff of local authorities.

4. Will local government and the country as a whole benefit from such training? It is submitted that the benefits should be enormous compared to the cost of such training. This should be so for the reason that the training as envisaged would boil down to local authorities sharing with others the accumulated expert knowledge of their officials' knowledge to be imparted not in the form of papers read at conferences, but in the form of a series of lectures in a concentrated course on a subject where the lecturer can be questioned and the student can himself participate and contribute to the total knowledge which the class will gain of the subject. The training should not be one-way communication.

5. What kind of official should be eligible for the kind of training to be given by an Institute for Advanced Local Government Training as proposed? The kind of training envisaged is the official who already has a professional qualification, but who has reached a stage in his career where he should be fully informed as to certain of the problems and tasks involved in large scale urbanization and where he should be given full particulars of:-

   (i) tried methods of doing the task or solving the problem; and

   (ii) proposed methods (but still untried) of doing the task or solving the problem.

6. The following are suggestions related to organization and cost of the training:-

   (i) The venue of a course need not always be the same centre. Participating local authorities could make a venue available. From time to time the venue of the course would be determined by the subject of the course, e.g. where a particular local authority has in fact introduced programmed budgeting and the course deals with this subject;

   (ii) considering that the lecturer or course leader would usually be a senior local government official with important duties in his own sphere of employment, courses should be carefully selected and planned far ahead and should be limited to one week's duration. The course should not be interrupted by social or recreational events, and the cost to the host town must be an absolute minimum.

   (iii) Where an official is the course leader, his subsistence and transport costs would have to be met by the proposed Institute, but the local authorities that employ them would have to meet the costs of sending officials to the courses. This should not exclude officials who may wish to attend in a personal capacity at their own cost.

   (iv) Occasionally it might be necessary to employ an outside expert as lecturer, and his costs would have to be met by the Institute.

   (v) Recording of lectures and group reports in the event of group discussions would be most desirable. The Institute could have this done under contract as well as the typing of the record.

   (vi) An aspect which will bring about costs is that the Institute would need a course organizer who would have to be a person with considerable knowledge of local government. The course organizer should be assisted by a panel of local government officials acting in a voluntary capacity; but success would still depend on the organizer who would have to be paid for his services which may be required on a full-time basis. He would also need typing and duplicating services and some equipment like projectors. He would incur travelling expenses and would need office accommodation and telephone services.

   (vii) The following is an estimate of annual expenditure excluding cost of recording lectures:-

Total cost of running an office including rental but excluding salaries and wages and transport and subsistence allowances	— R 6 000
Cost of course leaders on the basis of an average of R50 per lecture day and 200 lecture days per year	— R10 000
Expenditure on course organizer including travelling and subsistence allowances	— R12 000
Typing	— R 4 000
TOTAL	— R32 000

   Expenditure can be scaled down by decreasing the number of lecture days and generally bringing the undertaking within the scope of a part-time employed course organizer. It might be advisable to start on this basis and then gradually build up the Institute. Provision could be made for revenue by charging a course attendance fee.

7. The first step would be the establishment of the proposed Institute for Advanced Local Government Training. The members should be local authorities and they should constitute the Institute and in the constitution provide for a board of directors and a first contribution of funds to get the training started. The Board of Directors should appoint the panel of advisors and, in consultation with them, appoint the course organizer. Membership of the Institute should be open to all South African local authorities; but many may not really need the services of the Institute and may not wish to join as members and assume part liability for costs; nor could they be expected to do this. The reaction of the cities and the large towns to the proposal would obviously be very important because it would be for their needs that the Institute would primarily cater. If they

were to react favourably to a marked extent, the proposed Institute should become a successful reality and achieve its objective namely to equip municipal staff with advanced practical knowledge to use for the improvement of living conditions and services in the urban environment of our country.

(b) THE FEASIBILITY OF INSTITUTING ORGANIZED TRAINING FACILITIES AND A BURSARY SCHEME

The Sub-Committee is convinced that there is a great need at the present time for the provision of basic training facilities on an organized basis for local government staff. As in the case of the United Municipal Executive, neither the Institute of Town Clerks nor any of the other Institutes of professional officers in local government has the staff or the resources to be able to conduct the comprehensive investigation which would be necessary in order to determine the extent of the need for the training of local government staff and the feasibility of providing such training on an organized basis.

Certain of the larger local authorities such as Johannesburg, Cape Town, Durban and Port Elizabeth do provide training facilities for their own staff and, very often such facilities are made available to other local authorities.

It is understood that the Development and Services Board in Natal is at present considering a scheme whereby it would be entrusted with the training of future municipal officials for the smaller local authorities in that Province as well as staff units for the Board itself.

In view of the reply received from the Secretary for National Education to the United Municipal Executive's request for an interview with the Minister of National Education and, as local government is the responsibility of the Provincial authorities, the Sub-Committee recommends that the Executive should suggest to the Provincial Associations that they discuss this whole matter with their respective Directors of Local Government in order to bring to their notice for the provision of training facilities for local government staff and to explore the possibility of the provision of such facilities on an organized basis in each Province.

(c) THE TRAINING OF APPRENTICES

In so far as the training of apprentices is concerned, what the Sub-Committee had in mind when it recommended that such training should be organized on a regional basis in each Province was the establishment under the guidance of the Provincial Municipal Association concerned of basic training centres, where none were in existence, along the lines of those at present in operation in certain of the larger cities such as Johannesburg, Cape Town and Durban as well as in Roodepoort and, where posible, for such facilities also to be made available, by mutual agreement, to neighbouring local authorities or, alternatively, the establishment, where practicable, of joint training centres by two or more local authorities and the sharing of the costs involved in a project of this nature.

Each Municipal Association would have to decide which method would be best suited for the needs of its particular Province or regions within that Province.

The Sub-Committee cannot stress too strongly the great need which exists for the establishment by local authorities of more basic training centres for apprentices and the important role which the Provincial Municipal Associations can play in this connection should not be overlooked.

Industry does not always play its part in the training of apprentices and the Sub-Committee feels that employers in this field should be required to train their quota or contribute on the basis of so much for each artisan employed to meet the cost of such training.

For the information of the United Municipal Executive particulars regarding Johannesburg's Basic Training Centre for Apprentices are set out hereunder, viz.:-

1. The Basic Training Centre is situated within the complex of the Electricity Department's headquarters, 1 President Street West (the old Newtown Power Station), within walking distance of the central part of the city and also close to bus routes with regular services. The Basic Training Centre was not specifically designed as a training centre but developed as such from part of the workshop originally set aside for training purposes.

2. One Training Officer (Apprentices) and three Instructors (Apprentices) are responsible for the training of apprentices at the Training Centre. These men are drawn from the artisan ranks and they have many years of appropriate experience.

3. The Standard of Education laid down by the Council for the posts mentioned in (2) above is as follows:-

   (i) Having served an appropriate apprenticeship;

   (ii) Having had training and/or experience; and

   (iii) National Technical Certificate III.

   The normal duties of the Training Officer (Apprentices) are as follows:-

   (i) Organise, supervise and control the training of apprentices at the Basic Training Centre including the requisition for and control of equipment and material.

   (ii) Organise and control the on-the-job training of apprentices in the Council departments.

   (iii) Maintain liaison with the Witwatersrand Technical College, C.O.T.T. (Central Organization Trade Testing) and other organizations concerned with apprentice training.

   The normal duties of the Instructor (Apprentices) are as follows:-

   (i) Give practical instruction to apprentices in electrical fitting and turning, diesel and motor mechanics at the Basic Training Centre.

   (ii) Draw up suitable training programmes and prepare training material.

   (iii) Supervise work, behaviour and development of each apprentice, maintain progress report and report as required.

   (iv) Control tools, instruments and equipment in the Basic Training Centre.

4. Each year in August applications are invited through the local Press from white male candidates between the ages of 16 and 21 years to be indentured as apprentices in the following trades:-

Trade	Minimum School Qualification Required
Carpenter Plumber Bricklayer Boilermaker Blacksmith Painter Vehicle Body Builder Welder	Standard 7
Electrician Fitter and Turner Diesel Mechanic Auto Electrician Motor Mechanic	Standard 8

The Council concentrates on the training of electricians, diesel mechanics and fitters and turners in which trades the Council experiences a critical shortage.

5. After the applications have been received, points are awarded in respect of education and age on the following basis:-

Age	RATING Poor	Fair	Average	Good	Very Good
15 and over	—	6	7	8	9
16 and over	6	7	8	9	10
17 and over	7	8	9	10	—
18 and over	9	9	10	—	—
19 and over	9	10	—	—	—
20 and over	10	—	—	—	—

(6, 7, 8, 9, 10 = School Standard Passed).

Rating: Poor—1; Fair—2; Average—3; Good—4; Very Good—5.

Preference is given to applicants with a "good" or "very good" rating and they are requested to present themselves for an interview.

6. Each year about sixty applicants are selected by an internal committee which consists of three members of the Apprentice Executive Committee representing various Council departments. The Selection Committee is guided in its selection of applicants by factors such as education, alertness, co-operation, initiative, dependability and industry. A candidate who scores 24 or more points is considered very good. 40%-50% of the applicants are not acceptable as they do not meet the minimum standard of education required for a particular trade.

Each applicant selected in terms of paragraph 5 is aptitude tested by the Department of Labour free of charge. Normally applicants are tested after the interview but sometimes it may be necessary to have the applicant tested before the interview.

7. Each apprentice is medically examined for compliance with the requirements of the Apprenticeship Act and the rules of the Council's Pension Fund as it is a condition of service that they become and remain members of the Fund.

8. Record cards are kept of all the apprentices and quarterly rating received from the working areas are recorded thereon. From time to time officials from the Department of Labour compare the results of the aptitude tests with the quarterly rating. The aptitude tests have proved to be reliable and no prospective apprentice will be considered unless he has been tested.

9. Apprentices are granted three weeks' annual leave plus all public holidays and 10 days' sick leave per annum of which the later is cumulative indefinitely. They are issued with two pairs of overalls per annum. Each apprentice is issued with a tool box with a basic set of tools appropriate to the trade concerned. On completion of his apprenticeship the box and tools become the property of the apprentice. An apprentice who does not complete his apprenticeship must return the box and tools or pay its depreciated value to the Council.

10. Training of newly appointed apprentices starts immediately after the new year. Basic hand-tool training and training applicable to the trade concerned are given at the Training Centre to apprentice electricians, diesel and motor mechanics and fitters and turners in the first six months of their apprenticeship. Apprentice auto electricians, welders, boilermakers, plumbers, blacksmiths and vehicle body builders receive only basic tool training at the Centre in the first three months of their apprenticeship. The balance of their training is on-the-job. Apprentice bricklayers, carpenters and painters receive on-the-job training at the various points during the full period of their apprenticeship. At no stage do they receive any training at the Training Centre and their rotation from one training point to another is arranged by the department concerned but the Training Officer (Apprentices) is responsible for their attending the Technical College as determined by legislation.

11. Training facilities at the Training Centre are limited to between 50 and 55 apprentices. A maximum of 15 apprentice electricians and up to 40 apprentices in other trades can be trained simultaneously.

12. After the basic training period the apprentices are transferred to various specified points (such as the various worksites, workshops, overheads and cables sections and sub-stations, also generation and distribution stations and the meter branch) in the Council for on-the-job training. At these points each apprentice works under the supervision of an artisan. Each training point determines the number of apprentices it is capable of training. The Training Officer (Apprentices) endeavours to rotate all apprentices (except building trade apprentices) on four occasions each year.

13. Apprentice electricians, fitters and mechanics return to the Training Centre for a month every year and for a period of two to three weeks before they are due for the trade test. Each apprentice is trained in every facit of his trade. These apprentices who return to the Training Centre before the trade test go through the various aspects of the trade test and anything of general use to them. They are also trained to work against time and maintain a standard to meet trade test demands. To broaden their experience apprentice auto electricians are sent to General Motors in Pretoria for a two-week training course each year.

14. An apprentice is required to attend the Technical College until he has attained the National Technical Certificate Part II (N2) (four subjects) which is equivalent to Standard 9. Between 35 and 65 apprentices (depending on the availability of classes at the Technical College are released on block release system of ten weeks duration to attend classes on a full-time basis. There are three of these block releases per annum for Council apprentices. Even after an apprentice has attained N2 he is encouraged to continue attending classes to obtain the highest technical certificate or diploma available to him.

15. Arrangements are made with the Central Organization for Trade Testing (C.O.T.T.) at Olifantsfontein for Foremen and Chargehands to visit the centre in small groups of eight at a time to gain first hand knowledge of the standard of work required in the trade tests. This arrangement is mainly for the benefit of apprentices who receive on-the-job training.

16. An apprentice in a five-year trade is compelled by law to undergo a qualifying trade test conducted by the Departments of Labour and of National Education as shortly as practicable before the end of the fourth year of the period of apprenticeship or as soon as possible thereafter. An apprentice who fails this test may, whether or not he possesses the National Technical Certificate, Part II, voluntarily undergo a qualifying trade test during the final year of his apprenticeship. An apprentice who obtains a pass in the National Technical Certificate, Part II, or equivalent or higher level may voluntarily undergo a qualifying test after completion of the period of apprenticeship laid down by the various National Apprenticeship Committees. A further voluntary qualifying trade test may be undertaken on a date or dates determined by the state departments mentioned above.

    A fee of R6,00 is payable by an apprentice in respect of the second or any subsequent trade test undertaken on a voluntary basis.

17. Details of the results of the trade tests of Council apprentices during the period 1963 to 1974, are attached.

(d) CONCLUSION

This report completes the task which was entrusted to the appointed Sub-Committee by the United Municipal Executive and the members thereof wish to place on record their appreciation of the opportunity which was afforded the respective Institutes of collaborating on and submitting recommendations in connection with an important subject as the Training and Retention of Local Government Staff.

Should the United Municipal Executive deem it necessary again at some future date to enlist the services of a representative Sub-Committee, such as the one which dealt with the Training and Retention of Local Government Staff, on a general problem affecting the interests of local government, the various Institutes which were involved in the present instance have signified their willingness to render every assistance within thenr power in connection with any such problem.

VERSLAG OOR DIE WYSIGINGSWET OP ELEKTRIESE DRAADWERKERS EN KONTRAKTEURS

Gedurende Februarie 1972 het die Sekretaris van Arbeid die eerste konsepvoorstelle van die wysiging van die Wet op Elektriese Draadwerkers en Kontrakteurs vir algemene kommentaar vrygestel. Hierdie konsepvoorstelle is na 'n VMEO-subkomitee verwys en hulle kommentaar is deur die Uitvoerende Bestuur oorweeg en later aan die Sekretaris van Arbeid voorgelê.

Die Departement van Arbeid het egter sedertdien oor die doel en implementering van die Wet besin. Die doel van die Wet is om veilige elektriese installasies vir die beveiliging van die publiek te verseker en die registrasie van elektriese draadwerkers is dus daarop gemik om die bevoegdheid te verseker van persone wat bedradingswerk doen.

Daar is tot die gevolgtrekking geraak dat belangrike wysigings van die Wet nie noodsaaklik is vir voldoening aan die basiese vereiste van die Wet nie en dat dit binne die raamwerk van die huidige Wet en Regulasies bewerkstellig kan word. Dit is slegs ten opsigte van die huidige voorlopige registrasie van elektriese draadwerkers en met die eksamens dat sekere probleme ontstaan wat daartoe lei dat persone wat vervalde voorlopige registrasie-sertifikate besit en wat in die bedryf aanbly aanhou om bedradingswerk onwettiglik te doen en wat ook as kontrakteurs gelisensieer kan wees.

Hierdie probleme kan egter uitgeskakel word deur die daarstelling van 'n eksamen wat meer realisties is en wat dit wetlik moontlik maak vir draadwerkers wat nie die volle praktiese toets en geskrewe eksamen geslaag het nie om voort te gaan om bedradingswerk te doen en om die uitreiking van voorlopige registrasie-sertifikate tot buitengewone gevalle te beperk deur 'n tweevlakregistrasie van draadwerkers te aanvaar.

Die boonste vlak sal bestaan uit persone wat die volle eksamen geslaag het en die onderste vlak sal bestaan uit persone wat nie die volle eksamen geslaag het nie, maar wat nogtans die Raad tevrede gestel het om beperkte registrasie toe te laat en wat dan wetlik bedradingswerk onder die verantwoordelik toesig van 'n ten volle geregistreerde draadwerker kan doen.

Algemene tevredenheid met die basiese beginsel van die tweevlakregistrasie is deur die EKV, VMEO-bstuur en die Suid-Afrikaanse Elektriese Werkersvereniging uitgespreek en dit sal in ooreenstemming met die voorstelle vir die gewysigde wees. Die voorsitter van die Elektriese Draadwerkersregistrasieraad moet geluk gewens word met sy positiewe benadering om die probleme met die huidige implementering van die Wet uit te stryk. Dit ly geen twyfel nie dat dit ook verskaffers in staat sal stel om hulle verantwoordelikhede na te kom.

REPORT ON THE ELECTRICAL WIREMEN AND CONTRACTORS' AMENDMENT ACT

During February, 1972, the Secretary of Labour issued the first draft proposals for amendments to the Electrical Wiremen and Contractors' Act for general comment. These draft proposals were referred to the AMEU Sub-Committee and their comments were considered by the Executive Council and subsequently submitted to the Secretary of Labour.

The Department of Labour has however since had a serious look at the actual purpose and implementation of the Act, which is to ensure safe electrical installations for the protection of the public and the registration of electrical wiremen is aimed at ensuring the competency of persons doing wiring work. The conclusion has been reached that major amendments to the Act are not necessary to ensure compliance with the basic aims of the Act and that this can be achieved within the present framework of the Act and the Regulations. It is really only in respect of the present provisional registration of electrical wiremen that certain problems exist which may lead to persons holding expired provisional registration certificates. Such persons may remain in the industry and continue to do wiring work illegally and may also have been licensed as contractors.

These problems can, however, be solved by the establishment of an examination which will be more realistic and make it legally possible for wiremen who have not passed the full practical test and written examinations to continue doing wiring work and limiting the issue of provisional registration certificates in exceptional cases only by adopting a "two-tier" registration of wiremen.

The "upper-tier" will comprise persons who are successful in the full examinations and the "lower-tier" will cater for persons who have not passed the full examination but who have never the less satisfied the Board that limited registration may be granted and who can then do wiring work legally under the responsible supervision of a fully registered wireman.

Board agreement was expressed with the basic idea of "two-tier" registration proposed by the ECA, AMEU Executive and SA Electrical Workers' Association, which would be in line with the proposals for the amended legislation and the Chairman of the Electrical Wiremen's Registration Board is to be complimented on his positive approach to resolving the problems associated with the present implementation of the Act, which no doubt will also assist the suppliers in carrying out their responsibilities.

J. K. VON AHLFTEN,
Sameroeper/Convenor.

The following information was submitted by Mr. A. A. Weich with authority for its publication in the proceedings of the Convention.

CERTIFICATE OF COMPETENCY FOR MECHANICAL AND ELECTRICAL ENGINEER'S ENTRANCE QUALIFICATION AND EXAMINATIONS.

It is agreed that the minimum acceptable academic standard for acceptance as a candidate for the abovementioned examination is that of the NATIONAL HIGHER CERTIFICATE for TECHNICIANS in either MECHANICAL ENGINEERING or ELECTRICAL ENGINEERING (Heavy Current).

This is however only the minimum academic standard and the holder of such a "Certificate" will not be accepted as a candidate unless and until he has successfully completed the necessary adaptation courses as detailed on page 2 of your letter and also on the attached schedules.

It must also be stressed that only the holders of the National Higher Certificate for Technicians in either Mechanical or Electrical Engineering (Heavy Current) who obtained their Certificates with the subjects outlined in the attached schedules plus a pass in the necessary adaptation courses will be eligible for acceptance as candidates provided that they received suitable "post-Certificate" training in industry, acceptable to the commission of examiners, for a period of 2 years.

It is agreed that the direction of the aforementioned training must be similar to the practical training embodied in the technical course for which the candidate originally enrolled, but each case will be treated on its merits.

Candidates who offer the National **Diploma** for Technicians in either Mechanical Engineering or Electrical Engineering (Heavy Current), as basic qualification for acceptance as adaptation course but will also be required to submit proof a candidate will be exempted from the requirements of the of "Post Diploma" training, of a period of 2 years, similar to the practical training embodied in the technical course for which the candidate originally entered, but here again each application will be treated on its merits.

The procedure for candidates who wish to qualify for both Engineer's Certificates of Competency (Mechanical and Electrical) is incorporated in the attached schedules.

A candidate will only be accepted for the "alternative" Certificate of Competency if he submits proof that he has successfully completed the courses specified for the "conversion course" and that he has been appointed as an engineer in charge of both mechanical and electrical machinery, for a period of 4 years or 2 years as engineer in charge of purely mechanical machinery in the case of the holder of an Electrical Engineer's Certificate of Competency or 2 years in charge of purely electrical machinery in the case of the holder of the Mechanical Engineer's Certificate of Competency.

University graduates who are the holders of a BSc degree in either Mechanical or Electrical Engineering from a South African University will be entitled to sit the examination after completing 2 years of acceptable post-graduate training in industry but will then be required to sit two subjects, "Plant Engineering" and "Legal Knowledge", however a candidate who has completed 3 years of acceptable post-graduate training will be exempted from writing "Plant Engineering".

The educational qualifications of holders of foreign degrees, diplomas or certificates will have to be evaluated as

in the past, but it is agreed that in the initial stages they can still take the existing examination courses.

SCHEDULE A

COURSES FOR NATIONAL HIGHER CERTIFICATE FOR TECHNICIANS (MECHANICAL ENGINEERING) ACCEPTABLE FOR MECHANICAL ENGINEERS' CERTIFICATE OF COMPETENCY.

PART 1

Mathematics T1
Applied Mechanics T1
Applied Technology T1 or Workshop Technology T1
Engineering Drawing T1 or Applied Technology (Draughtsman) T1

PART 2

Mathematics T2
Applied Mechanics T2
Applied Technology T2 or Workshop Technology T2
Engineering Drawing T2 or Applied Technology (Draughtsman) T2 or Engineering Science T2

PART 3

Mechanics of Machines T3
Strength of Materials T3 or Theory of Structures (m) T3
Applied Thermodynamics T3 or Internal Combustion Engines T3
Hydraulics T3 or Hydraulic Control Systems T3

PART 4

Mechanics of Machines T4
Strength of Materials T4 or Theory of Structures (m) T4
Applied Thermodynamics T4 or Internal Combussion Engines T4
Hydraulics T4 or Hydraulic Control Systems T4

ADAPTATION COURSE

Principles of Electricity T1
Principles of Electricity T2
Electrotechnology T3

CONVERSION COURSE FOR MECHANICAL ENGINEERS TO OBTAIN ELECTRICAL ENGINEERS' CERTIFICATE OF COMPETENCY

Electrical Engineering T3
Electrical Engineering T4
Electrical Machines T3
Electrical Machines T4

SCHEDULE B

COURSES FOR NATIONAL HIGHER CERTIFICATE FOR TECHNICIANS, ELECTRICAL ENGINEERING (Heavy Current) ACCEPTABLE FOR ELECTRICAL ENGINEERS' CERTIFICATE OF COMPETENCY

PART 1

Mathematics T1
Principles of Electricity T1
Applied Technology T1 (hc) or Workshops Technology T1
Engineering Drawing T1 or Applied Mechanics T1

PART 2

Mathematics T2
Principles of Electricity T2
Applied Technology T2 (hc) or Workshop Technology T2
Electronics T2 or Workshop Mechanics T2

PART 3

Electrical Engineering T3
Electrical Machines T3
and 2 subjects from
Electronics T3
Electrical Measurements T3
Automatic Control T3
Strength of Materials

PART 4

Electrical Engineering T4
Electrical Machines T4
and 2 subjects from
Industrial Electronics T4
Electrical Measurements T4
Automatic Control T4
Strength of Materials T4

ADAPTATION COURSE

Mechanical Technology (E) T3
*Strength of Materials T3

CONVERSION COURSE FOR ELECTRICAL ENGINEERS' TO OBTAIN MECHANICAL ENGINEERS' CERTIFICATE OF COMPETENCY

Applied Thermodynamics T3
Applied Thermodynamics T4
Hydraulics T3 or Hydraulic Control Systems T3
Hydraulics T4 or Hydraulic Control Systems T4
*Strength of Materials T3 or Theory of Structures T3
*Strength of Materials T4 or Theory of Structures T4

* denotes "If not taken in the Certificate Course".

MR. K. G. ROBSON, President:

Thank you Mr. Weich — May I on behalf of the AMEU also thank you for having done us the honour of making this statement publicly here at this Convention for the first time. We appreciate it very much indeed.

Verslag oor die Bedrywighede van die Registrasieraad vir Elektrotegniese Draadwerkers

Met die voorlegging van hierdie verslag aan die Konvensie van 1977 moet ek melding maak van die oorlye van die vorige Voorsitter van die Registrasieraad vir Elektrotegniese Draadwerkers en Erelid van hierdie Vereniging, mnr. J. G. Wannenburg, Hoofinspekteur: Fabrieke.

Die Raad is gevolglik onder die Voorsitterskap van die huidige Hoofinspekteur: Fabrieke, mnr. A. A. Weich, opnuut saamgestel, met die volgende Raadslede:-

Mnr. A. C. L. Elisio	—	Elektrotegniese Draadwerkersvakbond.
Mnr. D. F. Kneale	—	E.K.V.
Mnr. G. W. A. Scandling	—	Elektrotegniese Draadwerkersvakbond.

Report on the Activities of the Electrical Wiremen's Registration Board

In submitting this report to the 1977 Convention mention must be made of the death of the previous Chairman of the Electrical Wiremen's Registration Board and an Honorary member of this Association, Mr. J. G. Wannenburg, Chief Inspector of Factories.

The Board was subsequently reconstituted under the Chairmanship of the present Chief Inspector of Factories, Mr. A. A. Weich, with the following members:-

Mr. A. C. L. Elisio	—	Electrical Wiremen (Trade Union).
Mr. D. F. Kneale	—	E.C.A.
Mr. G. W. A. Scandling	—	Electrical Wiremen (Trade Union).

Mnr. J. K. von Ahlften	—	VMEO.
Mnr. C. P. de Leeuw	—	Departement van Arbeid.
Mnr. C. H. Hare	—	(S.O.A.T. — raadgewende hoedanigheid).
Mnr. A. D. de Kock	—	(Sekretaris).

JAARVERSLAG VIR 1975

Die Raad het 11 keer vergader en 1 176 aansoeke om registrasie oorweeg. Hiervan is 1 117 persone of tot die eksamen toegelaat of gedeeltelik of ten volle vrygestel. Die aansoeke van 59 persone is van die hand gewys. Die Raad het ook ten opsigte van 1 423 persone voorlopige registrasiesertifikate toegestaan of die hernuwing van sodanige sertifikate goedgekeur.

Drie skriftelike eksamens is by 43 eksamensentra afgeneem en 1 802 kandidate is ingeskryf. Die uitslae sien soos volg daar uit:-

Druip deel 1	578
Slaag deel 1	287
Druip deel 2	250
Slaag deel 2	83
Afwesig tydens eksamens	604
TOTAAL	1 802

'n Aantal kandidate wat om verskeie redes die skriftelike eksamen nie kon aflê of deurkom nie, is toegelaat om mondelinge eksames af te lê.

Gedurende die verslagjaar is 290 praktiese eksamens in tien van die hoofsentra afgeneem. Reëlings is getref om 2 422 kandidate te toets, waarvan 341 geslaag het en 499 afwesig was. Van die 1 582 wat gedruip het, het 'n taamlike aantal sommige van die take geslaag, waarvan hulle in die daaropvolgende eksamens vrygestel is. Die slaagpunt vir elke taak is 60%.

(Die afname in die aantal toetse wat gereël is vergeleke met die vorige jaar, toe daar 2 661 toetse gereël is, kan gedeeltelik aan die tekort aan toetspersoneel by die Sentrale Organisasie vir Ambagtoetse toegeskryf word).

Die bostaande somtotale van 1 802 en 2 422 sluit kandidate wat die vorige jare gedruip het in.

JAARVERSLAG VIR 1976

Die Raad het 10 keer vergader en 888 aansoeke om registrasie oorweeg. Hiervan is 829 persone of tot die eksamen toegelaat of gedeeltelik of ten volle vrygestel. Die aansoeke van 59 persone is van die hand gewys. Die Raad het ook ten opsigte van 1 030 aansoeke voorlopige registrasiesertifikate toegestaan of die hernuwing van sodanige sertifikate goedgekeur. Drie skriftelike eksamens is by 43 eksamensentra afgeneem en 1 696 kandidate is ingeskryf.

Die uitslae sien as volg daar uit:-

Druip deel I (oor die Bedradingsregulasies)	574
Slaag deel I	342
Druip deel II (oor Elektrotegniese Teorie)	234
Sleeg deel II	53
Afwesig tydens eksamens	493
TOTAAL	1 696

'n Aantal kandidate wat om verskeie redes die skriftelike eksamen nie kon aflê of deurkom nie, is toegelaat om mondelinge eksamens af te lê.

Gedurende die verslagjaar is 273 praktiese eksamens in tien van die hoofsentra afgeneem. Reëlings is getref om 2 068 kandidate te toets, waarvan 353 geslaag en 383 afwesig was. Van die 1 332 wat gedruip het, het 'n taamlike aantal sommige van die take geslaag, waarvan hulle in die daaropvolgende eksames vrygestel is. Die slaagpunt vir elke taak is 60%.

(Die afname in die aantal toetse wat gereël is vergeleke met die vorige jaar, toe daar 2 422 toetse gereël is, kan gedeeltelik aan die tekort aan toetspersoneel by die Sentrale Organisasie vir Ambagstoetse toegeskryf word).

Die bostaande somtotale van 1 696 en 2 068 sluit kandidate wat die vorige jare gedruip het in.

REGISTRASIESERTIFIKATE UITGEREIK

Besonderhede van registrasiesertifikate wat sedert die inwerkingtrede van die Wet uitgereik is, word hieronder weergegee:-

Mr. J. K. von Ahlften	—	AMEU.
Mr. C. P. de Leeuw	—	Department of Labour.
Mr. C. H. Hare	—	(C.O.T.T. in an advisory capacity).
Mr. A. D. de Kock	—	(Secretary).

ANNUAL REPORT FOR 1975

The Board held 11 meetings and considered 1 176 applications for registration. 1 117 applicants were either accepted for the examinations or exempted from them in part or in full. The applications of 59 persons were refused. The Board also granted provisional registration certificates or approved renewal of such certificates in respect of 1 423 applicants.

Three written examinations were held at 43 examination centres and 1 802 candidates were entered. The results were as follows:-

Failed part I	578
Passed part 1	287
Failed part II	250
Passed part II	83
Absent from the examinations	604
TOTAL	1 802

A number of candidates who, for various reasons, were unable to undergo or pass the written examination, were allowed to undergo oral tests.

During the year under review 290 practical examinations were held in ten of the main centres. Test arrangements were made in respect of 2 422 candidates of whom 341 passed while 499 were absent. Of the 1 582 who failed quite a number pased in some of the tasks and they were granted exemptions from these in subsequent tests. The pass-mark for each task is 60%.

(The decrease in the number of arrangements made for practical examinations in comparison with that of the previous year (then it was 2 661) is partly attributed to a shortage of testing staff at the Central Organisation for Trade Testing).

The abovementioned totals of 1 802 and 2 422 include candidates who failed in previous years.

ANNUAL REPORT FOR 1976

The Board held 10 meetings and considered 888 applications for registration. Of these, 829 persons were either accepted for the examinations or exempted from them in part or in full. The applications of 59 persons were refused. The Board also granted provisional registration certificates or approved renewal of such certificates in respect of 1 030 applications. A further 369 applications were refused.

Three written examinations were held at 43 examination centres and 1 696 candidates were entered. The results were as follows:-

Failed part 1 (on the Wiring Regulations)	574
Passed part 1	342
Failed part 11 (on Electrical Theory)	234
Passed part II	53
Absent from examinations	493
TOTAL	1 696

A number of candidates who, for various reasons, were unable to undergo or pass the written examination, were allowed to undergo oral tests.

During the year under review 273 practical examinations were held in ten of the main centres. Test arrangements were made in respect of 2 068 candidates of whom 353 passed while 383 were absent. Of the 1 332 who failed quite a number passed in some of the tasks and they were granted exemptions from these in subsequent tests. The pass-mark for each task is 60%.

(The decrease in the number of arrangements made for practical examinations in comparison with that of the previous year — 1975 — (then it was 2 422) is partly attributed to a shortage of testing staff at the Central Organisation for Trade Testing).

The abovementioned totals of 1 696 and 2 068 include candidates who failed in previous years.

REGISTRATION CERTIFICATES ISSUED

Particulars of registration certificates issued since the Act came into operation are reflected hereunder:-

Jaar	Aan aansoekers wat van die eksamen vrygestel is	Aan aansoekers wat die eksamen gedurende 1976 of in vorige jare geslaag het	Totaal
1940-1971	2 997	8 448	11 445
1972	94	546	640
1973	55	549	604
1974	31	495	526
1975	18	406	424
1976	11	433	444
TOTAAL	3 206	10 877	14 083

Besonderhede van die aantal voorlopige registrasiesertifikate wat gedurende die afgelope 7 jaar uitgereik is (hernuwings uitgesluit), is soos volg:-

Jaar	Nommer
1970	702
1971	1 027
1972	1 288
1973	810
1974	680
1975	608
1976	416

ALGEMEEN

Wat betref die instelling van die half-geskoolde ambagsman wat bekendstaan as die Elektriesegeleibuisinstalleerder, waarmee die Raad en die Minister van Arbeid in 1974 akkoord gegaan het, is die eerste beperkte voorlopige registrasiesertifikate, wat hierdie ambaslui in staat stel om die werk op die terrein onder gekwalifiseerde toesig te leer, gedurende 1976 uitgereik. Nege van hierdie sertifikate is uitgereik, almal aan Bantoes.

Bo en behalwe die vergadering wat hierbo genoem is, is 'n spesiale vergadering van die Raad gehou en is ander samesprekings gevoer met uitvoerende lede van die organisasies wat op die Raad verteenwoordig word oor die indeling van elektrotegniese draadwerkers in twee groot kategorieë, naamlik diegene met die vereiste ervaring wat die voorgeskrewe eksamens afgelê het, en dié met onvoldoende ondervinding, of wat slegs 'n vakleerlingskap voltooi het, of slegs 'n deel/dele van die eksamen geslaag het. Ons meen dat laasgenoemde klas vakman wel produktief kan word, maar dat hulle nie toegelaat moet word om geheel en al op eie houtjie te werk nie.

Hierdie voorstelle is in beginsel deur die betrokke partye aanvaar en dit word beoog om in die voorgestelde wysigings van die Wet op Elektrotegniese Draadwerkers en Kontrakteurs, wat gedurende 1978 voor die Parlement behoort te dien, vir hierdie klassifikasie van vakmanne voorsiening te maak. Na ons mening is goeie vordering met die opstel van die voorgestelde wetsontwerp gemaak.

Year	To applicants exempted from the examinations	To applicants who passed the examinations during 1976 or in previous years	Totals
1940-1971	2 997	8 448	11 445
1972	94	546	640
1973	55	549	604
1974	31	495	526
1975	18	405	424
1976	11	433	444
TOTALS	3 206	10 877	14 083

Particulars of the number of provisional registration certificates issued over the last seven years (excluding renewals thereof) are as follows:-

Year	Number
1970	702
1971	1 027
1972	1 288
1973	810
1974	680
1975	608
1976	416

GENERAL

Regarding the introduction of the semi-skilled worker called a conduit installer, which was agreed to by the Board and the Minister of Labour during 1975, the first provisional registration certificates of limited scope to enable these workers to learn the work on site (under qualified supervision), were issued during 1976. Nine of the certificates have been issued — all to Bantu.

Apart from the meetings mentioned above, a special meeting of the Board was held and discussions took place between executive members of the organisations represented on the Board regarding the grading of electrical wiremen into two main categories, i.e. those with the requisite experience who have passed the prescribed examinations and those with inadequate experience, or who have only served an apprenticeship, or who have only passed part/s of the examination. It is considered that the latter class of artisan can be used productively but that such artisans should not be permitted to operate entirely on their own.

The suggestions were accepted in principle by the parties concerned and it is contemplated to make provision for this classification of artisans in the proposed amendments to the Electrical Wiremen and Contractors' Act which are intended to be put before Parliament during 1978. It is considered that good progress has been made in drawing up the proposed Bill.

J. K. VON AHLFTEN,
Verteenwoordiger/Representative.

MR. J. K. VON AHLFTEN, Springs:

Mr. President, with your permission I would like to discuss Reports Nos. 14 and 15 together.

The use of the words "major amendments" in my report on the Wireman's Act may be somewhat confusing. It was not intended to imply that the Act was beeing completely revised, but there are certain major amendments concerning Wiremen.

In regard to the report on the Registration Board, there are a few points which we must consider.

Firstly you will notice the very low pass marks recorded in parts 1 and 2 of the theoretical examinations. The average percentage of passes is approximately 26% for regulations and 7% for theory. For the practical tests an average of 15% to 20% of the candidates do not present themselves for examination. This all points to the fact that these candidates who do not pass their tests eventually get absorbed into industry — they have to be employed, but one of the main points is that these peeople will be classified as a lower order of wiremen.

It is quite apparent that we will never be able to absorb all these lower ranking wiremen in the industry and eventually get them through the test and I think it is essential that we have a look at this matter, but I think Mr Weich will have more to add to this particular aspect. Perhaps it is the training that is at fault, but the fact remains that these people are absorbed into the industry after three or four re-issues of their provisional licenses and are able to carry on with wiring work. These wiremen have somehow to be absorbed into the industry and this is the whole idea behind the lower tier of wireman, which incidentally has been agreed to by the AMEU executive. Perhaps Mr. Weich or Mr. Hare would like to elaborate on these points. Thank you.

MR. A. A. WEICH, Chief Inspector of Factories:

Mr. President, it is an honour and a pleasure to open the discussion on the Report on the activities of the Electrical Wiremen's Registration Board and also to comment on the proposed amendments to the Electrical Wiremen and Contractors Act. Mr. von Ahlften has very ably reported on these matters and I only intend commenting on a few salient points in order to throw some light on the subject.

1. **Registration Certificates with Limited Scope.**

This is not an entirely new concept. Certificates of limited scope have in past been issued to lift mechanics and works foremen of the Department of Public Works. It is not the intention to dwell on the merits of this practice but to consider the broader implications of the policy of the Board to issue large numbers of provisional certificates of registration to people who have not yet passed the prescribed examinations.

I will not bore you with tiresome statistics but it suffices to say that from 1971 up to and including 1976, 4 829 provisional registration certificates for electrical wiremen were issued against 3 231 full certificates. The implication of this is that there are always between 1 200 and 1 600 persons actively employed on wiring work who have not passed the prescribed examinations. It is also freely admitted that many persons are working as wiremen who are not in possession of any kind of legal document in their possession empowering them to do so.

This brings us to the question of how important passing the examination is to the safety of the public. It must be borne in mind that a provisional certificate of registration permits a person to do any wiring work without any supervision whatsoever, except that which is exercised by the supplier through his inspection of the finished work. By law such a person can work on this basis for two years, but now comes the anomoly because if, at the end of two years, the holder of the provisional certificate still has not passed the prescribed examination he may not legally continue at all; however it is not unreasonable to assume that he will continue with his activities regardless of this.

The Board has now recognised this situation and has decided to exercise its legal powers of issuing certificates of limited scope, rather than provisional certificates, to persons who have had recognised formal training. The certificates will limit such persons to doing wiring work under supervision of fully registered people. Provisional certificates will now become the exception rather than the rule.

It is not intended to furnish the convention with all the details of the rules that will be applied.

This decision of the Board will no doubt be criticised by many people, but it is the opinion of the Board that this arrangement serves the best interest of both the industry and the individual and is far superior to the existing one of issuing provisional certificates.

2. **The Qualifying Examination.**

The details of the qualifying examination are well-known.

It consists of a practical test (3 jobs) and two theoretical examinations on theory of electricity and the standard wiring regulations. Your attention is drawn to the large number of candidates who fail this examination notwithstanding the fact that the majority of the candidates are artisans who have served a recognised apprenticeship.

The examinations are designed within the framework of the training schedule for apprentices as provided for by legislation. The reasons for the high failure rate are, (a) an unreasonably high standard set by the examining body and (b) poor training given to the apprentices by their employers.

It is unfortunately true that it would be extremely difficult to arrange for everybody to be examined within those parameters in which his employer employed him and hence it is considered that the examination, it's scope and standard, will always be a bone of contention. In view of the remarks regarding the introduction of the limited scope certificate, it should be clear that the Board no longer considers passing the examination as a sine qua non for being able to do wiring work of a routine nature. What is foreseen is that examinations of higher standard will eventually prepare tne 'technician wireman' to undertake and supervise sophisticated work.

Regarding the standard of training being given to apprentices, the Board can do nothing. It is obvious that the artisan body on the one hand and the employers on the other must put their house in order!

3. **Amendments to the Act.**

It is expected that a draft copy of the amended Act will be available shortly for discusion with the Trade Union, Suppliers, Contractors and Consumers. Any further comment at this stage would be superfluous.

MR. L. H. HARE, COTT:

Mr. President, Mr. Weich, Mr. Von Ahlften, gentlemen, I would like to point out that the Central Organisation for Trade Testing is the official examining body, appointed in terms of the Act, for the Board's written and practical examinations. These examinations are conducted by COTT on behalf of the Board, and the mark sheets for each candidate are submitted to the Board for its final consideration.

In most cases the result is automatic, that is, a clear failure remains a failure and a clear pass is a pass. However, the Board has discretionary powers in terms of the Act to decide on a final result, and it uses these powers in most borderline cases.

In consultation with a delegation from the Board, the mark sheets for the practical examination were recently altered and subsequently approved by the Board. The mark sheet now consists of two sections, viz. Section "A", which is concerned with safe working in accordance with good practice and compliance with the "Standard Regulations for the Wiring of Premises", and Section "B", which is concerned with what Mr. Weich has appropriately called the "cosmetics" of the job, i.e. the general appearance and facets not covered by Section "A".

The possible maximum mark allocation for the conduit and wiring work is 230 marks at present. Of these, about 60% (or 116 marks) is allocated to Section "A", the balance to Section "B". A sub-minimum of a symbol "C" (i.e. 60% of 116 marks) is required in order to pass this test, irrespective of the final mark obtained.

This means that a candidate with a symbol "C" (60%-69%) for the job as a whole, can still fail if he failed the safety aspect of the job, i.e. if he failed Section "A".

The nett result, examinationwise, has been virtually "no change". Only a few isolated instances have occurred where a candidate has failed the job because he failed Section "A" even though he obtained a mark of 60% or better for the job as a whole.

This has borne out our contention that a good worker is a safe worker, a neat worker and a reasonably fast worker. This result can only be obtained by proper training.

All apprentice electrical wiremen are tested at Olifantsfontein (with a few exceptions for special reasons). I would like to submit the following statistics for your consideration:

Last year out of approximately 11 000 apprentices in all trades, other than that of electrical wiremen, 52% passed at their first voluntary attempt. Of those who failed, 1 064 attempted a paid voluntary test, of whom 61% passed. The pass rate for the compulsory test last year was 35% giving an overall pass rate for all trades in all industries (except wiremen) of 46%, an increase of 10% over the last 6 years.

In stark contrast, however, the pass rate for electrical wiremen at Olifantsfontein is 17%-18%. I feel that this is a fair reflection of the type of training meted out to many a hapless electrical wireman apprentice, as most of the trade test jobs done by both electricians and wiremen are, by and large, identical.

However, I must mention the rather startling and encouraging results obtained by the Johannesburg and Benoni Technical Colleges, and the BIFSA pilot training scheme at Baragwanath, where I know of candidates who had previously obtained marks in the low 40's, obtaining B or even A passes after completing the course.

The Technical College courses are subsidised by the Electrical Contractors Association, and their effort is a wonderful example of what can be done, if the will exists, to train correctly and motivate candidates to do well at the practical examinations.

Mr. President, I have expanded on this subject so that the delegates may be aware that candidates may fail the test as a whole by failing in the safety aspects of the work done during the examinations.

MNR. E. E. DE VILLIERS, Rustenburg:

Mnr. die President, ek wil graag aan die Konvensie 'n saak voordra en dit is miskien nodig om te verduidelik dat ek dit doen op versoek van die geregistreerde elektrotegniese aannemers van Rustenburg, wat 'n afvaardiging na my gestuur het enkele dae voordat ek na die Konvensie vertrek het. Daar was dus nie tyd om enigeen vooraf oor die saak te raadpleeg nie.

Aangesien dit uit hoofde van vorige besprekings tydens sittings van die Hoëveldtak by verskeie geleenthede in die verlede genoem was, het ek gevoel dat dit miskien 'n nuttige doel kan dien om dit aan die Konvensie voor te lê.

Die Stadsraad van Rustenburg het tesame met 31 ander stadsrade Verordeninge laat afkondig om die registrasie en lisensiëring van aannemers in hulle onderskeie gebiede te administreer. Dit was Administrateurskennisgewing Nr. 277 van 24 April 1963. (Die stadsrade is: Alberton, Barberton, Bedfordview, Bloemhof, Brits, Christiana, Delareyville, Edenvale, Ermelo, Heidelberg, Klerksdorp, Koster, Leeuwdoornstad, Lichtenburg, Lydenburg, Nelspruit, Nigel, Nylstroom, Orkney, Ottosdal, Piet Retief, Pretoria, Randburg, Residensia, Rustenburg, Sannieshof, Ventersdorp, Warmbad, Wolmaransstad en Zeerust, en die Gesondheidskomitees van Messina en Stilfontein.

Die tersaaklike paragrawe van die verordeninge wat handel oor die "perseel" wat deur die aannemer "geokkupeer" moet word (ingevolge artikel 21 (3) (a) (i) van die Wet) lui soos volg:

"2. (1) Niemand mag as aannemer draadwerk binne die regsgebied van die Raad onderneem nie tensy hy in besit is van 'n deur die Raad uitgereikte lisensie waarin die perseel of plek waarop hy geregtig is om die besigheid van aannemer te dryf, aangedui is.

(2) Die Raad kan 'n lisensie aan 'n aannemer wat in 'n ander bepaalde gebied geregisreer of gelisensieer is uitreik indien so 'n aannemer voldoen aan die vereistes van die Wet en die bepalings van hierdie verordeninge.

3. (1) Die ingenieur kan aan 'n lisensiehouer 'n verwyderingspermit toestaan om sy besigheid na ander persele te verwyder wat deur die ingenieur goedgekeur en in sodanige permit gespesifiseer is. Enige sodanige permit is bykomend tot en nie ter vervanging nie van enige dergelike permit wat ingevolge die Raad se Verordeninge met Betrekking tot Lisensies- en Besigheidsbeheer vereis word.

(2) 'n Aannemer se besigheidspersele met insluiting van sy werkswinkel moet:

(a) in 'n afsonderlike gebou weg van sy woning, vervat wees;

(b) minstens 180 vierkante voet groot wees."

Die aannemers wat in Rustenburg woon en werk en in die eerste plek plaaslik geregistreer is voldoen in elke besonderheid aan hierdie vereistes. Dit is nou hulle klagte dat die Stadsraad alhoemeer aannemers in hierdie gebied registreer op sterkte van lisensie deur Evkom uitgereik en hierdie persone reeds permanent in Rustenburg vestig en werk en nie nodig het om 'n perseel vir die dryf van sy aannemersbesigheid te okkupeer soos in die Verordeninge vereis word nie. Dit gee hulle 'n onregverdige finansiële voorsprong. Dit word ook beweer dat sommige van hierdie aannemers met Evkom-lisensies geensins voldoen aan die minimum vereistes van toerusting soos neergelê in artikel 21 (3) (a) (ii) van die Wet nie en selfs in sekere gevalle met gemak 'n sodanige registrasie bekom alleenlik deur die invul van die aansoek en betaling van die voorgeskrewe fooi.

Dit word toegegee dat die woordomskrywing van "perseel" in die Wet ook insluit " . . . 'n voertuig, vliegtuig of vaartuig" en ek wil graag die volgende vrae stel:

1. Is bogenoemde stellings aangaande die uitreiking van draadwerkerlisensies deur Evkom waar?
2. Kan dit nie ernstig oorweeg word om die woorde "en ook 'n voertuig, vliegtuig of vaartuig" uit die betrokke woordomskrywing weg te laat nie?
3. Of, moet die munisipaliteite hulle Verordeninge wysig wat die perseel betref?
4. Of, is die betrokke bepaling in die Verordeninge wat 'n plek vereis met neergelegde fisiese afmetings (180 vierkante voet) teenstrydig met die bepalings van die Wet en dus nie regsgeldig nie?
5. Waar artikel 21 (3) (a) dit stel dat 'n voorsiener 'n lisensie "kan" weier (in die Engelse teks "may" refuse) indien 'n applikant nie aan die navolgende vereistes voldoen nie, is dit korrek dat hy nogtans 'n aannemer kan registreer al voldoen hy in geen enkele opsig aan enige van die vereistes nie, en Evkom dus binne sy reg (indien dit wel gebeur) enigeen sonder aansien des persoons as elektrotegniese aannemer kan registreer?
6. Waar mnr. von Alhften dit in sy verslag stel dat die doel van die Wet is om veilige elektriese installasies vir die beveiliging van die publiek te verseker, ensovoorts, is dit nie aangewese dat alle voorsieners die nodige regulasies of verordeninge het om al die vereistes soos gestel in artikel 21 (3) (a) verpligtend te maak nie, en veral 'n paragraaf bevat wat die perseel betref soos beskrywe in die reedsgenoemde paragrawe 2 en 3 (en veral 3 (2) (b) wat die fisiese afmetings aangee)?

Mnr. die President, aangesien die tyd tot beskikking van die Konvensie om Verslae te bespreek nou uiters beperk is, wil ek aan die hand doen dat die Uitvoerende Rand, deurmiddel van sy toepaslike sub-komitees, aandag aan hierdie sake sal gee. Dankie.

SABS Vorderingsverslag vir 1975 en 1976

SABS Progress Report for 1975 and 1976

Gedurende die afgelope twee jaar is heelwat vordering gemaak. Uit die skedule wat die vordering aantoon, sal gesien word dat 21 spesifikasies reeds voltooi is of in die laaste fase van voltooiing is.

By die Tegniese Vergadering wat in Rustenburg gehou was, het ek voorgestel dat 'n vorm ontwerp word vir gebruik wanneer 'n foutiewe SABS merkdraende apparaat teruggestuur word na die verskaffer/vervaardiger sodat die SABS kennis dra van so 'n vervanging. Die Uitvoerende Bestuur het so 'n vorm goedgekeur. 'n Standaard Praktyk instruksie is opgestel en aan lede van die VMEO gesirkuleer. Die gebruik van die vorm is nie verpligtend nie.

Onder verwysing 15/14/37, projek 0751/5006, twee-pool en aardingspenproppe en sokuitgange, sal u merk is weinig vordering gemaak, maar dit is te wyte aan die feit dat op die IEK SC23C komitee gewag word om 'n besluit te neem oor 'n Internasionale aanvaarbare prop- en sokuitgang stelsel.

Tydens die vergadering van die IEK in Milaan in 1974 het diemeerderheid 'n Internasionale aanvaarbare prop- en sokuitgang-stelsel aanvaar. Dit is verder bespreek te Helsinki in 1975 en drie verskillende stelsels is aan die vergadering in Nice voorgelê in Mei 1976. Die Duitse voorstel vir 'n vierkantige pen is aanvaar, maar sekere detail is na 'n Werkgroep verwys. Daar word verwag om finaniteit in 1977 te verkry. Dit kan gemeld word dat die Europese Ekonomiese Gemeenskap reeds die stelsel aanvaar het as 'n toekomstige Europese Standaard.

Ek wil van die geleentheid gebruik maak om die SABS te bedank vir hulle leiding en die harde werk wat gedoen word voordat 'n konsep-spesifikasie voorgelê word vir bespreking. Ek wil ook graag namens die Uitvoerende Bestuur al die lede van die VMEO bedank vir hierdie belangrike taak wat hulle names die VMEO doen om op die verskillende Subkomitees te dien.

During the past two years substantial progress has been made. From the schedule indicating the progress, it will be noticed that 21 specifications have already been completed or are in the final process of being completed.

At the Technical Meeting held in Rustenburg I recommended that a form be designed for use when a faulty apparatus carrying the SABS-mark is returned to the supplier/manufacturer in order that the SABS may be aware of the incident. The Executive Council approved such a form. A Standard Practice Instruction was compiled and circulated to members of the AMEU. The use of the form is not compulsory.

Under reference 15/14/37, project 0751/5006, Two-pole and Earthing-pin plugs and socket outlets, you will notice that very little progress has been made, but this is due to the fact that the decision of the IEC-SC23C Committee is awaited regarding a world-wide plug and socket-outlet system.

At the meeting of the IEC in Milaan in 1974 the majority accepted a world-wide plug and socket-outlet system. It was further discussed at Helsinki in 1975 and three different systems were submitted to the meeting in Nice in May, 1976. The German proposal for a square pin was accepted, but certain detail was referred to a Working Group. Completion of this is expected in 1977. It should be mentioned that the European Economic Community has already adopted the system as a future European Standard.

I wish to take this opportunity to thank the SABS for their guidance and the hard work they do before a dratt specification is submitted for discussion. Also, on behalf of the Executive Council, I wish to thank all the AMEU members for this very important work they are doing for the AMEU by serving on the various Sub-Committees.

P. J. BOTES,
Ko-ordinerende Verteenwoordiger/Co-ordinating Representative.

SABS Verwys Nr./ Ref No.	ONDERWERP/TITLE	Verteenwoordiger Representative	Aantal Vergaderings No. of Meetings	VERSLAG/REPORT
15/7/19	Keuring en metodes van ontleding van Brandstof.	G. T. Stevens	Twee	Kommentaar op „Die keuring van kole" en „Die voorbereiding van 'n monster vir ontleding" is ontvang van verskeie produseerders en verbruikers. Konsep vir kommentaar oor die metodes van toets van brandstof monsters is uitgereik aan verskeie kole produseerders en verbruikers.
	Sampling and methods of analysis of solid fuels.		Two	Comments on "The sampling of coal" and "The preparation of a sample for analysis" were received from various producers and consumers. Drafts for comment on the methods of testing fuel samples have been issued to various coal producers and consumers.
15/7/22 0361/5028	Isoleerolie vir transfomators en skakeltoerusting.	V. A. Raynal	Een	Nou afgehandel.
	Insulating oil for transformers and switchgear.		One	Now completed.
15/14/3/1	Veiligheid van elektriese toestelle.	G. C. Theron	Geen	Aaneenlopend deur middel van korrespondensie.
	Standing advisory committee on electrical safety.		None	Continuous by means of correspondence.
15/14/5/1 0771/5003	Omhulde handlugbreek- en afsonderskakelaars. (Hersiening van SABS 152/1951).	L. B. Cumming	Geen	Uitgereik vir kommentaar.
	Manually operated enclosed type airbreak switches and isolators. (Rev. of SABS 152/ 1951).		None	Issued for comments.
15/14/5/2 0751/5005	Muur- en toestelskakelaars SABS 163/1963.	J. A. Loubser	Geen	'n Konsep van die voorgestelde hersiening van die standaardspesifikasie is uitgestuur vir kommentaar.
	SABS 163/1963 Wall and appliance switches.		None	A draft of the proposed revision of the standard specification has been circulated for comments.

SABS Verwys Nr./ Ref No.	ONDERWERP/TITLE	Verteenwoordiger Representative	Aantal Vergaderings No. of Meetings	VERSLAG/REPORT
15/14/5/3 0751/5004	Vlakgemonteerde binneshuis elektriese paneelborde.	J. A. Loubser	Een	'n Konsep standaardspesifikasie is uitgestuur vir kommentaar.
	Flush-mounted indoor electrical panelboards.		One	A draft standard specification has been circulated for comments.
15/14/9/1	Drie-fase induksie motors (hersiening van SABS 948/1969).	P. J. Botes	Twee	Vir kommentaar uitgereik.
	Three-phase induction motors (Rev. of SABS 948/1969).		Two	Issued for comments.
15/14/9/2	Enkelfase wisselstroom motors.	H. J. de Bruin	Twee	Vir kommentaar uitgereik.
	Single-phase alternating current motors.		Two	Issued for comments.
15/14/10/2 0721/5012	Ballaste vir fluoresseerlampe.	P. J. Botes	Twee	Gaan voort.
	Ballasts for fluorescent lamps.		Two	In progress.
15/14/10/4	Straatligmature.	M. Dempster	Geen	Werk het nog nie 'n aanvang geneem nie.
	Streetlighting Luminaires.		None	Work not yet commenced.
15/14/10/5 0721/5012	Kapasitors vir fluoresseer- en ontladingslamp ballaste.	A. J. v.d. Berg	Twee	Die toetsfasiliteite vir die uitvoering van sekere toetse is nou by die SABS voltooi. Verdere vergaderings sal gereël word ten einde hierdie projek te finaliseer.
	Capacitors for fluorescent and discharge lamp ballasts.		Two	The testing facilities at the SABS have now been completed for certain tests to be performed. Further meetings will be arranged to finalise this project.
15/14/10/8 0721/5015	Binneshuis Armature.	M. Dempster	Geen	Werk is afgehandel. Spesifikasie moet goedgekeur word deur SABS Raad.
	Interior Luminaires.		None	Work complete. Specification awaiting approval by SABS Council.
15/14/14/18 0761/6003	Hittebestande kabels vir gebruik by die binnebedrading van elektriese toestelle (Hersiening van SABS 529/1956).	A. J. v.d. Berg	Een	Afgehandel. Moet aan Raad voorgelê word vir goedkeuring.
	Heat resisting cables for use in the internal wiring of electrical appliances. (Rev. of SABS 529/1956).		One	Complete. To be submited to Council for approval.
15/14/14/1	Buigsame koorde vir krag en verligtingstoestelle. (Hersiening van SABS 168/1952).	G. C. Theron	Een	Finale hersiene uitgawe uitgestuur vir kommentaar.
	Medium voltage vulcanised rubber insulated cables and flexible cords for power and lighting purposes. (Rev. of SABS 168/1952).		One	Final revised edition circulated for comments.
15/14/21	Stroombrekers met gevormde hulse.	F. J. v.d. Merwe	Geen	Voltooi. Moet aan Raad voorgelê word vir goedkeuring.
	Moulded case circuit breakers.		None	Complete. To be submitted to Council for approval.
15/14/21/1 0771/5009	Aardlekbeveiligingseenhede van die Stroombalanstipe.	J. A. Loubser F. J. v.d. Merwe G. C. Theron	Vier	Goeie vordering is gemaak. IEK 23E (Secretariat) 15 is bespreek op laaste vergadering en kommentaar is daarop gelewer.
	Core balance earth leakage protection units.	G. J. Bucker	Four	Good progress. IEC 23E (Secretariat) 15 discussed at last meeting and comments were made.
15/14/24 0761/5005	Gekartelde of drukaansluiters.	S. G. McCullough	Een	Gaan voort.
	Crimped or pressure type connectors.		One	In progress.
15/14/26 0771/5006	Patroontipe sekeringskabels en patroontipe elektriese sekerings vir lae en medium spannings.	A. H. L. Fortman	Een	Voltooi. Vir redigering en vertaling, moet daarna aan Raad voorgelê word vir goedkeuring.
	Cartridge type fuse-links and cartridge type electric fuses for low and medium voltage.		One	Finalised. For re-editing and translation and thereafter to be submitted to Council for approval.
15/14/30	Geleiers vir bogrondse elektriese verspreidingslyne. 1. Koper geleiers. 2. Aluminium geleiers. 3. Staal versterkte aluminium geleiers. 4. Koper oorgetrekte staal geleiers. 5. Gegalvaniseerde staal geleiers.	D. Briers		Dele 1, 2 en 3 reeds gepubliseer. Dele 4 en 5 konsep word opgestel.
	Conductors for overhead electrical transmission lines: 1. Copper conductors. 2. Aluminium conductors. 3. Steel re-inforced aluminium conductors. 4. Copper clad steel conductors. 5. Galvanised steel conductors.			Parts 1, 2 and 3 already published. Parts 4 and 5 — Draft is being prepared.

SABS Verwys Nr./ Ref No.	ONDERWERP/TITLE	Verteenwoordiger Representative	Aantal Vergaderings No. of Meetings	VERSLAG/REPORT
15/14/34 0781/5011	Elektriese opgaar - waterverwarmers. (Hersiening van SABS 151/1958).	A. J. v.d. Berg	Een	Spesifikasie is goedgekeur deur SABS Raad.
	Electric storage water heaters. (Rev. of SABS 151/1958).		One	Specification approved by SABS Council.
15/14/37	Tweepool en aardingspen proppe en sokuitgange. (Metrieke eenhede).	J. A. Loubser	Geen	Sien verslag van Ko-ordinerende Verteenwoordiger.
	Two-pole and Earthing-pin Plugs and socket outlets. (Metric units).		None	See report by Co-ordinating Representative.
15/14/37/1	Kontakproppe, sokuitgange en koppelaars vir nywerheidsdoeleindes.	J. A. Loubser	Geen	Wag op IEK beslissing.
	Plugs, socket-outlets and couplers for industrial purposes.		None	Waiting on IEC decision.
15/14/43	Elektriese stowe, verwarmingsplate en soortgelyke toestelle.	L. B. Cumming		Gaan voort.
	Electric stoves, hot plates and similar appliances.			In progress.
15/14/44	Verspreidingstransformatore.	I. F. Boyack R. H. Small F. L. Knobel		Een vergadering vir hersiening van SABS 780.
	Distribution Transformers.			One meeting on revision of SABS 780.
15/14/49 0751/5007	Aansluitblokke vir elektriese doeleindes.	K. J. King	Een	Gaan voort.
	Terminal blocks for electrical purposes.		One	In progress.
15/14/53	Elektrotegniese Benamings.	J. K. von Ahlften	Geen	Afgehandel, geen vergaderings is gehou.
	Electrotechnical nomenclature.		None	Finalised, no meetings held.
15/14/56 0751/5010 0751/5012	Muuruitlaatkassies en dekplate.	J. A. Loubser	Geen	Spesifikasie vir dekplate is beskikbaar as SABS-1084-1976. Konsep spesifikasie vir muuruitlaatkassies se sluitingsdatum vir kommentaar was 30.10.76.
	Wall outlet boxes and cover plates.		None	Specification for cover plates available as SABS 1084-1976. Draft specification for wall outlet boxes issued for comments, closing date was 30.10.76.
15/14/60	Veiligheidsvereistes vir elektriese toestelle.	G. C. Theron	Twee	1. Wysiging aan skedule 4 — buigsame koorde om sekere spesiale koorde uit te sluit. 2. Huishoudelike elektriese wasbehandelingsmasjiene — Vir kommentaar. 3. Skedule 9 — Lamphouers hersien.
	Safety requirements for electrical appliances.		Two	1. Amendment to schedule 4 — flexible cords to exclude certain special cords. 2. Household electrical laundry treatment machines — For comments. 3. Schedule 9 — Lampholders, revised.
15/14/64/1 0791/5=15	Ko-ordinering van isolering — (Hoogspanning).	I. F. Boyack E. H. Scholes	Geen	SABS 1019-1975 is reeds gepubliseer.
	Insulation co-ordination — (high voltage).	J. K. von Ahlften E. de C. Pretorius	None	SABS 1019-1975 has been published.
15/14/64/1 0791/5009	Ko-ordinering van isolering — (Laagspanning).	J. C. Strauss		Deurlopend.
	Insulation co-ordination — (low voltage).			In progress.
15/14/73/2 0751/5008	Bedradingsroetering en vloerlyste.	J. J. Boshoff	Geen	Konsep uitgestuur vir kommentaar.
	Wiring Trunkings and Skirtings.		None	Draft has been circulated for comments.
15/14/73/3 0771/5020	Kontaktors.	F. J. v.d. Merwe	Een	Kommentaar is ontvang op voorlopige dokument en bespreek.
	Contactors.		One	Comments on preliminary document have been received and discussed.
15/14/73/4 0771/5022	Geleistamme (Koper en Aluminium).	S. Chait	Een	Konsep spesifikasie bespreek.
	Busbars (Copper and Aluminium).		One	Draft specification discussed.
15/21/3/9 0811/5028	Die installasie, toets en balanseer van pypleidings vir lugversorging.	D. E. T. Potgieter	Twee	Vordering met die konsep dokument is nog nie sodanig dat 'n konsep gebruikskode voorberei kan word nie.
	The installation, testing and balancing of duct work for air conditioning.		Two	Progress with the draft document is not such that a draft code of practice can be prepared.
15/23/13/1	Skakelbordinstrumente.	G. R. Marloth	Geen	Geen vordering.
	Switchboard instruments.		None	No progress.

SABS Verwys Nr./ Ref. No.	ONDERWERP/TITLE	Verteenwoordiger Representative	Aantal Vergaderings No. of Meetings	VERSLAG/REPORT
15/24/4/5	Nie-metaal buigbare pype.	J. J. Boshoff	Geen	In 1969 gefinaliseer en gepubliseer.
	Non-metallic flexible conduit.		None	Finalised and published in 1969.
19/3/3	Beskerming van gebou teen weerlig.	J. A. Loubser	Geen	Gebruikskode is voltooi en beskikbaar as SABS-03A-1976.
	Protection of Buildings against Lightning — COP. (Rev. and sub-division of SABS 03/1952-SANS 03/1952).		None	Code of Practice completed. Available as SABS-03A-1976.
15/65/13 0711/5022	Spesifikasie vir mobiele kommunikasie -uitrusting vir landgebruik.		Geen	Geen vordering.
	Specification of land mobile communication equipment.		None	No progress.
19/9/24 0751/5012	Die kies, hantering, installering en bediening van elektriese kabels tot en met 22KV ontwerp spanning.	P. J. Botes		Gaan voort.
	The selection, handling, installation and operation of electric power cables up to and including 22-KV rating.			In progress.
19/9/84	Bogrondse verspreidingslyne.	E. H. Scholes	Geen	Geen vergadering is tot dusver gehou nie.
0791/5025	Overhead Transmission Lines.		None	No meeting has yet taken place.
19/9/89	Aarding.	D. P. Viljoen	Geen	Gaan voort.
0751/5014	Earthing.		None	In progress.

MNR. PIET BOTES

MNR. E. E. DE VILLIERS, Rustenburg:

Mnr. die President, ek moet miskien vir u net meld wat betref hierdie sake van die katodiese beskerming. Ek is jammer dat mnr. Botes en ek nie aan u verslag gedoen het nie aangesien daar baie lang voorbereidingswerk deur die Komitee aan verbonde was. Ek het 'n dag of twee voordat ek Konvensie toe gekom het die stukke gekry van die SABS. Dus die finale stukke gesirkuleer net vir voorlegging aan die Raad en onmiddellik na goedkeuring sal dit gepubliseer word. So dit is die posisie met daardie Komitee met ander woorde dit het sy werk suksesvol afgehandel. Baie dankie.

MNR. J. K. VON AHLFTEN, Springs:

Mnr. die President net een vraag.

Mnr. Botes kan u vir ons sê wat geword het van die beoogde spesifikasies vir Pex kabels wat plaaslik vervaardig word. Daar was so n versoek gerig deur die Hoëveld-tak as ek reg onthou, dat daar 'n behoefte is aan so 'n spesifikasie vir hierdie tipe kabel wat plaaslik vervaardig word. Daar was niks vermeld in u verslag oor die saak nie.

MNR. P. J. BOTES, Roodepoort:

Mnr. die President daar is so 'n versoek gerig. Ons het dit oorgedra aan die SABS en hulle sal binnekort aandag gee aan die versoek. Ek weet nie of mnr. Smit wil uitbrei daarop nie. Dis miskien beter as hy iets wil sê.

MNR. J. W. SMIT, SABS:

Mnr. die President, ek weet nie wat noem 'n mens 'n Pex kabel in Afrikaans nie. Ek moet sê ek het nooit geweet nie.

Ons het die versoek ontvang, ons het dit aan ons Raad voorgelê en die Raad het goedgekeuer dat ons aangaan met die projek. Ek kan vir u sê ons is reeds besig om 'n konsep op te stel. Ek wil ook op hierdie stadium dit sê ons het hom 'n bietjie laer aanslag gegee as die CNE kabel. Dit is nodig op hierdie stadium. Hy is miskien nie so dringend nie maar ons is in elk geval besig om aan hom te werk.

Die SABS vorderingsverslag vir 1975 en 1976 soos deur mnr. P. J. Botes voorgelê, is omvattend en volledig. Ek kan mcontlik net die volgende vordering sedert die verslag opgestel is aanstip:

Hersiening van SABS 152-1951 en SABS 163-1963. Kommentaar vergaderings is gehou en die dokumente word nou voorberei vir voorlegging aan die Raad. Die kommentaar op die voorgestelde standaardspesifikasie vir vlakgemonteerde binnenshuise elektriese paneelborde is deur die komitee afgehandel en die dokumnt word voorbrei vir voorlegging aan die Raad.

Wat betref die spesifikasie vir straatligarmature wil ek, voordat mnr. Botes my weer soos gewoonlik voor stok kry, rapporteer dat ons reeds goeie vordering met 'n konsep vir bespreking gemaak het. Goedkeuring moet nog van die Raad verkry word om die spesifikasie op te stel maar ons verwag om binne drie tot vier maande die eerste vergadering te kan hou.

'n Vergadering om die kommentaar op die hersiening van SABS 168-1952 te bespreek is vir 23 Junie 1977 belê en dit word verwag om die spesifikasie dan af te handel.

Die spesifikasie vir stroombrekers met gevormde hulse is reeds deur die Raad goedgekeur en gepubliseer.

Die kommentaar op bedradingsroetering en vloerlyste is deur die komitee afgehandel en die dokument word voorberei vir voorlegging aan die Raad. Die spesifikasies vir kontaktors en geleistamme word albei ook nou voorberei vir voorlegging en goedkeuring.

As regards new development of interest to the AMEU, I intended to discuss NE cable. Mr. Botes has however elaborated on this subject and I can only add that the Bureau is working on a draft specification for CNE cable. With the imminent electrification of Bantu townships like Soweto where the PME system of reticulation will be used, the need for such a specification has become very urgent.

The Bureau has accordingly allocated top priority to this project and we hope to have our first committee meeting during the third quarter of this year. I may add that a fully representative meeting of interested parties, held recently at the SABS, decided that the Republic could not afford the luxury of all types of CNE cable and it was consequently resolved that only the waveform copper type would be manufactured in South Africa.

Gentlemen, it is clear from the report submitted by Mr. P. J. Botes that the Bureau, very ably assisted by the AMEU, worked hard during the past two years.

Ek is 'n oud-Tukkie, mnr. die President, en ly dus nie aan dieselfde winderigheid van die Maties wat die verhoog volsit of die Ikeys wat die saal volsit nie. Ek sal dus nou afsluit deur eerstens u koördinerende beampte, mnr. Botes, vir sy gewaardeerde samewerking met die Buro te bedank.

Tweedens wil ek my persoonlike dank aan elke lid van die VMO wat op ons vele komitees dien vir hul onmisbare bydrae, oordra en ten slotte wil ek voorstel dat die veerslag voor u met dank aanvaar word. Dankie.

MNR. E. DE C. PRETORIUS, Potchefstroom:

Mnr. die President n baie belangrike projek wat afgehandel is sedert ons vorige Konvensie word nie genoem nie en dit is die van miniatuur substasies. Vir die wat nou nog nie weet nie, die SABS het 1029 en 1030 van 1975 sederdien goedgekeur en gepubliseer. En dan net op bladsy 5 — hierdie SABS se verwysnommer 1514641 — dit is eintlik basies standaardspannings en strome en SABS 1019 is ten opsigte van standaardspannings en strome.

MR. S. G. HANCOCK, Affiliate:

Mr. President,

Very large claims are made of the eeconomy of using combined neutral and earth cables but very often the basis of comparison is not stated very clearly. We have carried out our own cost evaluations on 185 sq. mm. cable and we find that there is very little significant difference in cost between a three core aluminium conductor concentric CNE type wave form neutral in copper and a conventional four core aluminium conductor cable. The differences in cost seems to come mainly from one's basis of estimating and also whether one regards the CNE cable as additional to existing practice or in substitution thereof. When you estimate on a substitution basis i.e. for equal commercial contribution, the difference is in fact very small. The biggest claims for economy or financial advantage in CNE cables seem to come from the northern hemisphere, where they have been comparing wave form from our tables i.e. three aluminium conductors and an aluminium concentric neutral which the meeting on the 23rd March referred to by Mr. Smit and Mr. Botes, did not accept. Once you put in a wave form concentric in copper the price is bound to go up and moreover escalating raw material costs in the rest of the world are going to cut down the apparent advantage.

At the same time we do not know that certain costings in Britain, particularly on wave conal and its paper version of these concentric forms, were deliberately kept down in order to encourage the market—in the shape of the Electricity Boards — to acept them. Their basis of promotion is not adopted in this country — the apparent commercial advantages will be less. I want to say that the cable manufacturing industry is prepared to invest capital in necessary new plants to launch this new type of cable, but we do ask in return that the requirements are scientifically based and not arbitrary or fashionable. We feel that, certainly under present circumstances, change for the sake of fashion is not right and it could easily lead to trouble in relation to national investment programmes, with particular reference to the new AECI concentric and coalplex investment at Sasolburg which is centred on increased manufacture of PVC. Thank you Mr. President.

MNR. R. J. FULS, Orbar:

Mnr. die President in ons gebied is daar omtrent 75 000 huise wat nog nie krag het nie. So ons het alreeds oefeninge gedoen op verskeie metodes om goedkoper krag to kan versprei. Ek het ook na die CNE gekyk. My groot probleem wat ek sien, en dit is seker die heel grootste vir my, is wat maak ek met hom as hy klaar in die grond is, as ek 'n fout het op hom. Ek weet nie hoe ek hom gaan opspoor nie. Dit is vir my op hierdie stadium nie moontlik om te sê of ek dit ooit sal kan bereik nie. Dankie.

MR. H. D. FRASER, Durban:

Mr. President,

Mr. Botes was enquiring what the market might be amongst larger potential users. It would be entirely dependent on the cost of the product and it, as Mr. Hancock has intimated, it is not going to be cheaper than conventional cable, then there will be no great demand for it.

It was indicated that for the system proposed for Soweto, there was some advantage in this particular type of cable as compared to the conventional cable in regard to jointing, but the cost of the article is going to determine its demand.

Thank you Mr. President.

MR. K. G. ROBSON, President:
Thank you Mr. Fraser. Mnr. Theron, ek dink u moet die heel laaste bydrae lewer, asseblief.

MR. G. C. THERON, Vanderbijlpark:

Mr. Chairman, as you probably know we are the Technical Advisers to the Bantu Administration Board for the Vaal Triangle and we have a very large project on hand as far as electrification is concerned, both for existing houses and also new development. As far as this wave form cable is concerned, I can't see any technical advantage in using it in place of the conventional 4 core PVC insulated cables. We would be quite happy to use the wave form cable, provided there are economical grounds for doing so. Thank you.

MR. K. G. ROBSON, President:

Thank you Mr. Theron. May I pose one very quick question to Mr. Hancock, that is whether they are looking at the possibility of the normal solid aluminium low voltage 4 core cable with Pex insulation.

MR. S. G. HANCOCK, Affiliate:

Mr. Chairman, Pex was advocated initially in relation to Soweto, but this came under considerable opposition and criticism from ASEI and Centracan, because of the coalplex extensions. Coalplex will produce PVC entirely of local origin, whereas cross linked polyethylene at this stage has to be imported either from the Western Hemisphere, Northern Europe or from the United States and, of course, all these imports now carry a 15% penalty. ASEI maintain there will be no expansion of polyethylene capacity in this country until about 1982 when Sasol 2 comes on the scene and that is the earliest it would be possible to consider manufacturing or compounding cross-linkable polyethylene in this country. The commitment on this type of cable at the moment is very strongly PVC, assuming that normal voltage drop considerations of system design apply. If consideration be given to continuous current rating and possibly overload capacity, then it would force reconsideration of cross-linkable polyethylene. It depends entirely on the basis of system engineering design which is adopted.

Thank you Mr. Chairman.

MR. K. G. ROBSON, President:

Thank you very much Mr. Hancock. Time has regrettably caught up with us. We could continue for some time on this subject, but we must proceed to the next item, namely Report No. 17 — which is the revision of Standard Regulations for the Wiring of Premises.

Verslag oor die Hersiening van die Standaardregulasies vir die Bedrading van Persele

WERKGROEP 4 VAN DIE SABS-HOOFKOMITEE

ALGEMEEN:

Op 9 Maart 1976 het die Raad van die SABS 'n versoek dat die bedradingsregulasies in die vorm van 'n gebruikskode geskryf word, toegestaan. Die titel van die finale publikasie sal derhalwe „Gebruikskode vir die Bedrading van Persele" wees, met die kort titel: „Bedradingskode".

Die Komitees wat by hierdie projek betrokke is, het die volgende benamings ontvang:-

Bedradingskode: Hoofkomitee.
Bedradingskode: Natalse Onderkomitee.
Bedradingskode: Wes-Kaapse Onderkomitee.

Die twee werkgroepe is as volg benoem:-

Bedradingskode: Werkgroep 3.
Bedradingskode: Werkgroep 4.

BEDRADINGSKODE: WERKGROEP 4

Die Hoofkomitee: Bedradingskode het werkgroep 4 aangestel om die Bedradingsregulasies te wysig en daar is tot op datum twee-en-sestig vergaderings gehou waar inligting verwerk en teruggevoer is na die Hootkomitee, wat op sy beurt tot en met 17 Augustus 1976 reeds tien keer vergader het.

Daar word verwys na die 44ste Konvensieverrigtinge van 1975 en veral na die verslag van mnr. E. E. de Villiers oor die wysiging van Regulasie 226(F), wat handel oor verpligte aardlekbeveiliging. Hierdie Regulasie is weer eens gewysig gedurende November 1976 en die weergawe is nou soos volg:-

SUID-AFRIKAANSE BURO VIR STANDAARDE
November 1976-wysiging van die
STANDAARDREGULASIES VIR DIE BEDRADING VAN PERSELE
(Tweede uitgawe Mei 1951)
en
ADDENDUM NO. 1 (1971) IN METRIEKE EENHEDE
(Die datum van die vorige wysiging is Januarie 1975)

REGULASIE 226: OUTOMATIESE AARDLEKBEVEILIGING

Skrap Regulasie 226(F) en vervang dit deur die volgende Regulasie 226(F) en 226(G):-

(F) Behalwe soos in (G) hieronder gespesifiseer, moet stroombane wat krag aan kontaksokke in enige tipe installasie voorsien, van outomatiese aardlekbeveiliging voorsien word, tensy anders goedgekeur vir 'n tydperk wat die ingenieur spesifiseer:-

(i) In alle nuwe installasies.
(ii) Waar enige herbedrading van of toevoeging tot 'n kontaksokbaan in 'n bestaande installasie gedoen word, in welke geval die beveiliging op die stroombane wat aldus herbedraad of waaraan toegevoeg word, aangebring moet word.

Report on the Revision of the Standard Regulations for the Wiring of Premises

WORKING GROUP 4 OF THE SABS MAIN COMMITTEE

GENERAL:

On 9th March, 1976, the SABS Council approved a request that the Wiring Regulations be written in the form of a code of practice. The title of the final publication will therefore be "Code of Practice for the Wiring of Premises" and the short title, "Wiring Code".

The Committees concerned with this project were designated as follows:-

Wiring Code: Main Committee.
Wiring Code: Natal Sub-Committee.
Wiring Code: Western Cape Sub-Committee.

The two working groups were designated as follows:-

Wiring Code: Working Group 3.
Wiring Code: Working Group 4.

WIRING CODE: WORKING GROUP 4

The Main Committee: Wiring Code has appointed Working Group 4 to amend the Wiring Regulations.
To date sixty-two meetings have been held for digesting data and feeding these back to the Main Committee, which in turn has held ten meetings up to and including 17th August, 1976.

Reference is made to the 44th Convention Proceedings, and especially to the report by Mr. E. E. de Villiers on earth leakage protection. This regulation was once more amended during November, 1976, and now stands as follows:-

SOUTH AFRICAN BUREAU OF STANDARDS
November 1976 Amendment to the
STANDARD REGULATIONS FOR THE WIRING OF PREMISES
(Second Edition May 1951)
and
AMENDMENT NO. 1 (1971) IN METRIC UNITS
(The previous amendment was dated January 1975)

REGULATION 226: AUTOMATIC EARTH LEAKAGE PROTECTION

Delete Regulation 226(F) and substitute the following Regulations 226(F) and 226(G):-

(F) Except as specified in (G) below, circuits supplying socket-outlets in any type of installation shall be provided with automatic earth leakage protection unless otherwise approved for a period specified by the Engineer:-

(i) In every new installation.
(ii) Where any rewiring of or extension to a socket-outlet circuit in an existing installation is carried out, in which case the protection shall be applied to the circuits so rewired or extended.

OPM. 1: Die bedoeling is dat die bepalings van (F)(i) en (F)(ii) onmiddellik vir huishoudelike installasies geld, maar dat die Ingenieur in die geval van ander installasies toegewings kan maak, indien dit in die omstandighede geregverdig is, tydens die tydperke wat aan die einde van die twaalfde maand en die einde van die derde maand onderskeidelik in die geval van (F)(i) en (F)(ii) na die publikasie van hierdie wysiging eindig.

OPM. 2: Volgens die bepalings van hierdie regulasie word die vervanging van 'n kontaksok nie as herbedrading van of toevoeging tot 'n installasie beskou nie.

OPM. 3: Enige koppelstuk wat spesifiek bedoel is vir die aansluiting van 'n vaste of staande toestel soos 'n kooktoestel wat binne die bestek van SABS 153 val, 'n yskas, 'n diepvrieseenheid of 'n diefalarm en wat nie 'n prop kan neem wat volgens SABS 164 vervaardig is nie, word nie as 'n kontaksok binne die strekking van hierdie Regulasie beskou nie en hoef nie by outomatiese aardlekbeveiliging ingesluit te word nie.

(G) Die verpligte toepassing van outomatiese aardlekbeveiliging ooreenkomstig (F) hierbo geld nie vir die volgende nie:-

(i) Kontaksokstroombane wat met 'n noordverligtingstoevoer verbind is.
(ii) Kontaksokstroombane wat van 'n elektroniese verdowwer in enige teater, bioskoop of soortgelyke openbare bymekaarkomplek van krag voorsien word.
(iii) Stroombane in vals plafonne en op soortgelyke plekke en wat krag voorsien aan vaste kontaksokke wat vir die verbinding van verligtingstoevoere bedoel is.
(iv) Stroombane wat krag voorsien aan kontaksokke vir nywerheidsgebruik wat nie in ooreenstemming met SABS 164 is nie of wat nie vir verbinding van verplaasbare toestelle bedoel is nie.

Die Hoofkomitee: Bedradingskode het op sy vergadering van 17 August 1976 besluit dat al die basiesestof vir 'n konsep vir kommentaar nou deur die Hoofkomitee goedgekeur is.

Die Voorsitter van Werkgroep 4, mnr. J. V. Grant, en sy personeel is tans besig om die konsep vir kommentaar te redigeer.

Aangesien dit moeilik is om 'n bepaalde seksie van die gewysigde Bedradingskode uit te sonder en daaroor verslag te doen, is die verstandhouding dat, as daar tyd is, die Bedradingskode tydens ons volgende konvensie op Oos-Londen bespreek sal word.

Dit is uiters moeilik om enige instansie of persoon uit te sonder vir die waardevolle werk wat gedoen word met die hersiening van die Bedradingskode noudat ek besef hoeveel mense inderwaarheid saamwerk om hierdie projek deur te voer.

Ek wil egter die Voorsitter van die Hoofkomitee, mnr. A. A. Middlecote, en sy komitee gelukwens met die goeie werk wat daar in hierdie verband gedoen word om 'n Nasionale Bedradingskode daar te stel. Die Voorsitter van Werkgroep 4, mnr. J. V. Grant, en sy komitee verdien groot lof vir hulle bydrae tot hierdie projek.

NOTE 1: It is intended that the provisions of (F)(i) and (F)(ii) shall apply forthwith to domestic installations but that relaxation by the Engineer may be permitted for other installations, when so warranted by the circumstances, during the periods terminating at the end of the twelfth month and the end of the third month in the cases of (F)(i) and (F)(ii) respectively, after publication of this amendment.

NOTE 2: In terms of this regulation, the replacement of a socket-outlet does not constitute rewiring of or extension to an installation.

NOTE 3: Any coupler which is specifically intended for the connection of a fixed or stationary appliance such as a cooking appliance falling within the scope of SABS 153, a refrigerator, a deep-freeze unit or a burglar alarm and which cannot accept a plug manufactured in accordance with SABS 164 is not deemed to be a socket-outlet in terms of this regulation and need not be included in the automatic earth leakage protection.

(G) The mandatory application of automatic earth leakage protection in terms of (F) above shall not apply to the following:-

(i) Socket-outlet circuits connected to an emergency lighting supply.
(ii) Socket-outlet circuits supplied from an electronic dimmer in any theatre, cinema or similar place of public assembly.
(iii) Circuits in false ceilings and similar locations that supply fixed socket-outlets intended for the connection of lighting fittings.
(iv) Circuits supplying socket-outlets for industrial applications which are not in conformity with SABS 164 or are not intended for the connection of portable appliances.

The Main Committee: Wiring Code decided at a meeting held on 17th August, 1976, that all the basic material for a draft for comment had now been approved by the Main Committee.

The Chairman of Working Group 4, Mr. J. V. Grant, and his staff are at present editing the draft for comments.

As it is difficult to single out any specific section of the amended Wiring Code and to report thereon, it is understood that, time permitting, the Wiring Code will be discussed at our next convention in East London.

It is extremely difficult to single out any particular party or person regarding the valuable work done in connection with the revision of the Wiring Code; I am only now realising how many persons do in fact collaborate to carry this project through.

I would, however, like to congratulate the Chairman of the Main Committee, Mr. A. A. Middlecote, and its members on the excellent work done to establish a National Wiring Code. The Chairman of Working Group 4, Mr. J. V. Grant, and his Committee deserve great praise for their contribution to this project.

A. J. VAN DEN BERG,
Verteenwoordiger/Representative.

WERKGROEP 3 VAN DIE SABS-HOOFKOMITEE

Hierdie werkgroep se doel is hoofsaaklik om die werk van IEC TC 64 (International Electrotechnical Commission Technical Committee 64) te bespreek en kommentaar daarop te lewer ooreenkomstig Suid-Afrikaanse vereistes en omstandighede.

'n Ontsaglike hoeveelheid dokumente is deur die verteenwoordigers op hierdie komitee, bestudeer, bspreek en kommentaar op gelewer. Onder andere is die volgende voorgestelde publikasies op die wyse hanteer:-

1. Hoofstuk 52: Kanale vir kabels, geleiers en ander bedradings materiaal.
2. Hoofstuk 53: Skakeltuig vir beveiliging en isolering.
3. Hoofstuk 54: Aarding en beskermingsgeleiers.
4. Hoofstuk 41: Beveiliging deur beperking op spannings.
5. Hoofstuk 32: Eksterne invloede — Voorgestelde bylaes tot die klassifikasies van eksterne invloede.
6. Hoofstuk 47: Beskerming vir veiligheid — Toepassing van beskermende maatreëls.
7. Hoofstuk 48: Spesiale voorsiening vir data prosessering en soortgelyke installasies.

WORKING GROUP 3 OF THE SABS MAIN COMMITTEE

The purpose of this Working Group is largely to discuss and comment upon the workof IEC TC 64 (International Electrotechnical Commission Technical Committee 64), in the light of South African requirements and conditions.

An enormous number of documents was studied, discussed and commented upon by the representatives of this Committee. These include, inter alia, the following proposed publications:-

1. Chapter 52: Ducts for cables, conductors and other wiring materials.
2. Chapter 53: Couplings for protection and insulation.
3. Chapter 54: Earthing and protective conductors.
4. Chapter 41: Protection by limitation of voltages.
5. Chapter 32: External influences — Proposed appendices to the classification of external influences.
6. Chapter 47: Protection for safety — Application of protective measures.
7. Chapter 48: Special provision for data processing and similar installations.

8. Voorgestelde riglyne op veiligheidsmaatreëls vir die installering van verhittings kabels en verhittingstoerusting.
9. Hoofstuk 51: Algemene reëls vir die keuse en oprigting van elektriese toerusting.
10. Hoofstuk 43: Beveiliging van geleiers teen oorbelasting.
11. Hoofstuk 42: Beskerming teen termiese effekte in normale diens.
12. Hoofstuk 44: Beskerming teen oorspanning.
13. Hoofstuk 45: Beskerming teen onderspanning.

VERVOLG:

Hierdie is maar net enkele van die items wat behandel is en heelwat van hulle het meer as een keer voor die Suid-Afrikaanse Komitee gedien d.w.s. nadat kommentaar van ander lande ontvang is.

Gedurende die tydperk 10-25 Junie 1976 is 'n vergadering van die Internasionale Elektrotegniese Kommissie, Tegniese Komitee Nr. 64 gehou te Ottawa. Ongelukkig was dit nie vir enige van die Suid-Afrikaanse komiteelede moontlik om die vergadering by te woon nie, maar daar is wel deeglik kennis geneem van die S.A. Komitee se kommentaar oor die verskeie items.

Terwille van kontinuiteit het die Uitvoerende Raad van die VMEO besluit om die lede wat tans op die betrokke werkgroep dien nie te wysig as daar 'n nuwe Uitvoerende Raad gekies word nie.

Mnr. J. V. Grant van die SABS tree as Voorsitter vir die werkgroep op en verdien groot lof vir sy ywer en bydrae tot hierdie werk.

8. Proposed guide lines on safety measures for the installation of heating equipment.
9. Chapter 51: General regulations for the selection and installation of electrical equipment.
10. Chapter 43: Protection of conductors against overloading.
11. Chapter 42: Protection against thermal effects in normal use.
12. Chapter 44: Protection against overvoltage.
13. Chapter 45: Protection against undervoltage.

CONCLUSION:

These are but a few of the items covered and many of them came up before the South African Committee more than once, i.e. after comment had been received from other countries.

During the period 10th-15th June, 1976, a meeting of the International Electrotechnical Committee was held at Ottawa. Unfortunately none of the South African committee members was able to attend, but due note was taken of the South African Committee's comments on the various items.

In the interest of continuity the Executive of the AMEU decided not to alter its present representation on the Working Group concerned, when a new Executive is elected. Mr. J. V. Grant of the SABS acts as Chairman of the Working Group and deserves great praise for his enthusiasm for and contribution to this work.

J. A. LOUBSER,
Verteenwoordiger/Representative.

MR. J. A. LOUBSER

Mrs. N. Reddel, Mrs. T. Kerr and Mrs. J. Swanson assisted with registrations, typing and general information

MNR. J. A. LOUBSER, Benoni:

Mnr. die President, deur Werk Groep 3 is daar 'n ontsaglike hoeveelheid werk gedoen en daar is nog 'n ontsaglike hoeveelheid werk wat wag om gedoen te word. Ek dink ek sal in elk geval my plig versuim as ek nalaat om een van ons geaffilieerders te wete Roger Everitt te bedank vir sy bydrae in hierdie geval. U weet met die bestaande metode van verkiesing van die uitvoerende Raad en die verteenwoordiges op hierdie komitee wissel hulle moontlik elke twee jaar, moontlik 'n bietjie langer. Daar is in elk geval net een lid te wete Roger Everitt wat van die begin af in hierdie Komitee gedien het wat werklik 'n uitstaande geheue het en dinge kan onthou wat ons lankal al vergeet het en soos ons in Engels sal sê "We pick his brains" Mr. President. Thank you very much.

MR. K. G. ROBSON, President:

Thank you Mr. Loubser. I am pleased to welcome Mr. Grant of the Bureau of Standards and it would appear Mr. Grant, that we are able to give 45 minutes for the discussion of this important report. May I suggest that you lead the discussion, taking about 15 to 20 minutes and then we can use the remaining time for discussion from the floor.

MR. J. V. GRANT, SABS:

Mr. President — thank you for those kind words, not only yours but those in the reports of Mr. Loubser and Mr. van den Berg, who are on our two working groups. I am not going to say very much about Working Group 3 or the International situation mainly because of shortage of time.

It was indeed a pleasure to accept this Association's invitation to open the discussion on the present revision of the Standard Regulations for the Wiring of Premises. Moreover, it was even more pleasing to read the congratulatory comments made by two of your representatives on the Main Committee for this project, in their reports to this convention, Mr. Loubser (WG3) and Mr. van den Berg (WG4). I hasten to endorse their view that I have done a great deal of work on the project, purely to boost my own ego, but when you get down to brass tacks, it was the contributions and constructive ideas of the WG members that led to what will be known as the Wiring Code (i.e. the new SABS Code of Practice for the Wiring of Premises). Therefore, I in turn, would like to express my appreciation to Mr. Loubser and Mr. van den Berg for the time and trouble they have taken to expedite this work.

We have held just under 100 meetings altogether, for both Working Groups.

WORKING GROUP 3: IEC

In opening the discusion on the revision of the Wiring Regulations, I will not dwell on the details of WG3's work because you will, I feel, be more interested in the new Wiring Code as such. In any event, Mr. Loubser has dealt with this matter in his report. I need only say that we are tending to follow the IEC in the matter of wiring rules and adopting its concepts wherever possible in this code. Once the IEC rules are completed, we can again review the situation.

THE WIRING CODE

Turning now to the Wiring Code, I propose to give you a broad outline of its basic construction, make some comments on general aspects of the code and then, finally, review some of the changes as compared with the existing Wiring Regulations.

Basic Construction

The basis of the Wiring Code is to lay down the principles cf safety against shock and fire hazards, but also with regard to the proper functioning of an electrical installation.

This, I can hear you saying, is nothing new and I must agree but in this particular context I should explain that I use the word 'principle' in the dictionary meanings of 'primary sense or element' and 'a fundamental truth as a basis for reasoning'.

To illustrate, let me quote an obviously sound fundamental principle: 'Every electrical installation shall be safe'. This one statement is hardly good enough as a wiring code so we begin to elaborate as follcws:

a) Safe from what? Fire and shock.

b) Safe to whom or what? Persons, electrical equipment, buildings, contamination of foodstuffs, etc.

c) What is a safe voltage? To man or child? To the healthy or sick? To the workman in a wet boiler or the office worker? And so on.

These factors must then be taken separately, and in conjunction with others, to begin to arrive at solutions to provide safety under all reasonable circumstances — I say reasonable because it is not practical to distribute energy at zero volts, which would be perfectly safe.

Thus the Wiring Code has been based on a set of fundamental principles drawn up by the IEC and incorporated in our code as an introduction. These principles are, in effect, sound comon sense and several persons have said to me that they are not therefore worth saying. It is surprising, though, how many times I have checked back on these fundamentals when writing more detailed requirements in the code because they are, in fact, the cornerstones of the whole structure of the code.

The use of principles of safety, rather than fully described methods of complying therewith, does however lead to one main and rather disturbing disadvantage — the possibility of various interpretations of any one statement of principle. Although the code does give the means of compliance with the safetey principles in numerous instances, it has not, in other cases, been found practicable to do so. These information gaps, as I shall call them, have to be filled in in another way and I will revert to this subject presently.

On the other hand, statements of principle do have the advantage of flexibility when applied in practice as can be seen from the following examples.

a) **In the case of an installation problem having a number of solutions.** If one intends to clip an unarmoured multicore cable to a factory wall, can this be considered safe practice? In some cases yes; but various persons might suggest the following alternatives: Put a pipe round it; armour it; install it higher; put an extra sheath on it! ensure it is two metres from a water tap; use a bigger cable; use earth leakage protection; bury it; or just don't do it at all. The only practical answer is to apply the principle: "If you must put it there and it could be subject to mechanical damage, protect it accordingly". As I have said, the information gap that remains can be dealt with in another way.

b) **In the case of techniques that may change or may be completely revised.** Let us look at the jointing of steel conduit. It should not be necessary, in wiring rules, to go into details of lock nuts, bush nuts and all the rest, because this is part of a wireman's training. We should therefore limit ourselves to the principle that such joints must be electrically and mechanically sound. I agree that this leaves another information gap which must be filled in in some way.

c) **In the case of the introduction of a completely new product.** If the new product does not resemble any existing product, it must be treated individually on its own merits.

A case in point would be the introduction of wallpaper with its own heating elements built in to it. However, many new products do resemble existing ones; for example a small type of PVC surface-mounted wiring trunking which would fall into the category of what we now call a 'wireway'. Now, if rigid PVC conduit is acceptable for doing the same job, we should look at the principles of safety as they concern the wireway and ask ourselves "Is it as good as the conduit?"

1) Is it of the same material?
2) Does it provide the same degree of (double) insulation for the wiring?
3) Does it afford equivalent mechanical protection?
4) Will it withstand the same environmental conditions e.g. occasional water splashes?
5) As the main difference is the wireway cover, will this be well fixed in position?

And so on.

If all the answers are 'yes', then the wireway can be accepted for the same purposes as the conduit. Here there is no information gap evident, but we have been able to accept the wireway by applying our principles of safety.

Do I hear you say: "But this is all theoretical nonsense. Just tell me how many socket-outlets I can put on a circuit", I must admit that one's first impression of this approach to wiring rules could be just that. But let me reassure you that the Wiring Code does go into considerable detail in many instances so you will not be left entirely in the lurch by the Wiring Code as such.

When WG4 produced the first draft documents based on these ideas, the immediate reaction of several members of the Main Committee was: "But what about the man on the job — the wireman and the inspector". Well, to cut a long story short, it was decided to publish a guidance document to fill in our information gaps and deal with the interpretation problem. For the moment, it is to be called the 'Wiremen's Guide'. Therefore, while the Wiring Code is to be the national set of wiring rules, the parallel publication, the Wiremen's Guide, will fill in the gaps and could well be used as a basis for examinations. Some consideration

has been given to this guide but a great deal of work remains to be done yet. It is, however, visualized that the Guide will be of a descriptive and chatty nature, liberally sprinkled with drawings, diagrams, sketches and possibly photographs, to show the wireman how it is intended that he should achieve compliance with the Wiring Code. This publication can be amended easily and kept up-to-date with descripitions of the newest techniques etc. On the other hand, there should be less need to amend the Wiring Code at frequent intervals because it is based more on principles of safety, which do not change much over the years.

The Main Committee having made this fundamental decision, it was discovered that the IEC intended to proceed along the same lines i.e. draw up a basic set of wiring rules and publish a number of guides. I draw your attention to Mr. Loubser's report on WG3 and point out that Items 7 and 8 constitute guides for DPE and heating equipment respectively, within the framework of TC64's work. Further investigation also revealed that other countries had already established this procedure, which had been working well for many years e.g. the UK, France, Germany. The Main Committee therefore felt that this was the correct approach for the Wiring Code. Please, therefore, bear in mind that certain information gaps will be filled by means of the 'Wiremen's Guide' in due course.

Wiring Code: Changes

General Aspects

It is the intention that the Wiring Code will be approved by the Chief Inspector of Factories, through the Electrical Wiremen and Contractors Act, as a code of good practice for the wiring of premises. It will then be necessary to adhere to this code in all types of electrical installation operating at over 50V and up to 1 000V, excepting, of course, Supply Authorities' and Governmental installations, etc.

The concept of 'approval' by the Supply Authority has been retained in many instances but we are also providing for a separate method of adopting new techniques and equipment, called 'authorized'. This term means authorized by the relevant statutory authority or his duly delegated agent and the agent will be the Wiring Code: Main Committee.

There are not, as yet, very many instances where the term 'authorized' replaces 'approved' but it is anticipated that more use of this authorization will be made over the years.

As examples, it was thought advisable to state that every prefabricated wiring system and all soil heating apparatus should be 'authorized'.

In this context, the definition for specification has been changed to permit the use of equipment complying with a SABS specification **or another authorized standard.** This leaves the way open to authorize a British, German, American or any other standard. It was also thought that in certain unusual cases, a local standard could be drawn up and authorized for specific equipment, to be used under South African conditions.

Specific points and changes

a) **Segregation of emergency circuits.** It is stated that emergency circuits (e.g. for fire services) must not be affected by the failure of other circuits. The means for achieving such segregation of the circuits has not been given but this would be an ideal case for inclusion in the Wireman's Guide.

b) **Socket-outlet circuits**

1) The number of soket-outlets on one circuit is not limited but due regard must be taken of the utilization of the building, the convenience of the user and whether or not separate heating or air-conditioning is provided.

   However, in domestic installations the number of rooms to be served by one socket-outlet circuit is limited and related to the rating of the circuit protection. These ratios are caluclated on the assumption that heating/cooling appliances of large current consumption may be plugged-in but that all other loads will be of low wattage.

2) If a socket-outlet is protected by a device rated at more than 20A, then the socket-outlets must have individual protective devices mounted adjacent to them. You must all be aware of the circuit-breaker/socket-outlet combination unit which is on the local market but fused socket-outlets are not precluded as long as there is satisfactory protection against shock.

3) The protection on a socket-outlet circuit is no longer restricted to 30A and can be as much as 50A rating. In fact, it could be even greater in an industrial installation. In such cases, of course, the previous requirement calling for protected socket-outlets would apply.

4) From the preceding remarks it can be seen that a good deal more flexibility in the design of socket-outlet circuits has been provided for all types of electrical installation. Nevertheless, it may be thought that the increased use of protected socket-outlets will lead to higher costs but it must be remembered that a higher degree of safety will be achieved. In addition, the material costs are only a small proportion of the overall costs.

   Would it really be so much more expensive to provide more circuits, for instance in a domestic house, and protect them at 20A?

c) **Mixed loading of circuits**

1) One final circuit may supply 16A socket-outlets and lighting points, provided close overcurrent protection rated at not more than 20A is used. No restriction on number of points.

2) One final circuit may suply 16A socket-outlets and fixed appliances provided close overcurrent protection is used. If this protection exceeds 20A rating, each appliance must have its own protection on the same lines as the socket-outlets. In domestic installations, the appliances shall be heaters/air-conditioners only, and the circuit shall be treated as a normal socket-outlet circuit (as in 3.2.3(a). Number of points is otherwise unlimited.

3) Fixed appliances may be wired on to lighting circuits having close overcurrent protection not exceeding 20A, provided each appliance is rated at 100W or less, with a total appliance load of 500W. Number of points unlimited.

It can be seen that a considerable amount of flexibility is now available in the design of these circuits. Although the number of points is not limited, the protection rules do not allow overloading of the conductors.

d) **Current-carrying capacity of conductors** (CCC). Old Reg. 310 required the area of conductors to be maintained to the end of a circuit. This is, of course, incorrect because all types of cable do not have the same CCC for the same size of conductor. The code now requires the CCC of the conductors to be maintained to the end of a circuit but exceptions are permitted as follows: Provided all the conductors are protected against overcurrent (i.e. overload and short-circuit) it is permitted to

1) reduce the CCC at one or more points along a circuit, or
2) tee-in one or more spurs, with conductors of reduced CCC, to a circuit, or
3) split a circuit ,at one point, into two or more branches with conductors of reduced CCC.

These rules allow for flexibility in design, but must be read in conjunction with the rules on protection where, for instance, protection against overload may, under certain circumstances, be placed at the load end of the circuit. This brings me to the next change which is:

e) **Overload Protection.** The code still maintains the basic rule that an overload protection device should be placed at the point where there is a reduction in the current-carrying capacity of a conductor. But there are now certain exceptions stated when

1) the device can be moved away from the point mentioned and placed nearer the load, and
2) the device can be omitted altogether.

f) **Short-circuit protection.** In the same way as for overload devices, a short-circuit device is normally placed at the point where a reduction in the rated CCC of a conductor occurs but in this case any alternative arrangement must be 'approved'. This means that the Supplier may agree to omitting the short-circuit protection, for the sake of argument, in the case of a tee-off from rising mains. This is commcnly done in practice.

g) **Earth continuity conductors.** In the wiring Code you will find a table from which you can determine the earth continuity conductor sizes for circuits, depending on the rating of the circuit protection and the length of the circuits. This has been developed from extensive calculations and discussions and should be used instead of the rule of thumb method given in Old Reg. 1305 (E) — half the rated area of the live conductors, with a minimum and maximum. It was found that we commonly use conductors much larger than necessary, at present, and that 70mm^2 is inadequate for heavy faults at the top end of the scale. You will find that the table only covers protective devices of up to 315A rating.

The code also permits the teeing-in of ECC's provided that thc rated area of the ECC at any point is not reduced between that point and the point of connection (or main earth terminal).

h) **Special earthing arrangements.** Another section states that wireways shall not be used as earth continuity conductors unless acceptable to the Supplier. However, in this subsection, wireways shall not be used for circuits supplying the following equipment, in which cases a separate earth continuity conductor must be used:

1) Distribution boards
2) Socekt-outlets provided with an earthing contact
3) Apparatus in bathrooms
4) Appliances exposed to the weather or water, etc.
5) Appliances associated with water, such as cookers, water heaters, washing and dishwashing machines and garbage disposal machines.

i) **Joints in cables and conductors.** It was felt that old Reg. 311 should not appear in this code, because it goes into extreme detail and in any case new methods of jointing often occur. This information would be much better placed in the Wiremen's Guide as I mentioned when discussing joints in conduit. We can then, again, state that cable joints must be electrically and mechanically sound.

k) **Wireway systems — capacity of conduits.** A new concept has been introduced to overcome the problem of calculating how many single-core cables can be drawn into a conduit when they are of different sizes. Each cable size is allocated a constant 'C' (based on its overall area) and each conduit size is allocated a factor 'K' (based on its internal area).

The total sum of all the constants 'C' for the cables to be drawn into a conduit must not exceed the value of factor 'K' for that conduit.

This overcomes the present problem of drawing cables of different sizes into a conduit and the normal table of conduit capacities covers the drawing-in of cables all of one size.

m) **Flexible conduit.** Because of the existence of various types of non-metallic and metal flexible conduits, also combinations of plastic and metal, a number of general rules or principles have been laid down for these. I will not go into details unless anyone expresses interest in this matter:

n) **Bathrooms.** The following definitions were accepted by the Main Committee:

Bathroom. That volume of a room containing a bath or shower that extends horizontally 2,5m outwards from the cutside of the bath or the shower cubicle and extends vertically from floor level up to 2,5m above the floor.

Protective volume (of a bathroom). That volume that extends horizontally 1,0m outwards from the outside of a bath or a shower cubicle and extends vertically from floor level up to 2,5m above the bottom of the inside of the bath or the shower basin or above the floor if the bath or the shower basin is lower than the floor.

Contained volume (of a bathroom). The volume within the lower and upper limits of the protective volume and limited horizontally by the outside dimensions of the bath or the shower cubicle.

The concepts are that the most dangerous volume is the contained volume, e.g. for a person in a bath or shower, as far as accessibility of electrical equipment is concerned, and the possibility of splashing water. The next most dangerous volume is where persons could reach while in a bath or shower. And lastly, the least hazardous volume is where a person could simultaneously touch the bath and electrical equipment i.e. 2,5m apart.

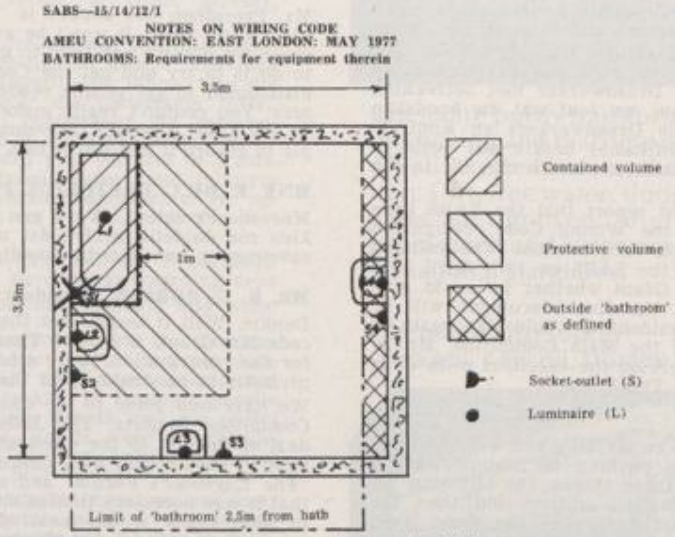
Depending on the type of equipment and its location in a bathroom, specific protective measures are laid down in this subsection. Here again, we have laid down the principles of protection with the idea that when a new piece of equipment arrives on the scene and is to be installed within a bathroom, the various principles can be applied to see whether it can be used and, if so, in which part of the bathroom (with all the gadgets appearing these days, we might even be able to make a decision on a luminaire with a built-in fan and heater plus a telephone extension and a TV screen with the control console mounted over the bath). Nevertheless, these new concepts have caused some difficulty in understanding the requirements so we will probably provide a sketch of some kind to illustrate the intentions of our rules.

p) **Inspection and testing.** The contractor is required to have a registered wireman inspect and test his own installations and thereafter he must ensure that he complies with any requirements of the Electrical Wiremen and Contractors Act in respect of inspection, testing and approval of the installation by the Supplier. I should mention here that the Act is being amended but as the new wording has not yet been circulated for coment I must leave any discussion to the Chief Inspector of Factories.

CONCLUSION

It was my intention to give you a rough idea or an overall picture of the Wiring Code and I sincerely hope that I have done this. There are many rules which have not been mentioned and there may be questions on these or on the matters which have been briefly discussed. Subject to the permission of the Chairman, I will be glad to answer any such questions to the best of my ability.

Thank you for your attention and, once again, thank you for the opportunity to address you on a subject that is of interest to all Supply Authorities and is so vital to the safety of all consumers of electricity.



EXAMPLES

In Contained Volume

L1 — Permitted provided ceiling-mounted, enclosed in insulating material and if ELP or safety transformer used

S1 — Prohibited (all socket-outlets)

In Protective Volume

L2 — As for L1

S2 — Shaver units permitted

In remainder of bathroom

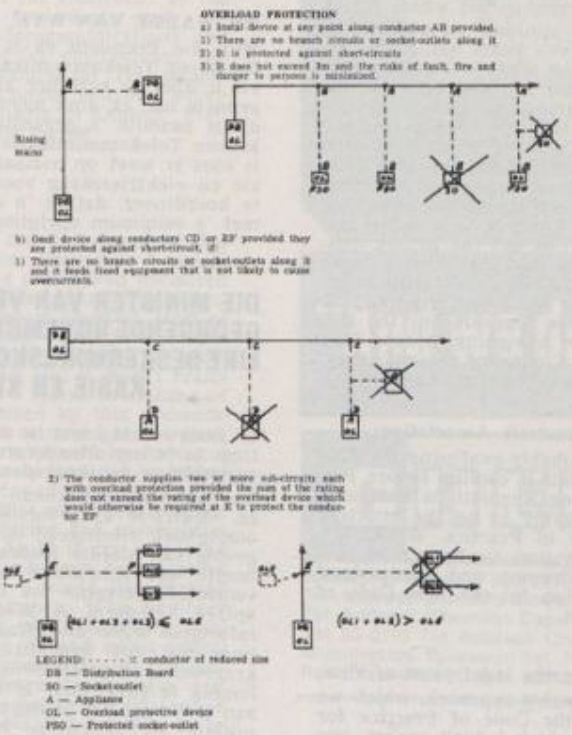
L3 — Permitted provided it is enclosed in insulating material. Alternatively, if metallic and > 2,25m above the floor, ELP must be used

S3 — Shaver units permitted

Outside 'bathroom'

L4 — Normal rules apply

S4 — Any socket-outlet permitted: Normal rules



MR. K. G. ROBSON, President:

Thank you very much Mr. Grant. Well, the invitation has been extended to you to ask any questions you would like to.

MNR. A. J. VAN DEN BERG, Krugersdorp:

Mnr. die President, in die Afrikaanse vertaling van die verslag word in die opskrif verwys na Werkgroep 3 in plaas van Werkgroep 4, soos dit egter moet lees om nie verwarring te skep nie. U sal dit opmerk en ek dink ons moet dit net regstel. Die Nasionale Bedradingskode soos beoog in die finale uitgawe behoort 'n groot aanwins te wees. Met die samestelling daarvan was dit egter nodig om na die vereistes van die Fabriekswet en die Wet op Elektriese Draadwerkers en Kontrakteurs te kyk en met die hulp van mnr. Weich ons Hooffabrieksinspekteur sal sekere knelpunte wat in die verlede ontstaan het nou opgelos word. Daar moet egter gewaak word om die Bedradingskode soos dit sal verskyn en gebruik gaan word ook aanvaarbaar te maak vir die Kontrakteur en Draadwerker met betrekking tot verstaanbare taalgebruik en een fout wat die boodskap reg sal oordra aangesien baie Draadwerkers en Kontrakteurs nie altyd oor die kwalifikasies beskik wat hulle in staat sal stel om die kode maklik te vertolk nie. Dit is een van my groot bekommernisse.

Further, Mr. President, I must report that the SABS have issued a complete draft of the Wiring Code, designated Wiring Code Committee Draft, for comment. The collated comments were forwarded to the SABS on 15th April 1977 and I would like to ask Mr. Grant whether he could give us some indication of when the final document will be ready. In conclusion, Mr. President, I would like again to congratulate the Chairman of the Main Committee, Mr. A. A. Middlecote, and his members on the excellent work done to establish a National Code. Thank you.

MR. J. V. GRANT, SABS

I think the question was Mr. President "When will the Code be ready"? Mr. Middlecote is pushing me strongly, but I honestly can't say. We have three stages, the technical review, the straightforward English editing and then the translation into Afrikaans and editing at the same time. The technical review is finished and I am at present going through this with them. Once that is done we then have to go through to the editors. This takes normally three to four months. We are dealing with the editorial comments right now, but they are technical comments and won't delay matters much because it is only an odd amendment here and there.

MR. A. A. MIDDLECOTE, SABS:

I would like to give you a little background of how important Wiring Regulations are becoming in the whole world. When TC64 came up with a simple approach, it was for the developing countries. It's taken seven years but it has advanced quite a lot in that time, but what is significant is that the developing countries do use this and they use the results of all the European countries who are seeking a common market agreement — in fact it's been a common market fight to get agreement. There is a State Official from Indonesia, who has been attending for the last three years, and who informs me that they issue even the temporary documents controlling the wiring of premises, but what is more important from your point of view is the fact that France already uses a lot of TC64 and the British delegation wrote to me recently to state that they have a crash programme and they hope to have new British Wiring Regulations based on TC64 by March or April next year and also that they are having a Conference sponsored by the IEC London in September at which they are going to have Contractors, Wiremen and Consulting Engineers present to explain how they wish these new sets of regulations to be applied.

MR. D. KNEALE, Electrical Contractor's Association:

Mr. President, one point that is probably confusing the Contractors is that we believe a new bill is coming before Parliament called the National Building Regulations Standards Bill and we believe that this is going to be the enacting legislation for enforcing the Code of Practice. Would Mr. Grant throw some light on this, because we have been told here today that the Electrical Wiremen and Contractors' Act will then be enacting legislation for the new Code of Practice. Thank you Mr. President.

MR. J. V. GRANT, SABS:

I can give the answer quickly from the legal point of view. I think the point is that if Mr. Weich's approach, which we like, goes through, it will cover the Code of Practice for Wiring. If there is any difficulty, which I don't expect, one could fall back on the Building Regulations, but this is not intended. We prefer to work along with Mr. Weich. Thank you.

MR. D. H. FRASER, Durban:

Mr. President may I enquire whether it is anticipated that the Wiremen's format or the document that will interpret the principles will be available at the time the code is published, because I think it is important that the people who are going to have to see that the principles are complied with, the wiring inspectors, are going to have some difficulty in getting a common assessment of what is required. Also the availability of the Wiremen's Guide is important.

MR. J. V. GRANT, SABS:

Mr. President, the answer is "No", but I think I'd better say a little more. It won't be available at the same time because we haven't had time to get down to it. What we want to do is to try and get the Code of Practice published and distributed to get people reading it and accustomed to the idea. You couldn't really make it mandatory a month later in any case. It would take some considerable time for people to absorb it and put it into practice all over the country.

MNR. E. DE C. PRETORIUS, Potchefstroom:

Mnr. die President, ek wil een saak net regstel. Dit het miskien nie duidelik geblyk dat mnr. Attie van den Berg die sameroeper van hierdie komitee is nie.

MR. K. G. ROBSON, President:

Dankie. Well it seems that the next step is to produce the code Mr. Grant, is it not? Thank you very much Mr. Grant for the contribution being made by the SABS and you are probably in no doubt at all that it is being eagerly awaited. We have now come to the end of two long sessions on the Committee Reports. The Executive Council gave a good deal of thought to the question of whether or not this Convention should deal with Committee Reports under the title "The Engineer's Forum" and obviously they wisely decided that it was necessary that as much time as possible be given to what really is the meat of the Association's work between Conventions and Technical Meetings. It is an impressive range of work that has been covered by these Committees and on your behalf I would like to extend our sincere thanks and our congratulations to the convenors and the members of the Committees. I think we should record our appreciation to their Councils for making it possible for them to serve, together with the Bureau of Standards and many other bodies, on this important aspect of this specialised field of electrical engineering — the electricity supply industry.

MR. NAUDE VAN WYK, WNNR:

Mnr. die President ek is gevra deur Brigadier Botha, die Direkteur Telekommunikasies van die SAV om miskien net vir u weer te herinner aan die organisasie wat u nou net genoem het, ek dink meeste van die lede is bewus daarvan, dit is naamlik 'n organisasie van die naam Die Suid-Afrikaanse Telekommunikasie en Krag Voorsieningstak en die is soos jy weet op n finale vlak gestig om telekommunikasie en elektriesekrag voorsiening behoeftes op so 'n wyse te koordineer, dat in 'n nood situasie lewensaaklike diens met 'n minimum oprigting herstel kan word.

DIE MINISTER VAN VERDEDIGING SE VERKLARING GEDURENDE NOVEMBER 1976 TYDENS 'N BURGER-LIKE BESKERMINGSKONGRES OOR TELEKOMMUNIKASIE EN KRAGVOORSIENINGS

In samewerking met 'n aantal ander departmente en inrigtings is 'n omvattende studie oor die die koördinering van verbindings en kragvoorsiening in noodtoestande voltooi. Die verantwoordelikhede ten opsigte van telekommunikasie en elektriese kragvoorsiening soos dit tans in die Staatsoorlogboek uiteengesit is, is ontoereikend en verouderd. As gevolg van hierdie toedrag van sake, en die dringende behoefte aan behoorlike koördinering van fasiliteite in die voormelde terreine om in gebeurlikhede effektief te kan optree, het die S. A. Weermag die inisiatief geneem en op informele wyse met Staadsdepartemente en ander instellings wat oor wesenlike telekommunikasie en elektriese kragvoorsieningsvermoëns beskik, oorleg gepleeg om 'n oplossing te vind. Daar is vervolgens gesamentlik besluit om aan te beveel dat 'n liggaam ,te wete die S. A. Telekommunikasie en Elektriese Kragvoorsieningsgesag (SATEKG) gestig word.

Omdat die SATEKG 'n groot liggaam is, het dit 'n dagbestuur goedgekeur wat die dag-tot-dag aktiwiteite moet hanteer. Die dagbestuur bestaan uit senior verteenwoordigers van die S.A. Weermag, S.A. Polisie, Departemente Pos- en Telekommunikasiewese en Vervoer, S.A. Spoorweë en Hawens, SAUK, EVKOM, KRYGKOR en WNNR. Alle verteenwoordigers op SATEKG het, na oorleg met die hoofde van hulle onderskeie instellings, saamgestem dat die liggaam deur die S.A. Weermag geakkommodeer en geadministreer moet word.

Die Minister van Verdediging het intussen amptelike goedkeuring verleen en daarom het die voormelde liggaam vanweë die dringende behoefte en die enorme omvang van die taak, reeds onder leiding van die S.A. Weermag begin funksioneer. Noemenswaardige vordering is reeds gemaak, naamlik:

(a) Verantwoordelikhede en optredes wat van die owerheid- en privaatsektor, individue en groepe individue verwag word, is hierin uiteengesit. Die inhoud van die handboek is in beginsel deur die onderskeie instellings aanvaar, en is finaal goedgekeur vir verspreiding deur die instellings wat op die dagbestuur verteenwoordig is. Die handboek word tans verpsrei in Staatsdepartmente, provinsiale administrasies (met inbegrip van Suidwes-Afrika) en Leërkommandemente vir optredes wat daarin vervat is en wat op hulle van toepassing is.

(b) Die finale konsep sal in oorleg met die Department van Justisie gereed gemaak word vir aanvaarding deur SATEKG en verdere prosessering wat nodig mag wees.

(c) Hulle is tans besig om te organiseer om die toekomstige werklading te hanteer. Hier sal tot 'n groot mate gesteun word op Burgermag- en Kommandolede wat oor die nodige kundigheid beskik. In sommige gevalle is reeds aansienlike vordering gemaak met die opstel van telekommunikasieplanne. Voorts word kommandemente besoek deur senior lede van Leërhoofkwartier en hierdie hoofkwartier om hulp te verleen.

(d) Lede van die dagbestuur vergader minstens een keer elke twee maande en vordering te monitor en te koördineer, en waar moontlik, knelpunte uit die weg te ruim.

Indien enige van die publikasies verlang word, kan aanvraag gedoen word by:

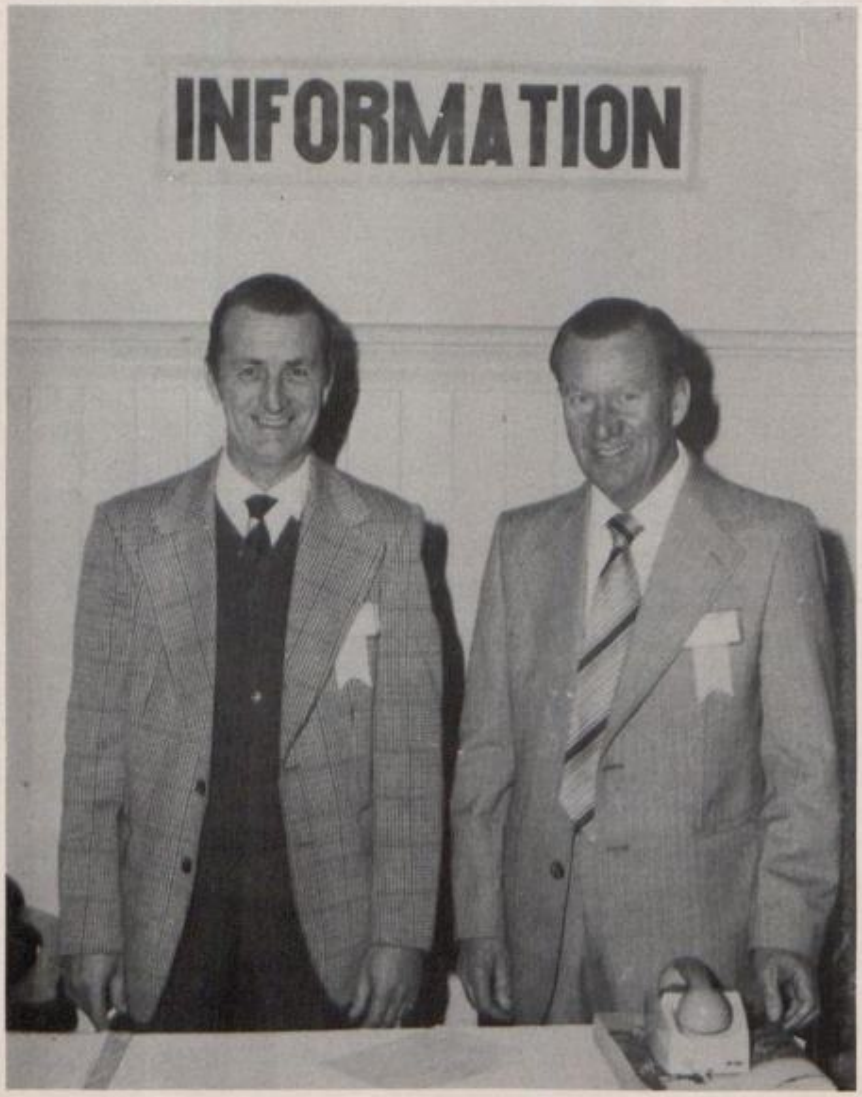
Die Kontroleur, SATEKG, Direkteur Telekommunikasies, SAW, Verdedingshoofkwartier, Potgieterstraat, Pretoria 0002.

Mr. President I would like to draw the attention to the formation of the S.A. Telecommunications and Electrical Power Supply Authority and that they have produced a few publications which are available from the Controller at the Defence Headquarters in Pretoria. One deals with the Planning and Activating Standby Telecommunications and Electrical Power Cupply for facilities for emergencies, the other one is Continengcy Planning Manual for Telecommunication and Electrical Power Provisioning and one which as far as I know probably is also available in English "Staf-vereistes vir Radio en Alarmstel in 66 tot 68.

MR. K. G. ROBSON, President:

We now come to the presentation of the first paper of this 45th Convention and, as an Electrical Engineer, I would like to say to you, Dr. Olivier, that we are indeed honoured by the presence here, as the reader of a paper, of so distinguished a South African Civil Engineer as yourself. Most of us have known of Dr. Olivier for many years as not only an outstanding son of South Africa, but probably the most outstanding personage from Sutherland. But it wasn't really until I read his book "Dammit" that I learnt something of the man himself and I was so impressed by this presentation of a man's life and work that it occurred to me that, as electrical engineers, we could do very well by having a civil engineer who has been so intimately involved in hydro-electric planning and development to address us at this Convention. It is particularly timely that we should put our minds to some of these exciting problems and possibilities that face this country and I have no doubt in my own mind that Dr. Olivier is probably the man who can best present some of these ideas and possibilities. I would like to read one extract that struck me in his book, viz.: "The Engineer of the future has a prime role to play regarding vital standards of living. No longer can he sit and await orders from above and then execute them irrespective of the consequences. The top engineer must learn to conceive projects and possibilities and to guide the politicians, statesmen and financiers concerning the full potential benefits to be derived from viable projects."

The City Hall of East London with 450 delegates at the 45th Convention



Mr. Jimmy Robb and Mr. Reg Walsh were on duty at the Convention information desk.

Die benadering van Ingenieurswese tot Interafhanklikheid in Suider Afrika

deur

HENRY OLIVIER

C.M.G., Pr.Ing., M.Sc.(Ing.), Ph.D.Ing., Dr.Ing., FICE, GSAISI., F.ASCE., FRSA(G.B.)

Sedert die Tweede Wêreldoorlog het ons groot omwentelinge in wêreldsake en -betrekkinge beleef.

Eers het ons gesien hoe die era van Politieke Diplomasie ten einde loop. Die wêreldkaart, wat so lank oorheersend rooi gekleurd was, het vinnig van kleur verander namate Brittanje kolonie na kolonie prysgegee het in alle dele van die wêreld. Die era van die Britse Ryk het geëindig. Onafhanklike volke en nuwe plekname het te voorskyn gekom.

Dit is gevolg deur 'n era van Ekonomiese Diplomasie. Die klem het geval op ekonomiese bande en betrekkinge en op heropbou en ontwikkeling. Vir hierdie doel is groot internasionale bankinstellings gestig, soos die Internasionale Bank vir Heropbou en Ontwikkeling (Wêreldbank) en die Internasionale Monetêre Fonds.

Namate die klem op heropbou verswak en net ontwikkeling oorgebly het, het probleme egter opgeduik vanweë die al wyer gaping tussen die „vermoënde" en die „nie-vermoënde" volke, die rykes en die armes, die Weste en die Derde Wêreld.

Gevolglik is daar gedurende die afgelope dekade of wat, 'n nuwe era ingelui: Tegniese Diplomasie. Tegniese bystand in plaas van bydraes en geskenke. Dit het duidelik geword dat 'n toevloei van geld vanaf die positiewe na die negatiewe volke selde die einddoel daarvan verwesenlik het, om die eenvoudige rede dat die fondse slegs by uitsondering die behoeftiges, oftewel die gewone mense bereik het.

In teenstelling, is die toevloei van tegniese kundigheid vanaf die Weste na die behoeftige volke 'n heeltemal ander saak: Dit lei tot die uitvoering van sigbare en betekenisvolle projekte en die verhoging van standaarde, en dit help hierdie volke om hulleself te help — wat, terloops, ook die beleid of die sienswyse van die Suid-Afrikaanse Regering is.

Na die verdeling van die Indiese subkontinent in 1947 en die totstandbrenging van Indië en Pakistan, kon nòg politieke nòg ekonomiese druk daarin slaag om die toenemende spanning te verlig wat tussen hierdie twee lande ontstaan het as gevolg van verskille oor die verdeling van die water van die ontsaglike Indusrivierbekken. Uiteindelik het 'n onverklaarde oorlog uitgebreek.

DR. H. OLIVIER was born in Sutherland, Cape Province, on the 25th January, 1914, and matriculated at Umtali High School 1932. Graduated B.Sc.(Hons.) in civil engineering, December, 1936, at the University of Cape Town; graduated M.Sc. in Engineering, Cape Town University, 1948: Thesis: "Notes on Steam-electric Power Engineering with Special Reference to the Civil Engineer"; graduated Ph.D. in Engineering, University College, University of London, 1953: Thesis: "New Aids to Planning — Engineering Developments of Hydro-potential in Relation to Climate"; received the first Doctorate of Engineering awarded by the University of the Witwatersrand in December, 1967 (Multi-purpose Water Resources Development with Special Reference to Irrigation); awarded Doctorate of Science (Honoris Causa) by the University of Cape Town during the Jubilee Celebrations in August, 1968; awarded Doctorate of Science (Honoris Causa) by the University of Rhodesia on the occasion of the Inauguration of their Civil Engineering Faculty Buildings on 10th December, 1975.

He is the Senior Partner of Henry Olivier and Associates: Specialist Civil Engineering Advisers and Managers to the South African Government in the field of Water and Power and a Member of the Council of the South African Institution of Civil Engineers; Member of the Executive of the South African National Committee on Large Dams; South African representative on the International Committee on the Hydraulics of Dams (ICOLD); and a Member of the Executive Committee of the South African British Trade Association (SABRITA).

Engineering for Interdependence in Southern Africa

by

HENRY OLIVIER

C.M.G., Pr.Eng., M.Sc.(Eng.), Ph.D.(Eng.), D.Eng., FICE, F.SAICE., F.ASCE., FRSA(G.B.)

Since World War II we have experienced great evulsions in world affairs and relationships..

First we saw the era of Political Diplomacy phased out. The world map, which has been coloured predominantly red for so long, changed colours rapidly as Britain relinquished colony after colony in all parts of the world. The era of Empire had ended. Independent nations and new place names emerged.

This was followed by an era of Economic Diplomacy. The emphasis was on economic ties and relationships and on reconstruction and development. To this end major international banking institutions were created such as the International Bank for Reconstruction and Development (World Bank) and the International Monetary Fund.

However, as the emphasis on reconstruction faded and only development remains, there emerged problems due to the widening gap between the "Have" and the "Have not" nations, the rich and the poor, the West and the Third World.

Thus, during the past decade or so, a new era was ushered in: Technical Diplomacy. Technical support rather than grants and gifts. It became clear that a flow of money from the positive to the negative nations rarely succeeded in its ultimate objectives for the simple reason that the funds seldom reached down to the needy grass roots, i.e. the ordinary people.

In contradistinction a flow of technical know-how from the West to the needy nations is a very different story: it results in the accomplishment of visible and meaningful projects, the uplift of standards and helps these nations to help themselves — which, incidentally, is also the policy, or philosophy, of the South African Government.

After partitioning of the Indian sub-continent in 1947 and the creation of India and Pakistan neither political nor economic pressure could achieve anything as regards reducing growing tensions between these two countries on account of disputes about the sharing of the waters of the vast Indus river basin — eventually undeclared war broke out.

DR. H. OLIVIER

Uit wanhoop is 'n oplossing in ingenieurswese gesoek en gevind onder die beskerming van die Wêreldbank. Die oplossing is ses jaar (1954-1960) bestudeer en is vervat in die Indus-waterverdrag van 1960 wat deur Indië en Pakistan onderteken is. Die wêreld se grootste enkele ingenieursprojek is van stapel gestuur teen 'n koste van $1 200 miljoen wat hoofsaaklik in die vorm van gratis toekennings deur ses lande (die „vriendelike" lande genoem) bygedra is.

Die ingenieursoplossing was om water van die drie oostelike takriviere na die Indus te lei oor die gebied van Pakistan, ten einde hulle in die weste te vergoed vir die verlies van die drie westelike riviere wat aan Indië toegeken is. Dit het die bou van massiewe damme soos Mangla in die Jhelum- en Tarbela in die Indusrivier beteken, benewens sewe studamme oor die Industakriviere en 'n netwerk tussenrivier-verbindingskanale van 1 100 km wat ontwerp is om 'n voldoende hoeveelheid water oor te plaas vir die besproeiing van 'n gebied so groot as die hele gebied onder standhoudende besproeiing in Egipte, en om as 'n neweproduk hidro-elektriese energie te ontwikkel.

Hier was vir die wêreld 'n voorbeeld van hoe tegniese samewerking, wat ook die behoorlike toewysing en administrasie van fondse behels, toestande kan skep vir vreedsame naasbestaan en tot wedersydse voordeel vir al die partye.

Suidelike Afrika, wat naasteby omskryf kan word as alles suid van die ewenaar, is 'n uitgestrekte landmassa met geweldige potensiaal wat om verskeie redes nie behoorlik tot voordeel van die mens benut is nie, behalwe in Rhodesië en die industrieel en tegnologies ontwikkelde kragbron — die Republiek van Suid-Afrika.

Hoe kan ons die ontsaglike probleme en uitdagings aandurf en die ewe groot geleenthede benut wat hier bestaan?

Politiek sal nie juis deug vir die gevoelige jong republieke met verskillende skakerings van politieke verwantskap en opvattings nie.

Ekonomiese indringing sal slegs in 'n beperkte mate slaag, want die vrees vir ekonomiese oorheersing en voogdyskap is oorweldigend by al die ontwikkelende state wat pas onafhanklik geword het.

Tegnologiese samewerking kan en sal werk. Onderlinge afhanklikheid gesmee op die aambeeld van tegniese samewerking bring vir al die partye selfrespek, wedersydse voordele, stygende lewenstandaarde en vreedsame, gelukkige naasbestaan mee.

Ek is nie bevoeg om alle aspekte van tegnologie of selfs alle sfere van die ingenieurswese te behandel nie en sal my derhalwe beperk tot my eie studierigting — water- en kragingenieurswese.

Water is die bron van lewe. Dit is die katalisator vir alle ontwikkelings: industrieel en landboukundig. Dit is die oorvloedigste maar ook die skaarsste materiaal op aarde. Ongeveer 'n helfte van die reën wat op die aarde val, keer terug na die atmosfeer as gevolg van verdamping en transpirasie en kan derhalwe nie benut word om in die mens se behoeftes te voorsien nie, altans nie dadelik nie. Van die oorblywende water op die aarde, word 97 persent in sout oseane aangetref, is 2 persent opgesluit in ysgletsers en is slegs 1 persent vars water. Slegs 'n klein gedeelte van die vars water is bo-op die grondvlak sigbaar. Die grootste gedeelte vloei ondergronds of word daar opgegaar.

Volgens huidige beramings, sal die wêreldbevolking dubbeld meer wees teen die jaar 2000. Om die mens se bedrywighede slegs teen die huidige tempo te handhaaf, sal drie kubieke meter water nodig wees tenoor elke twee kubieke meter wat vandag vereis word.

Terwyl die vinnig dalende hoeveelheid water wat per persoon beskikbaar is, ernstige kommer wek, besorg die verswakkende gehalte van die beskikbare voorraad weens besoedeling, ook hulpbronbeplanners groot hoofbrekens.

Water is bowenal die grondslag van energie. Energie is nie bloot die getal kilowatt-uur wat jaarliks per hoof verbruik word nie — dit is ook die maatstaf van 'n volk se gesondheid en produktiwiteit: die kalorieë of kilojoules per hoof per jaar.

Alle beskaafde vooruitgang word op energie gebaseer. Die mees geïndustrialiseerde of beskaafde volke het derhalwe die hoogste verbruik van kilowatt-uur per hoof in 'n jaar. Hulle het ook die hoogste voedingstandaarde in kalorieë (kilojoules) per hoof per jaar. Nasionale produktiwiteit is 'n regstreekse maatstaf van nasionale fiksheid.

Die strawwe droogtes wat onlangs in die noordwestelike gebiede van Afrika en in Ethiopië ondervind is, het die wêreld se aandag gevestig op hierdie hele kwessie van voedingstandaarde en die politieke en ander gevolge wat uit die verontagsaming van hierdie aspek van energie kan voortspruit.

'n Mens moet bietjie terugstaan en die toneel uit 'n inge-

In desperation an engineering solution was sought and found under the auspices of the World Bank. The solution was studied for six years (1954-1960) and was enshrined in the Indus Waters Treaty of 1960 signed between India and Pakistan. The world's biggest single water engineering project was launched at a cost of $1 200 million contributed mainly in the form of free grants from six countries (called the "friendly" countries).

The engineering solution was to transfer the waters of the three eastern tributaries to the Indus across Pakistan to compensate her in the west for the loss of the three Western rivers which were allocated to India. This meant the construction of massive dams such as Mangla on the Jhelum and Tarbela on the Indus rivers, seven barrages across the Indus tributaries, and a 1 100-kilometre network of interriver link canals designed to transfer a volume of water sufficient to irrigate an area equal to the whole area under perennial irrigation in Egypt and, as a by-product, the generation of hydro-electric energy.

Here was an example to the world as to how technical cooperation, which involves the proper allocation and administration of funds, can force conditions for peaceful co-existence and mutual benefits to all parties.

Southern Africa, which may be loosely defined as everything south of the equator, is a vast land mass with immense potential which, for various reasons, has not been exploited properly for the benefit of man except in Rhodesia and in the industrial and technologically endowed powerhouse — the Republic of South Africa.

How do we address ourselves to the massive problems, challenges, and equally massive opportunities which exist here?

Politics will not work easily with sensitive young Republics with varying hues of political affiliations and outlook.

Economic penetration will work only to a limited extent as the fear of economic domination and paternalism is uppermost in the minds of all the newly independent developing states.

Technological co-operation can and will work. Interdependence forged on the anvil of technical co-operation leaves all parties with self-respect, mutual benefits, rising standards of living and peaceful and happy co-existence.

I am not qualified to cover all aspects of technology or even all spheres of engineering disciplines and will therefore confine myself to my own discipline — Water and Power Engineering.

Water is the elixir of life. It is the catalyst for all development: industrial and agricultural. It is the most abundant and the most scarce material on earth. About one half of all precipitation which falls on the earth is returned to the atmosphere by evaporation and transpiration and is thus lost, at least immediately, to man's needs. Of the remaining water on earth approximately 97 per cent is found in the salt oceans, 2 per cent is locked in the form of ice glaciers and only 1 per cent is fresh water. Of the fresh water only a fraction is exposed on the surface and the larger proportion flows or is stored underground.

At current projections the world population will double by the year 2000. In order merely to maintain human activity at its present pace three cubic metres of water will be needed for every two cubic metres required today.

While the rapidly decreasing amount of water available per person is a serious cause for concern the diminishing quality of the available supply due to pollution also gives resource planners cause for concern.

Water is above all the basis of energy. Energy is not just the amount of kilowatt-hours consumed per head per annum — it is also the yardstick of a nation's health and productivity: the calories of kilo-joules per head per annum.

All civilised progress is based on energy. Thus the most highly industrialised or civilised nations have the highest consumption of kilowatt-hours per head of population a year. They also have the highest nutritional standards in calories (kilo-joules) per head per annum. National productivity is a direct measure of national fitness.

The recent terrible droughts experienced in the north-western areas of Africa and in Ethiopia have focussed international attention on this whole question of nutritional standards and the political and other consequences which can flow from neglecting this aspect of energy.

One has to stand back then and survey the scene, from an

nieurswese-ekonomiese oogpunt betrag en eers na Suid-Afrika kyk en miskien later ook na Afrika.

Water en energie is die sleutels. Water is die sleutel tot voedselproduksie ten einde 'n land voortdurend van energie te voorsien; dit word benodig om die installasies van die reusagtige hitteontwikkelingstelle vir elektriese energie af te koel in dit kan op sigself elektriese energie ontwikkel as die water van 'n opvanggebied agter 'n groot dam soos Kariba of Cabora Bassa opgedam en van die beskikbare hoogte laat val word om die statiese drukhoogte in kinetiese energie te verander, wat op sy beurt in elektriese energie-eenhede verander word. Dit is egter nie nodig om sulke enkele groot skemas aan te pak nie. By die hidroprojekte in Noord-Skotland en in die Sneeuberge (Australië) word krag ontwikkel deur een rivier in 'n ander een te laat vloei, ensovoorts en word dieselfde energie ontwikkel deur van 'n aantal damme, tonnels of kanale en kragstasies gebruik te maak. In hoofsaak is hidroëlektriese energie die hoeveelheid water wat per tydseenheid beskikbaar is, vermenigvuldig met die valhoogte of waterdrukhoogte wat beskikbaar is. 'n Klein rivier met 'n hoë val kan derhalwe dieselfde hoeveelheid krag en energie lewer as 'n groot rivier met 'n klein val. Die ideale toestand is wanneer 'n mens 'n groot rivier met 'n hoë drukhoogte of val het, soos die Zambezi by Kariba en Cabora Bassa. Daar is natuurlik nie veel van hierdie soort terreine oor nie, maar dit beteken nie dat die hidropotensiaal van Suidelike Afrika beperk is nie, veral nie as dit op 'n koöperatiewe streekgrondslag ingespan word nie.

Tot onlangs was die groot afstande van Afrika die eintlike probleem. Dit was nie moontlik om elektriese energie ekonomies oor groot afstande oor te bring nie. In 1960 het Kariba die weg gebaan deur hoëspanningskrag oor afstande van tot 600 km te lei, en in 1976 het Cabora Bassa werklik 'n deurbraak gemaak deur 'n groot hoeveelheid krag oor 'n afstand van 1 400 km te lei na die Apollo-omsetterstasie op Irene naby Pretoria.

Om elektriese energie te versprei, te verruil, te verkoop of te koop, het 'n mens 'n transmissienetwerk nodig. As die landbou 'n oorskot oplewer, kan 'n mens die gewasse wissel of na ander gebiede uitvoer. Op die gebied van elektrisiteit is 'n mens beperk tot die transmissienetwerk wat beskikbaar is of wat teen 'n redelike koste opgerig kan word.

Evkom het stilweg en sonder lofsang hulle hoëspanningtransmissienetwerk van 400 kV oor die hele Republiek uitgebrei, benewens die oprigting van voerlyne vir laer spannings. In 1973 het die nasionale netwerk transmissielyne van 400 kV reeds oor 4 500 km gestrek, en die beplande uitbreiding maak voorsiening vir 8 000 km teen 1978, bo en behalwe die kraglyn van 1 400 km lank wat tans die nasionale netwerk met Cabora Bassa verbind.

Hierdie nasionale netwerk, wat in die hart van 'n nywerheidskompleks met 'n hoë aanvraag na elektriese energie geleë is en wat na die noorde van Suidelike Afrika uitgebrei kan word soos dit tans gedemonstreer word in die geval van Cabora Bassa, sal die hoeksteen van onderlinge energie- en waterafhanklikheid in Suidelike Afrika vorm, tot wedersydse voordeel van al die betrokkenes.

'n Netwerk soos hierdie maak dit moontlik om die elektriese krag wat deur alle beskikbare bronne gelewer word, te absorbeer en te integreer, hetsy dit termiese, kern- of hidroëlektriese bronne is. Verder kan daar in die spitsaanvrae na energie, gegrond op 'n daaglikse of jaarlikse laskenkromme, voorsien word vanaf die mees ekonomiese bron, bereken volgens beskikbaarheid en doeltreffendheid. Die daaglikse laskenkromme wissel gewoonlik van uur tot uur en bereik spitse wat van korte duur maar veel hoër as die gemiddelde vir die dag kan wees. Hierdie spitsstuwings onstaan weens verskeie redes: spitsuurverkeer, skielike koue weer of die gewoontes van verbruikers in 'n bepaalde omgewing. Die jaarlikse laskenkromme toon ook seisoenswisselings met spitstydperke. In die moderne praktyk word reusagtige turbogenerators in termiese kragstasies gebruik, hetsy dit met steenkool of kernkrag werk. Die generators werk teen die mees ekonomiese bedryfskoste wanneer dit 'n feitlik konstante toevoer lewer, d.w.s. basislasenergie lewer. Reserwevermoëns moet derhalwe beskikbaar wees om hierdie skielike, kortstondige opstuwings in die aanvraag te behartig. Die doeltreffendste manier om in hierdie spitsaanvrae te voorsien, is deur hidroëlektriese of gasaangedrewe turbogenerators te gebruik. Hierdie waterturbines kan binne enkele oomblikke in diens of in volle werking gestel word. 'n Hidro-aanleg „verbruik" nie water nie. Nadat die energie van die vallende water in elektriese energie omgesit is deur die turbogenerators, vloei die ontkragte water weer ongehinderd terug na die rivier. Daar is ook geen besoedeling nie.

Evkom, in samewerking met die Departement van Waterwese, het onlangs groot water- en hidroëlektriese projekte in die Tugelabekken van stapel gestuur, soos die Tugela-Vaal-(Drakensberg-) skema waar 'n pompopgaarprojek met 'n geïnstalleerde ontwikkelingsvermoë van 1 000 MW, ingeskakel sal word by die oorplasing van 11 m3/s water uit die

engineering-economic viewpoint, and look first at Southern Africa and may be one day, Africa.

Water and energy are the keys. Water is the key to food production for maintaining national energy; it is required to cool the plant for the mighty thermal generating sets for electrical energy and it can generate electrical energy by itself if the waters of a river catchment are concentrated behind a large dam such as Kariba or Cabora Bassa and dropped through the available height to transform the pressure from static head to kinetic energy which in turn is transformed into units of electrical energy. But it is not necessary to have such single big schemes. In the North of Scotland and Snowy Mountain (Australia) hydro-projects the power is produced by transferring one river to the other and so on and to produce the same energy by using a number of dams, tunnels or canals, and power stations. In essence hydro-electric energy is the quantity of water available per unit of time multiplied by the height of drop, or head, available. Thus a small river with a high fall could produce the same power and energy output as a large river with a small fall. The ideal situation is when you have a large river with a high head or fall such as the Zambezi at Kariba and Cabora Bassa. Of course there are not many such sites left, but this does not mean that the hydro potential of Southern Africa is limited, particularly if harnessed on a regional co-operative basis.

Up to recently the great problem was the vast distances of Africa. Thus it was not possible to transmit electrical energy economically over long distances. In 1960 Kariba showed the way with high voltage transmission distances of up to 600 kilometres and in 1976 Cabora Bassa really broke through with the transmission of a large block of power over a distance of 1 400 kilometres to Apollo converter station at Irene, near Pretoria.

To disseminate, barter, sell or buy electrical energy one needs a transmission network. If there is a glut in agricultural output one can change the crop pattern or export to another region. In the electrical field one is confined to the transmission grid available or which can be constructed at reasonable cost.

Quietly and unsung Escom have expanded their high voltage 400 kV transmission network over the length and breadth of the Republic, in addition to the lower voltage feeders. By 1973 the length of 400 kV national grid transmission lines had reached 4 500 kilometres and the expansion planned budgets for 8 000 kilometres by 1978 apart from the 1 400 kilometres of line which now links the national grid with Cabora Bassa.

It is the existence of this national grid, situated in the heart of an industrial complex with a high demand for electrical energy and which can be extended northwards into Southern Africa, as now demonstrated by the Cabora Bassa example, which will form the cornerstone of energy and water interdependence in Southern Africa — to the mutual benefit of all concerned.

Such a grid makes it possible to absorb and integrate the output of electrical generation from all available sources: thermal, nuclear and hydro-electric. Furthermore the peak demands of energy, whether on a daily or annual load curve, can be met from the most economic source according to availability and efficiency. The daily load curve generally varies hour by hour and reaches peaks which may be of short duration but much higher than the average for the day. Such peak surges arise due to various causes: rush-hour traffic, sudden cold snaps, or the habits of consumers in a given locality. The annual load curve also has seasonal variations with peak periods. In modern practice very large turbo-generators are used in thermal stations whether coal- or nuclear-fired and these operate most economically when run at nearly constant output, i.e. producing base load energy. Spare capacity must therefore be available to meet these sudden short duration surges in demand. The most efficient means of supplying such peak demands is by hydro-electric or gas-driven turbo-generators. These water turbines can be brought into service or on "stream" in a matter of minutes. A hydro-plant does not "consume" water. When the energy of the folling water has been transformed by the turbo-generators into electrical energy the de-energised water returns peacefully to the river. There is also no pollution.

Escom, in collaboration with the Department of Water Affairs, have recently launched big water and hydro-electric projects in the Tugela basin, such as the Tugela-Vaal (Drakensberg) scheme where a pumped storage project with an installed generating capacity of 1 000 Megawatts is to be coupled with the transfer of 11 m3/s of

Tugela na die dorstige Vaalrivierbekken.

Ondersoek word tans ingestel na ander groot hidroëlektriese projekte.

In Suidelike Afrika is die posisie oor die algemeen dat ons, om dit eenvoudig te stel, dink aan die „nat" noorde en die „droë" suide.

Noord van die Republiek is daar die magtige riviere, soos die Zaire (Kongo), Rufiji, Rovuma, Shire, Kunene en die Zambezi.

'n Konserwatiewe beraming van die totale potensiële vermoë van Suidelike Afrika se riviere is 60 000 MW, waarvan ongeveer 8 000 MW in die Republiek, die tuislande en die buurstate ontwikkel kan word. Die totale hidropotensiaal van die Zambezi en sy takriviere is sowat 11 000 MW, of dieselfde as die huidige totale geïnstalleerde vermoë van die Republiek. Verder na die noorde, word die potensiaal van die magtige Zaire op 40 000 MW gereken, of drie-en-dertig keer soveel as die geïnstalleerde vermoë van Kariba.

Indien die hoëspanning-transmissienetwerke wat reeds in die Republiek, Zambië, Rhodesië en Mosambiek bestaan, uitgebrei word om 'n Pan-Afrika-netwerk te vorm wat Zaïre, Malawi en Tanzanië insluit, word die ontwikkeling van al hierdie hidropotensiaal moontlik tot die wedersydse voordeel van almal. Dit kan binne 'n dekade verwesenlik word!

Dit sal nie altyd net Suid-Afrika wees wat elektrisiteit invoer nie. As gevolg van Suid-Afrika se huidige ekonomiese oorheersing van die kontinent is hy op die oomblik die enigste afsetgebied. Met 'n Pan-Afrika-kragtransmissienetwerk sal dit egter moontlik wees om elektrisiteit op die beste benutting- of mees ekonomiese grondslag uit te voer of in te voer. Daar sal bykomende ontwikkeling wees, soos die infrastruktuur om die nodige damme, tonnels en kragstasies te bou. Dit sal in aansienlike mate help om die huidige afgeleë gebiede oop te stel.

Dit is nie al nie. Die Pan-Afrika-netwerk sal dit moontlik maak om die hidro- en termiese potensiaal van al die gebiede in die streek te integreer, wat beteken dat die steenkoolreserwes wat tans onontgin lê in lande soos Botswana, Swaziland, Rhodesië, Zambië, Mosambiek en andere, vir ekonomiese vooruitgang en vir die verdere verstewiging van die streek se landsbegrotings, asook vir die beste benutting van die hele streek se mannekragbronne aangewend kan word.

Wat voedsel betref, is daar geen rede waarom Suidelike Afrika nie die graanskuur van Afrika en van dele van die Derde Wereld kan word nie.

Die ontwikkelende of armer lande bevat meer as twee derdes van die wereld se bevolking, maar hulle produseer minder as 44 persent van die wêreld se voedsel. Betreffende die produksie van plaasdierprodukte, is die balans selfs swakker, want hierdie lande produseer slegs ongeveer 22 persent van die totale hoeveelheid vleis, melk en eiers. Hierdie onewewigtigheid sal boonop vinnig vererger. Terwyl die ontwikkelde lande hulle voedselopbrengs per hoof gehandhaaf en verbeter het, het die ontwikkelende lande 'n skerp daling in die opbrengs per hoof getoon. Dit het reeds laer as die syfers van 1954 gedaal.

Sy Keiserlike Majesteit, die Shahanshah van Iran, het verklaar dat hierdie vraagstuk miskien van groter belang is, d.w.s. 'n groter moontlike, uiteindelike uitwerking op internasionale betrekkinge kan hê, as die olie- en energiekrisis. Die viervoudige styging in oliepryse gedurende die afgelope paar jaar, het natuurlik die koste van meganisasie, kunsmis en landboukundige chemikalieë opgejaag, wat 'n nadelige uitwerking op die landboukundige ontwikkeling in die armer lande gehad het en tot die onewewigtigheid bygedra het.

Honger ken geen grense nie. Die hele vraagstuk verdien die dringende aandag van al die lande wat in staat is om 'n bydrae te lewer tot 'n bestendige voedselvoorraad vir die benoeftige Derde Wêreld.

Die lande wat nog reserwevermoëns vir landboukundige ontwikkeling het, in Suid-Amerika waar slegs 16 persent van die potensiële bewerkbare grond tot dusver benut word, Australië en Nieu-Seeland met meer as 'n derde in reserwe en Rusland met presies 'n derde. Selfs die ouer lande in Europa kan hulle bewerkbare grond met 20 persent uitbrei. Noord-Amerika het 86 persent van sy potensiële bewerkbare landbougrond onder die ploeg gesteek. In hierdie geval heers daar egter ietwat pessimisme of die verwagte graansurplus van 30 miljoen in die V.S.A. teen 1985, genoeg sal wees om te voorsien in meer as een jaar se behoeftes van die armer lande teen die huidige tempo van bevolkingsaanwas.

Die Direkteur van Landbou-ekonomie in die Departement van Landbou van die Verenigde State het die volgende pessimistiese mening uitgespreek in 'n onlangse oorsig van die wêreld se voedselposisie:-

„Op die lang duur, as 'n blik in die een-en-twintigste eeu gewerp word, is daar geen oplossing vir die wêreld se

Tugela water to the thirsty Vaal river basin.

Other big hydro-electric projects are under investigation.

In Southern Africa the position is generally such that, in simplified terms, we think of the "wet" north and the "dry" south.

To the north of the Republic there are the mighty major rivers such as the Zaire (Congo), Rufiji, Rovuma, Shire, Cunene and the Zambezi.

A conservative estimate of the total potential capacity of the Southern African rivers is 60 000 megawatts of which approximately 8 000 megawatts can be installed in the Republic, the Homelands, and in neighbouring territories. The total hydro potential of the Zambezi and its tributaries is of the order of 11 000 megawatts, or the same as the total present installed capacity of the Republic. Further to the north the mighty Zaire (Congo) river is rated at 40 000 megawatts or thirty-three times the installed capacity at Kariba.

If the high voltage transmission grids which already exist in the Republic, Zambia, Rhodesia and Mocambique are extended to form a pan-African grid including Zaire, Malawi and Tanzania the development of all this hydro-potential to the mutual benefit of all, becomes possible. It can be achieved in a decade!

South Africa will not always do the importing of electricity. By virtue of her present economic dominance of the continent she is for the moment the only market. But with a pan-African power transmission grid, it will be possible to export and import electricity on the best use or most economic basis. There will be further by-products, such as the infrastructure requirements to build the necessary dams, tunnels and power stations. This would help materially to open up the presently remote areas.

This is not all. The pan-African grid will make it possible to integrate the hydro and thermal potential of all the territories in the region which means that the coal reserves now lying fallow in countries like Botswana, Swaziland, Rhodesia, Zambia, Mocambique and others could be put to economic use and further bolster the budgets of the region, and make best use of the manpower resources of the whole region.

On the nutritional front there is no reason why Southern Africa should not become the granary for Africa and parts of the Third World.

The developing or poorer countries comprise more than two-thirds of the world's population but they produce less than 44 per cent of the world's food. As regards the production of farm animal products the balance is even more unfavourable because these countries produce only about 22 per cent of the total quantity of meat, milk and eggs. Moreover, the imbalance position will get rapidly worse. Whereas the developed areas have maintained and improved their output of food per head of population, the developing territories have shown a plunging decline in output per head of population which has already dropped to below 1954 figures.

His Imperial Majesty, the Shahanshah of Iran, is on record as saying that this question is perhaps of greater importance, i.e. with greater potential ultimate impact on international relations than the oil and energy crisis.

The quadrupling of oil prices over a few years' span, has of course, forced up the prices of mechanisation, fertilizers and agricultural chemicals, which has affected adversely the agricultural development in the poor countries and is yet another factor in increasing the imbalance.

Hunger knows no boundaries. The whole question deserves urgent attention by all countries that are able to contribute towards a stable food supply to the needy third world.

The countries which still have reserve capacity for agricultural development are South America, where only 16 per cent of potential arable land has so far been used, Australia and New Zealand with more than a third in reserve and Russia with exactly a third. Even the older countries in Europe can extend their arable land by 20%. North America has put 86 per cent of its potential culturable land under the plough. Here, however, there is some pessimism as to whether by 1985 the anticipated grain surplus of 30 million tons in the U.S.A. will be able to cope with more than one year's requirements of the poorer countries at the present population growth rate.

The Director of Agricultural Economics in the United States Department of Agriculture in a recent review of the world food situation expressed the following pessimistic opinion:-

"In the long run, looking into the twenty-first century, unless the population growth is checked, there is no

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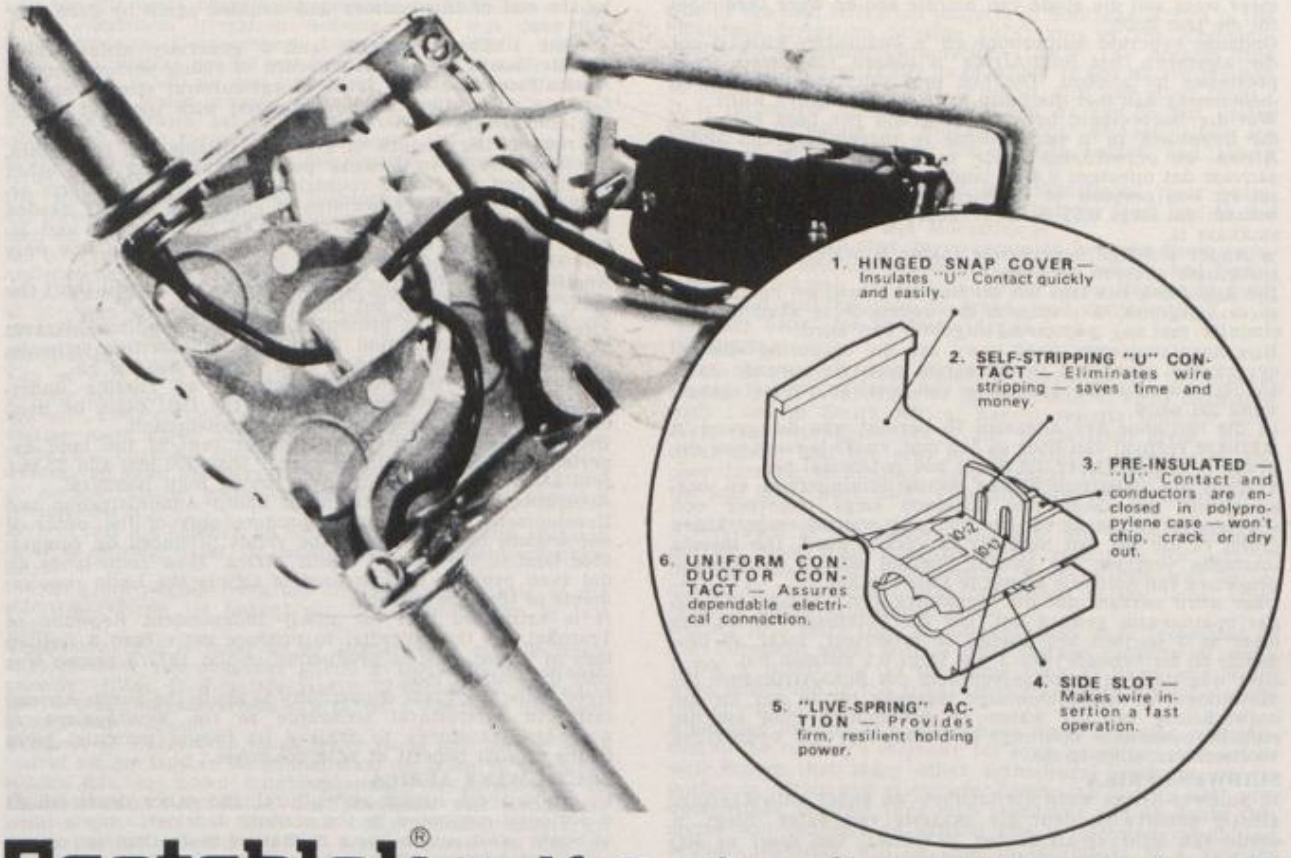

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voedselprobleem nie, tensy die bevolkingsaanwas gestuit word. Beraam volgens onlangse tempo's, loop die bevolkingsgrafiek oor die kant van die bladsy; die syfers word nie net onbeheerbaar nie, maar ook ondenkbaar".

Met die hoop dat die rem so 'n bietjie aangedraai kan word op die tempo van bevolkingsaanwas, het ons sowat 'n kwarteeu oor om die tyd uit te koop. Dit sal toegewyde ywer van al die „vermoënde" lande gedurende hierdie tydperk verg. Dit plaas Suidelike Afrika in die soeklig.

In Suidelike Afrika sal die voedselposisie ook in oënskou geneem moet word ten opsigte van bevolkingsyfers en die verwagte bevolkingsaanwas.

SUID-AFRIKA

Die totale bevolking van 25 miljoen sal waarskynlik dubbeld meer wees aan die einde van hierdie eeu en weer verdubbel tot die jaar 2020.

Ondanks beperkte hulpbronne en 'n ongunstige klimaat oor die algemeen, het Suid-Afrika 'n rekord van steeds hoër prestasies in landbou. Die hoë peil van landboukunde en -beoefening kan met die beste ter wêreld vergelyk word.

Wat die hoeveelheid bewerkbare grond per hoof betref, is die Republiek in 'n swak posisie in vergelyking met ander Afrika- en ontwikkelde lande in die wêreld. Deskundiges aanvaar dat minstens 0,4 ha landbougrond nodig is om voedsel vir een persoon te voorsien, en reeds in 1973 is daar beraam dat slegs 0,57 ha bewerkbare grond per persoon beskikbaar is.

'n Ander ernstige beperkende faktor is water, wat die besproeibare gebiede sal beperk.

Die Republiek het tans net minder as 'n miljoen hektaar besproeiingsgrond, wat volgens die owerhede se skatting, uiteindelik met nog 340000 ha uitgebrei kan word.

Baie navorsingswerk word gewy aan die opsporing van ondergrondse water wat in die eerste plek vir lewende hawe en vernaliwe vir die produksie van dierlike voedsel aangewend sal word.

In die tuislande kry altesaam 76 persent van die grond 'n jaarlikse reënval van hoër as 500 mm, en 33 persent van die grond is geklassifiseer dat dit 'n hoë potensiaal het.

Volgens die Departement van Bantoe-administrasie en -ontwikkeling, produseer die tuislande slegs ongeveer een sewende tot een sesde van die opbrengs wat uit vergelykbare grond in die res van Suid-Afrika verkry word. Die meeste tuislande voorsien nie genoeg voedsel om in die basiese behoeftes van hulle eie mense te voorsien nie.

Daar word beraam dat die Republiek van Transkei wat so pas onafhanklik geword het, oor die potensiaal beskik om meer as 3 miljoen ton mielies te produseer, maar sy produksie in die seisoen 1972/3 was slegs 0,1 miljoen ton.

Hier wag daar 'n groot geleentheid om Suid-Afrikaanse bedrewenheid in landboukundige tegnieke toe te pas vir die ontwikkeling van die water- en grondhulpbronne om die eintlike potensiele opbrengs te verkry tot die wedersydse voordeel van albei lande.

SUIDWES-AFRIKA

In Suidwes-Afrika word die landbou- en ander ontwikkelings ernstig gekortwiek deur die skaarste van water. Slegs 'n derde van Suidwes-Afrika het 'n reënval van meer as 400 mm per jaar, en vanweë die wisselvallige aard van die reënval, word droelandgewasse in slegs 1,1 persent van die gebied verbou. Die Namibwoestyn beslaan ongeveer 'n vyfde van die land, en in die binneland is daar geen standhoudende riviere nie, behalwe op die heel noordelike en suidelike grense. Die dravermoë van die veld is oor die algemeen baie laag. Boerdery word nietemin op groot skaal beoefen en 'n groot aantal vee en karkasse word na die Republiek uitgevoer, maar op sy beurt voer Suidwes-Afrika baie landbouprodukte van Suid-Afrika in.

BOTSWANA

Die grootste deel van Botswana word beslaan deur die Kalahari met sy uiters lae reënval wat hoër word na die noordelike en oostelike dele van die land. Weens die swak reënval word slegs ongeveer 400 000 ha gebruik vir die verbouing van gewasse. Dit is minder as 10 persent van die totale bewerkbare grond in Botswana. Baie van die grond het egter 'n grenswaarde as gevolg van die wisselvallige reënval.

Veeboerdery is die vernaamste bron van inkomste uit landbou, maar die omset is laag, naamlik 8 persent. Vanweë die langdurige droogtes in die jare 1960, kon Botswana in 1971 nie voorsien in die voedselbehoeftes van sy bevolking van 630 000 nie, en moes voedsel ingevoer word. Die toestande is vandag gunstiger.

Besproeiing word nie op groot skaal beoefen nie. Water is beskikbaar uit die Okavango-, Chobe- en Limpoporivier. Besproeiing word op beperkte skaal langs die Limpopo (Tuliblok) toegepas, met 'n redelike tot hoë mate van sukses.

LESOTHO

Ofskoon hierdie land 'n hoë reënval van bykans 2 000 mm per jaar het, is die land arm aan landboukundige hulpbronne. Die hoë reënval tesame met swak boerderymetodes in hier-

solution to the world food problem. Projected at recent rates the population chart runs off the page: the numbers become not only unmanageable but inconceivable."

In the hope that a brake can by some means be placed on the rate of increase in population we have say a quarter of a century in which to buy time. This will require dedicated efforts by all the "have" countries during that period.
This brings the spotlight on to Southern Africa.

In Southern Africa the food position must also be viewed in terms of population numbers and the anticipated increase therein.

SOUTH AFRICA

The total population of 25 million is expected to be doubled by the end of this century and doubled again by 2020.

Despite limited resources and a generally unfavourable climate, South Africa has a record of rising performance in Agriculture. The high level of agricultural science and of farming application can be compared with the best in the world.

As regards the amount of available tillable soil per capita, the Republic is in a weak position compared with other African and developed countries of the world. Experts accept that at least 0,4 hectares of cultivated land is needed to provide the food requirements of each person and already by 1973 it was estimated that there is available only 0,57 hectares of arable soil per person.

Another serious limiting factor is water which will limit the areas which could be put under irrigation.

The Republic has at present just under a million hectares of land under irrigation which, the Authorities estimate, can eventually be expanded by a further 340 000 ha.

Much research is being concentrated on finding underground water sources which will in the first place be used for livestock and hence animal food production.

In the Homelands altogether 76 per cent of the land experiences an annual rainfall higher than 500 mm and 33 per cent of the land is classified as having high potential.

According to the Department of Bantu Administration and Development the Homelands produce only of the order of one-seventh to one-sixth of the yields produced on comparable land in the rest of South Africa. Most Homelands do not even produce enough food to supply the basic requirements of their own people.

It is estimated that the newly independent Republic of Transkei has the potential to produce more than 3 million tons of maize, but its production in the 1972/3 season was only 0,1 million tons.

Here there is a great opportunity to apply the South African skills in agricultural technique to the development of water-land resources to achieve its proper potential yield to the mutual benefit of both countries.

SOUTH WEST AFRICA

In South West Africa agricultural and other development is seriously hampered by the scarcity of water. Only a third of South West Africa has a raintall of more than 400 mm a year, and because of the erratic nature of the rainfall the cultivation of dryland crops is carried out on only 1,1 per cent of the territory. The Namib Desert covers about a fifth of the country, and in the interior there are no perennial rivers, except on the extreme northern and southern borders. The carrying capacity of the veld in general is very low. A high level of farm management is nevertheless maintained and large numbers of cattle and cattle carcases are exported to the Republic, but South West Africa in turn imports a lot of agricultural products from South Africa.

BOTSWANA

The greater part of Botswana is covered by the Kalahari with its extremely low rainfall which increases towards the northern and eastern parts of the country. Owing to the poor rainfall only about 400 000 hectares are used for crops, less than 10 per cent of the total arable land in Botswana. Much of the arable land, however, is marginal because of erratic rainfall.

Cattle farming is the main source of revenue from agriculture, but the turnover is low, namely 8 per cent. Owing to the lengthy droughts in the 1960s, Botswana could not provide the food requirements of its population of 630 000 in 1971 and food had to be imported. Conditions today are more favourable.

Irrigation is not practised on a significant scale. Water is available from the Okavango, the Chobe and Limpopo rivers. A limited amount of irrigation is practised along the Limpopo (Tuli Block) with fair to a high degree of success.

LESOTHO

Although this country has a high rainfall of nearly 2 000 mm a year the country is poorly endowed with agricultural resources. The high rainfall combined with poor farming

die oorbevolkte gebied wat ongeveer 13 ha per hoof vir sy miljoen inwoners het, het tot ernstige gronderosie deur byna die hele land gelei. Ongeveer 85 persent van sy ekonomies aktiewe inwoners is aan die landbou verbonde, maar die opbrengs is laag, hoewel daar 'n potensiaal vir 'n hoër opbrengs bestaan.

SWAZILAND

Die moontlikheid van landbou-uitbreidings in hierdie klein landjie is inderdaad baie goed wat die beskikbaarheid van ekstra grond vir besproeiing en verbeterde boerderymetodes betref.

Die land het groot standhoudende riviere en goeie grond vir landbou en bosbou, asook 'n betreklik hoë reenval oor die hele land. Die opbrengs per hektaar is dieselfde as in Suid-Afrika.

Een van die beste besproeiingsprojekte in Suidelike Afrika is die Swaziland Irrigation Scheme (SIS) wat deur die Commonwealth Development Corporation (CDC) beheer word. Die huidige gebied wat besproei word, beslaan 12 750 ha waarvan 10 400 na met suikerriet en die res met sitrusbome, rys en ander gewasse beplant is.

Daar word beraam dat minstens 75 000 ha ekonomies besproei kan word teen die huidige koste. Dit is bekend dat opdamplekke beskikbaar is in die Komati-, Lomati- en Usuturivier se sytakke.

Die Komatirivier is deel van 'n internasionale rivierbekken, die Incomati, met waterlope van en na die Republiek, Swaziland en Mosambiek.

Dit ly geen twyfel nie dat as hierdie lande saamwerk, op die beginsel van beste benutting, dit tot voordeel van almal sal strek. Swaziland sal nie net in staat wees om sy eie voedsel te voorsien nie, maar sal ook voedsel kan bydra tot 'n „graanbank" vir Suidelike Afrika.

RHODESIE

Van al die lande in Suidelike Afrika, het Rhodesië die hoogste gemiddelde opbrengs van produkte in kilogram per hektaar: 2 962 vergeleke met 1 704 in Suid-Afrika. Onlangse verslae meld egter dat oorbevolking van die stamtrustgebiede, wat ongeveer die helfte van die land beslaan, oorbeweiding en swak boerderymetodes reeds baie van die grond in „onbewerkbare" grond verander het wat feitlik ongeskik vir landbou is.

Riviere soos die Zambezi en Sabi en hulle takriviere voorsien meer as genoeg water vir landbou- en nywerheidsontwikkeling.

Dit sal groot pogings verg om die landbouproduksie in die stamtrustgebiede tot bokant die bestaansminimum te laat styg.

Gedurende 1975 is meer as 20 opgaarwerke met 'n totale opgaarvermoë van ongeveer 12 000 x 103m3 in die Blanke gebiede voltooi. In dieselfde jaar is 12 damme en keerwalle met 'n totale opgaarvermoë van 14, 13 x 106m3 in die stamtrustgebiede voltooi.

Rhodesië se uitvoer van tabak lewer reeds jare lank 'n groot bydrae tot die land se ekonomie, maar dit is nie so algemeen bekend dat baie ander landbouprodukte na Afrika-state en elders uitgevoer word nie. Die produksie van Rhodesiese kwaliteitsbeesvleis het reeds baie hoë standaarde bereik, en hierdie sektor sal ongetwyfeld verder uitbrei, en ook na gekeurde, gespesialiseerde produksoorte. Rhodesië sal in staat wees om tot 'n „graanbank" by te dra.

ZAMBIE

'n Groot verskeidenheid landbougewasse kan verbou word in hierdie land se onderskeie streke met klimate wat van tropies tot subtropies wissel. Produksie word gekniehalter deur swak grond in groot dele van die land en deur lang, droë seisoene.

Hoewel Zambië 'n aantal sterkvloeiende riviere het, is min besproeiing nog onderneem.

'n Groep Blanke boere het in 1970 ongeveer die helfte van die bemarkte landbouprodukte geproduseer. In die afgelope jare het die regering verskillende metodes op die proef gestel om doeltreffende landbouproduksie te bevorder, maar die vooruitgang was stadig. Dit ly geen twyfel nie dat Zambië met 'n toegewyde benadering meer as net selfvoorsienend kan word wat landbou betref.

MALAWI

Malawi is 'n betreklik klein landjie, maar meer as die helfte van sy grondgebied is geskik vir bewerking. Hierdie land se grond word beskou as van die vrugbaarste in Suidelike Midde-Afrika. Desnieteenstaande word net ongeveer een derde van die bewerkbare grond tot dusver benut, en die land se aansienlike potensiaal vir besproeiingsboerdery is feitlik nog glad nie ontwikkel nie. Die Malawiese landboubedryf kan nietemin beskou word as een van die doeltreffendste in Suidelike Afrika, en landbouprodukte ter waarde van miljoene rande word jaarliks uitgevoer nadat daar in die plaaslike behoeftes voorsien is.

ANGOLA

Die landboupotensiaal van hierdie waterryke land is aansienlik hoog, maar tans word net sowat 2 persent van die land se bewerkbare grond aktief benut.

practices in this overpopulated territory with about 13 hectares a head for its million people, has led to very serious soil erosion over virtually the whole country. About 85 per cent of the economically active population is engaged in agriculture, but yields are very low though potential for higher yields does exist.

SWAZILAND

The possibility of agricultural expansion in this small country is very good indeed both as regards extra land available for irrigation and as regards improved farming practices.

It has large perennial rivers and good soils for agriculture and forestry and a relatively high rainfall over the entire country. The yield per hectare is of the same order as that of South Africa.

One of the best irrigation projects in Southern Africa is the Swaziland Irrigation Scheme (SIS) run by the Commonwealth Development Corporation (CDC). The present area under irrigation is 12 750 ha of which 10 400 ha are planted to sugar and the remainder to citrus, rice and other crops.

It is estimated that at least 75 000 ha can be put under economic irrigation at today's prices. Storage sites are known to be available on the Komati, Lomati and Usutu river tributaries.

The Komati river is part of an international river basin, the Incomati, involving water contributions from and to the Republic, Swaziland and Mocambique.

There is no doubt that, by co-operation between these countries on the best use philosophy, all will benefit and Swaziland will not only be able to remain self-sufficient in foodstuffs but will be able to make food contributions to a "granary bank" for Southern Africa.

RHODESIA

Of the Southern African countries, Rhodesia has the highest average yield of produce in kg per hectare: 2 962 compared with 1 704 in South Africa. Recent reports indicate however, that overpopulation in the tribal trust areas, which cover about half the area of the country, overgrazing and poor farming techniques have already converted much of the soil into "wasteland" virtually unfit for agriculture.

Rivers such as the Zambezi and Sabi and their tributaries provide more than adequate water resources for agricultural and industrial development. Great efforts will be required to raise agricultural production in the tribal trust lands to above subsistence levels.

During 1975 more than 20 storage works were completed in the European areas with a total storage capacity of some 12 000 x 103m3 and in the same year 12 dams and weirs were completed in the tribal trust areas with a total storage capacity of 14, 13 x 106m3.

Rhodesian exports of tobacco have made a major contribution to the country's economy for some years but it is not so well known that many other agricultural products are exported to Africa and elsewhere. Rhodesian quality beef production has reached very high standards and no doubt this sector will continue to expand and in selected specialised brands. Rhodesia will be able to contribute to a granary bank.

ZAMBIA

A large variety of farm crops can be grown in its various regions which range from tropical to subtropical and temperate climates. Production is limited by poor soils over great parts of the country and a long, dry season.

Although Zambia has a number of strong, flowing rivers, little irrigation has as yet taken place.

A group of white farmers produced in 1970 about half the marketed agricultural production. In recent years the government has by various methods tried to promote efficient agricultural production but progress has been slow. There is no reason to doubt that with a dedicated approach Zambia can be made more than self-sufficient in an agricultural sense.

MALAWI

Malawi is a relatively small country, but more than half of its land area is suitable for cultivation. Its soils are regarded as among the most fertile in Southern Central Africa. Nevertheless, only about one-third of the arable land has so far been utilised, and the country's considerable potential for irrigation farming has hardly been developed. The Malawian agricultural industry must, however, be regarded as one of the most efficient in Southern Africa, and agricultural products worth millions of rands are exported annually after the local requirements have been satisfied.

ANGOLA

The agricultural potential of this huge well-watered land is considerable. However, at present only about 2 per cent of the country's arable land was utilised actively.

MOSAMBIEK

Net soos Angola, het Mosambiek 'n aantal goeie riviere en 'n hoë landboupotensiaal. Die landbou is oor die algemeen beter ontwikkel as in Angola, maar selfs daar word net ongeveer 5 persent van die bewerkbare grond benut.

Met die voltooiing van die Cabora Bassa-projek het 'n nuwe era vir Mosambiek aangebreek wat betekenisvolle en die hopelik snelle ontwikkeling van die landbou betref.

Cabora Bassa word oor die algemeen beskou as 'n kragprojek vir die uitvoer van energie. Dit is wel so, maar miskien sal die werklike betekenis van hierdie projek sy bydrae tot voedsel- en veselplantproduksie wees vir die 8 miljoen mense wat tans van 'n blote bestaansekonomie afhanklik is.

Grondopnames het 'n ontsaglike landboupotensiaal in die laer Zambezistreek aangetoon. Die uiteindelike potensiaal vir landbou in die Zambezivallei word op sowat 2,5 miljoen ha geskat, waarvan 1,5 miljoen ha besproei en die res vir droëlandboerdery gebruik kan word. Daar word verstaan dat planne wat tans oorweeg word, voorsiening maak vir vee, sitrusvrugte en voedselgewasse in die hooglande en vir suiker, katoen en jute in die laaglande.

Die geweldige opgaarvermoëns van die Kariba- en Cabora Bassa-meer sal verseker dat die verwoestende vloede wat jaarliks plaasvind, voorkom of in groot mate bekamp kan word. Elke bykomende dam wat in die Zambezi gebou word, sal daartoe bydra. Sodoende sal dit moontlik wees om inwoners in hierdie laer streek te vestig en om die landboupotensiaal tot sy uiterste toe te ontwikkel. Die inkomste wat met die uitvoer van energie na die Republiek verdien word, sal dit ekonomies uitvoerbaar maak.

Die landboupotensiaal van die Incomatirivier wat gevoed word deur takriviere soos die Komati-, Sabi- en Krokodilrivier, is ook aansienlik hoog. Hier sal samewerking tussen Mosambiek, Swaziland en die Republiek nodig wees ten einde hierdie internasionale rivierstelsel te beheer.

Die potensiaal van hierdie land vir bydraes uit surplusvoedsel- en veselprodukte is ontsaglik groot.

Dit is duidelik dat die Republiek, net soos die V.S.A., dit teen 1985 moeilik sal vind om voedselsurplusse te produseer wat na behoeftige lande gestuur kan word.

As Suidelike Afrika egter saamstaan, kan hy homself red en genoeg vir sy eie behoeftes produseer met nog oor vir die Derde Wêreld.

Die bewese landboukundige vernuf van Suid-Afrikaners en Rhodesiërs, die waterryke noordelike gebiede, die opleiding van Afrika-boere en blitsgrondopnames is almal faktore wat ingespan kan word om hierdie ideaal te verwesenlik.

Die Suid-Afrikaanse kragtransmissienetwerk wat in wording is, sal ongetwyfeld as 'n belangrike katalisator in hierdie verband dien. Goedkoop energie sal dit moontlik maak om gebiede te besproei wat tans as ongeskik beskou word weens topografiese redes. Hoogliggende grond kan besproei word met water wat gelewer word deur pompe wat goedkoop elektrisiteit gebruik.

As ons in die verbeelding spesiaal geboude graansuiers naby kusgebiede sien waar die surplusbydraes van die onderskeie lande geberg kan word vir verspreiding na behoeftige gebiede, dan het ons dieselfde konsep as die Wêreldbank. In die geval van die Wêreldbank word die geld saam in 'n internasionale fonds gestort en leners doen nie navraag oor watter besondere volk die geld bygedra het wat hy geleen het nie.

Wanneer die voedselprodukte met die nodige kalorie- of proteïenwaardes eers saam in internasionale graansuiers geberg is, sal hongerlyers nie nog wil uitvis oor die oorsprong van die lewensreddende voedsel nie.

So 'n konsep sal natuurlik ook groot ontwikkelings ten opsigte van die vervoerinfrastruktuur meebring, en nuwe, moderne idees moet ondersoek word om hoëwaarde- en bederfbare goedere vinnig en goedkoop te vervoer.

Benewens tussenstreeksamewerking ten opsigte van energie- en voedselhulpbronne, duik daar nog 'n derde vergesig op na aanleiding van onlangse vorderings op die gebied van skeertuigtegnologie.

In die voorwoord van „Jane's Surface Skimmers 1975-76" word besonderhede verstrek oor die nuwe tipe skeertuie wat tans in die gevorderde beplanningstadiums is. Byvoorbeeld, die BH 88 wat tans beplan word om die bestaande SRN4 — een van die grootste skeertuie in die wêreld — te vervang, sal 40 persent minder krag nodig hê en 'n branstofbesparing van 60 persent meebring.

Daar word ook beweer dat hierdie skeertuig in staat sal wees om veilig en redelik gerieflik in toestande van tot krag 9 te werk. Dit sal derhalwe ideaal wees vir baie roetes oor die Stille Oseaan, Noord- en Sentraal-Amerika en Kanada, onder andere ook oor 'n snelweg/waterverbinding oor die Michiganmeer.

Die V.S.A. se vlootbeplanningspanne stel sulke skeertuie van tot 10 000 ton (die SES) en met 'n spoed van 80-100 knope in die vooruitsig en het die SES in gedagte om weer die voorsprong in spoed te behaal wat deur die duikboot oortref is met die koms van kernkrag.

MOCAMBIQUE

Like Angola, Mocambique has a number of rivers and agricultural potential is high: Agriculture is generally better developed than in Angola, but even here only about 5 per cent of the arable land is cultivated.

With the completion of the Cabora Bassa project a new era has dawned for Mocambique as regards meaningful and hopefully rapid agricultural development.

Cabora Bassa is generally regarded as a power project for the export of energy. So it is, but perhaps the real significance of this project will be in its contribution to food and fibre production for the 8 million people who exist currently on a subsistence economy.

Soil surveys have revealed immense agricultural potential in the lower Zambezi. The ultimate potential for cultivation within the Zambezi valley is assessed at some 2,5 million hectares of which 1,5 million hectares will be irrigated and the remainder dry-farmed. It is understood that plans under consideration allow for cattle, citrus and food crops in the highlands and sugar, cotton and jute in the lowlands.

The massive storage capacities of Lakes Kariba and Cabora Bassa will ensure that the annually recurrent destructive floods are eliminated or mitigated to a considerable extent. Every additional dam built on the Zambezi will strengthen this insurance. Thus it is possible to settle the population in this lower region and to develop the agricultural potential to its fullest extent. The revenues earned from energy exports to the Republic will make this economically feasible.

The agricultural potential of the Incomati river, which is fed by tributaries such as the Komati, Sabi and Krokodil rivers, is also considerable. Here collaboration between Mocambique, Swaziland and the Republic will be necessary in order to regulate this international river system.

The potential in this country for contributions from surplus food and fibre products is immense.

It is clear that by 1985 the Republic, like the U.S.A., will find it difficult to produce surpluses in foodstuffs for dissemination to other needy countries.

But Southern Africa in co-operation can save itself and produce enough for its own needs and to spare for the third world.

The proven agricultural skills of the South Africans and Rhodesians, the well-watered northern areas, education of the African farmers, crash action as regards soil surveys are all factors to be harnessed to this ideal.

The Southern Africon power transmission grid, which is in the making, will undoubtedly be a meaningful catalyst in this context. Cheap energy will make it possible to irrigate areas now considered unsuitable for topographical reasons. High lying land can be irrigated with supplies delivered by pumps using cheap electricity.

If we visualise specially constructed silos near coastal areas where the surplus contributions from the different countries can be stored for distribution to other needy areas we have the same concept as that of the World Bank. In the case of the Bank money is mixed in an international fund and no borrower enquires from which particular nation his money originates.

Once the food products with the necessary calory or protein values are "mixed" in international silos the hungry will not prevaricate about the origin of life preserving material.

Naturally such a concept will involve also great strides as regards transport infrastructure and new and novel ideas must be considered in order to make movement of high value and perishable goods rapid and inexpensive.

Apart from inter-regional co-operation in energy and food resources there looms a third prospect arising from recent advances made in hovercraft technology.

In the Foreword to "Jane's Surface Skimmers 1975-76", details are given about the new generation of Hovercraft now in the advanced planning stages. For instance, the BH 88 now planned to replace the existing SRN4, one of the largest hovercraft operating in the world, will show a 40 per cent reduction in power requirements and a 60 per cent saving in fuel.

It is also claimed that this craft will be able to operate safely and with reasonable comfort in conditions up to Force 9 and would therefore be ideal for many routes in the Pacific, North and Central America, and Canada, including among others a highway-water connection across Lake Michigan.

The U.S.A. Naval planning teams are envisaging such ships of up to 10 000 tons (the SES) and capable of 80-100 knots and are looking to the SES to regain the edge in speed that has gone to the submarine with the advent of nuclear power.

Maar dis genoeg van die toekomsplanne wat intussen daadwerklik en klaarblyklik vinnig gestalte aanneem en wat as rigsnoer vir vooruitdenkende ingenieurs dien om projekte te beplan vir infrastruktuurontwikkeling wat die grootste ekonomiese voordele vir die grootste getalle sal meebring.
Om die Zambezi en sy takriviere bevaarbaar te maak, is so 'n soort konsep. Dit moet egter op 'n praktiese manier benader word en moet rekening hou met die terrein en die oorlangse waterprofiel in verhouding tot die vloeiing van die water.
Die bemoedigendste ontwikkeling van groter onmiddellike, praktiese betekenis, is die onlangse ontwikkeling van die skeerbarg wat, hoewel dit nie so vinnig as die skeertuig is nie, sowat 20 tot 30 knope kan behaal.
Die doel met die luggesmeerde barg (Air Lubricated Barge) is om n oplossing te vind vir die skeepsvervoerprobleem.
Hierdie oplossing lê êrens tussen die bestaande stadige waterverplasingsvaartuig wat massavrag vervoer, en die hoëprestasiewatertuig (skeertuig of skeerboot) wat geskik is vir die vervoer van passasiers en motors op hoofroetes. Daar is aansienlike afsetmoontlikhede vir 'n watertuig (skeertuig of skeerboot) wat passasiers en motors op hoofroetes kan vervoer. Daar is ook groot afsetmoontlikhede vir 'n watertuig wat waardevolle vrag (bv. bederfbare goedere, motors, hoevolume/massamasjinerie, houers, ens.) kan vervoer en versprei en geskik sal wees vir passasiers/voertuigroetes waar 35-40 knope miskien nie geregverdig sal wees nie, maar 25-30 knope voldoende sal wees.
Wat grootte en spoed betref, is dit uniek want dit bied 'n betreklik hoe werkverrigting teen uiters laë kragverbruik, d.w.s. brandstofverbruik. Die eenvoudige konstruksie van sweisbare ligte allooi en die betroubare, stewige dieselenjins verseker ekonomiese aanvangskoste en lae bedryfskoste. Die gemiddelde koste per tonseemyl sal sowat 3-4 new pence sterling bedra, d.w.s. ongeveer 5 S.A. sent per tonseemyl.
'n Onlangse ontwerp wat groot belofte inhou, is die ALB-tipe 525 (Air Lubricated Barge) — 'n dieselgedrewe skeervragtuig wat deur Hovermarine ontwerp is om algemene en behouerde vrag op riviere en binnelandse waterweë te vervoer teen snelhede van 25-28 knope.
Hierdie dieselgedrewe vragtuig is ontwerp om tot 400 ton algemene of behouerde vrag teen 'n lae koste op riviere en binnelandse waterweë te vervoer. Dit het 'n kruissnelheid van 25 knope, en ofskoon hierdie snelheid veel beter is as dié van die hedendaagse sleepboot- en bargeenhede, is dit nie so hoog dat dit moontlike gevaar vir ander waterverkeer in bedrywige gebiede sal inhou nie.
Deur kajuitmodules by die basiese romp te voeg, kan die tuig aangepas word om passasiers vir verskillende doeleindes te vervoer.
'n Mens moet ook die feitlik wêreldwye neiging tot die behouering van vrag in gedagte hou. Dit maak die „oprol-afrol"-tegniek prakties uitvoerbaar in die geval van skeerbargverkeer.
Hierdie „oprol-afrol"-tegniek sal dit moontlik maak om die reeks damme in die Zambezi verby te steek en om vrag van een meervlak na die volgende een te vervoer. Die bou van sluise by damme wat gewoonlik in bergklowe geleë is, is buite die kwessie.
'n Ander benadering is om groot hysmasjiene op te rig wat die tuig saam met die vrag van een vlak na 'n ander een kan oplig of laat sak, maar dit sal meebring dat 'n kleiner tuig gebruik moet word, en die koste van siviele ingenieurswerk sal baie hoog wees in sulke bergagtige gebiede.

Die oplossing is blykbaar om die skeerbarge net op hulle eie mere te gebruik en om die vrag en passasiers by dameindpunte op padvoertuie te laai wat dan met paaie met geskikte hellings na die volgende meer sal afdaal (of opstyg) om die vrag en passasiers weer op die volgende skeerbarge te laai, ensovoorts.

By sommige terreine sal dit moontlik wees om die tuig teen 'n betreklik lae koste op bane langs te hys of te laat sak, ten einde die gebruik van ekstra skeerbarge en bemannings uit te skakel. Dit kan bepaal word deur uitvoerbaarheidstudies.

In die geval van die Zambezi, sal dit merendeels vragverkeer wees, minstens in die aanvanklike bedryfstadiums, en minimale akkommodasie vir passasiers hoef derhalwe voorsien te word. Met sulke pragtige mere en natuurskoon langs die roete, sal die posisie waarskynlik verander, moontlik baie gou, en sal die toeristeverkeer toeneem.

Skeerbarge kan op die Shirerivier begin gebruik word sonder om eers te wag dat bykomende damme en keerwalle in die Zambezi gebou word, gedagtig aan die verbeterde stroomafvloeiing van die sameloop van die Zambezi- en Shirerivier as gevolg van die regulering van die vloeiing by die opgaardamme in die Zambezi- en Kafuerivier en die Malawimeer.

Die Shire loop in die Zambezirivier aan die stroomafkant van die Mutararabrug, waar die riviervlak ongeveer 50 m bo die seespieël is. Die val van die rivier na die see, 'n afstand van sowat 200 km, sal ongeveer 1:4 000 wees. Die sameloop is onderkant die laaste keerwal of dam wat stroomaf in die Zambezirivier gebou sal word.

So much for the future plans which are maturing actively and apparently rapidly and which are a guidance to forward looking engineers for conceiving projects in infrastructure development which will bring the greatest economic benefits to the greatest number.
Making the Zambezi and its tributaries navigable is such a concept.
It has, however, to be approached in a practical manner having regard to the terrain and the longitudinal water profile of the river in relation to flow of water.
The most encouraging developments of a more immediate practical significance relate to the recent development of the Hoverbarge which, while not as fast as the hovercraft, operates at say 20 to 30 knots.
The Air Lubricated Barge concept seeks to provide a solution to the marine transport problem that lies between existing slow displacement craft carrying bulk cargo and the high performance marine vehicle (hovercraft or hydrofoil) suitable for carrying passengers and cars on premium routes.
A considerable market potential also lies in the provision of a marine vehicle that could transport and distribute premium freight (e.g. perishable goods, automobiles, high volume/weight machinery, containers, etc.) and also would justify passenger/vehicle routes where 35-40 knots may not be justified, but 25-30 knots would be.

For its size and speed it is unique in providing relatively high performance at extremely low power, i.e. fuel consumption. The simple construction involving weldable light alloy and reliable robust diesel engines provides an economic first cost and low running costs. Average costs per ton nautical mile will be in the 3-4 sterling new pence range, i.e. around 5 S.A. cents per ton nautical mile.
A recent design which holds out high promise is the ALB Type 525 (Air Lubricated Barge), a diesel-powered hoverfreighter designed by Hovermarine to carry general or containerised cargoes on rivers and inland waterways at speeds of 25-28 knots.
This diesel-powered freighter has been designed to carry up to 400 tons of general or containerised cargoes on rivers and inland waterways at low cost. It cruises at 25 knots, and while this speed represents a substantial improvement on that of present day tug-and-barge units, it is not so high as to present a potential hazard to other water traffic in congested areas.
By adding cabin modules to the basic hull, the craft can be adapted to various passenger carrying roles.
One must also look at the almost universal trend towards containerisation of cargo. This makes the "roll on roll off" technique a practical proposition applied to hoverbarge traffic.
It is the "roll on roll off" technique which will make it possible to bypass the series of dams on the Zambezi and to transfer loads from one lake level to the next. The construction of locks at the dams which are generally located in mountain gorges is out of the question.
Another approach would be to construct large hoisting gear to lift or lower the craft complete with cargo from one level to another but this would tend to limit the size of craft that could be utilised and the civil engineering costs would be very high in such mountainous terrain.
The answer would appear to be to confine the hoverbarges to their own lakes and at the dam terminus to "roll off" the cargo and passengers on to road vehicles which would descend (or ascend) to the next lake by roads with suitable gradients and "roll on" to the next hovercraft, and so on.

At some sites it will be possible to hoist or winch the craft up or down ramps at relatively less expense and so eliminate the use of extra craft and crews. This can be determined by feasibility study.

In the case of the Zambezi traffic will generally be cargo orientated, at least in the early stages of operation and passenger accommodation need only be minimal. However, with such beautiful lakes and scenery along the route the position is likely to change, probably rapidly, and tourist traffic should increase.

Hoverbarge traffic on the Shire river could commence without waiting for additional dams or weirs to be built on the Zambezi bearing in mind the improved flow conditions downstream of the junction of the Zambezi and Shire rivers due to the regulation of flows by the reservoirs on the Zambezi and Kafue rivers and on Lake Malawi.

The Shire joins the Zambezi river downstream of Mutarara bridge where the river level is approximately 50 metres above sea level and the slope of the river to the sea, a distance of some 200 km would be of the order of 1:4 000. The junction is below the last weir or dam to be built in a downstream direction on the Zambezi river.

Skeerbarge kan dus op die Malawimeer tot by die Luvondo- (Kamazu-) studam gebruik word. Die vrag kan „afgerol" en per pad of spoor verby die stroomversnellings en klowe vervoer word na die onderloopwater van die Shire by die Hamiltonwaterval (Chikwawa). Daar kan dit weer in ander skeerbarge „opgerol" word vir 'n ononderbroke rit na die see en na hawens langs die Indiese Oseaan, hetsy noord of suid van die riviermonding.

Die gemiddelde trein van 800 ton vanaf Lusaka na Beira oor Rhodesië, 'n afstand van 1 600 km, neem 15 dae vir 'n retoerrit, vergeleke met 4 dae in die geval van skeerbarge, met inagneming van spoor- en padverbindings vanaf Lusaka na die Cabora Bassameer en die uitwykpadverkeer tussen die mere in die kloofagtige gebiede tot so ver as Mutarara.

Daar word natuurlik nie gedink dat skeerbarge die spoorwegstelsel sal vervang nie. Hierdie konsep beoog dat die waterwegverkeer die spoorwegstelsel moet aanvul ten opsigte van die snelvervoer van hoëwaarde- en bederfbare produkte. Bestaande spoorwegstelsels sal gemoderniseer of herontwerp moet word, en nuwe aansluitings word tans opgemeet.

Op die oomblik is die Zambezi slegs 160 km bevaarbaar tot so ver as Vila Fontes vanaf die monding.

Met die geregulcerde vloeiing deur die turbines en sluise van die damme by Kariba, Itezhitezhi, Kafue en Cabora Bassa met hulle ontsaglike gekombineerde opgaarvermoë, sal die stroomafvloeiing na die riviermonding in die Indiese Oseaan op so 'n manier beheer kan word dat dit die diepgang van riviervaartuie verbeter, om sodoende die bevaarbare afstand te verleng en ook groter vaartuie met welslae te gebruik.

Die skepping van hierdie uitgestrekte binnelandse mere en die regulering van die riviere, laat vergesigte ontstaan oor die langtermynpotensiaal vir riviervaart en veral oor die ontsaglike potensiële ekonomiese voordele vir Mosambiek en die landomringde Malawi, Zambië, Rhodesië en Botswana, wat nie net uit die goedkoper nie, maar ook die vinniger vervoer van hoëwaarde- en bederfbare produkte, vir uitvoer sowel as invoer, sal voorspruit.

Die watervlak van die Cabora Bassa-meer strek tot by die Zambiese en Rhodesiese grense, en deur middel van gekoördineerde werking tussen Kariba en Cabora Bassa, kan die watervlak op 'n redelik konstante hoogte gehou word. 'n Plaat water van 270 km lank na die dam, sê van twee hawens aan die oewers van hierdie lande, is derhalwe beskikbaar vir vinnige lugkussingtuie of -barge.

By daardie punt kan die vrag „afgerol" word in spesiale padvoertuie wat nie noodwendig paaie met lae hellings nodig het nie. In die eerste plek kan dit per pad tot naby Tete vervoer word, waar dit weer in ander skeerbarge „opgerol" word. Die skeerbarge kan dan die rit na die see afle, en om verby die twee studamme by Lupata en die Mutararabrug te kom, kan die skeerbarge laat sak word of kan daar van die „oprol-afrol"-tegniek gebruik gemaak word. Daarna is die weg oop na die see en na Beira of hawens in die noorde, soos Ncala.

Later wanneer die Mpanda Uncua- en Boromadam klaargebou is, kan die skeerbarge ook oor hierdie gelyk plate water gebruik word om sodoende die padvervoerafstand te verminder.

By Moatize, naby Tete, is die groot afsettings kooksteenkool wat die waardevolste uitvoerproduk kon gewees het as dit nie vir die huidige belemmerende treinvervoerkoste oor die lang afstande was nie. Laer af in die vallei, naby die see, is daar die uitgestrekte lappe vrugbare landbougrond aan weerskante van die rivier. Bederfbare produkte kan dus regstreeks na Beira of elders vervoer word, altans veel vinniger as in die huidige omstandighede. Omgekeerd is dit net so voordelig. Noodsaaklike invoergoedere, soos spesiale installasies en masjinerie en ander handelsware uit die buiteland, kan goedkoop en vinnig ingebring word.

Ter afsluiting, herhaal ek dat water en energie — sowel elektries as menslik — die sleutels is tot ingenieurswere vir onderlinge afhanklikheid en vrede in Suidelike Afrika. Al die ander infrastruktuur-ontwikkelings sal daaruit voortspruit.

Om hierdie mikpunte te bereik, met vreedsame naasbestaan as die einddoelwit, sal langtermynbeplanning verg. In die verlede was die neiging te veel tot ad hoc-beplannings volgens ekonomiese voorspoed of slaptes. Hierdie soort aanpassings by ekonomiese toestande kan nog gedoen word binne die raamwerk van 'n langtermyntotaalplan. Die Republiek, uit hoofde van sy sterk ekonomie en sy groot reserwes tegniese kundigheid, kan en behoort die leiding te neem by die formulering van sulke langtermynplanne, waarvolgens prioriteite bepaal kan word tot die wedersydse voordeel van al die volke van Suidelike Afrika.

(Ek is ten opsigte van die landboukundige statistiek baie dank verskuldig aan dr. W. A. Verbeek en ander skrywers wat bygedra het tot die simposium: „Hulpbronne van Suidelike Afrika — Vandag en Môre," wat onder die beskerming van die Geassosieerde Wetenskaplike en Tegniese Verenigings van Suid-Afrika gehou is in Johannesburg, 22-26 September 1975).

Hoverbarges could thus operate on Lake Malawi up to Luvondo (Kamazu) barrage. The cargo would be "rolled off" and transported past the rapids and gorges by road or rail to the tailwater of the Shire at Hamilton Falls (Chiwawa). There it would be "rolled on" to other hoverbarges for an uninterrupted journey to the sea and to ports in the Indian Ocean either to the north or the south of the river mouth.

The average 800 tonne train from Lusaka to Beira via Rhodesia, a distance of 1 600 km, takes 15 days for the return journey compared with 4 days for the hoverbarges, allowing for rail or road connections from Lusaka to Lake Cabora Bassa and the by-pass road traffic between the lakes in the gorge areas as far as Mutarara.

It is of course not contemplated that hovercraft traffic will **replace** the railway systems. The concept envisages that the waterway traffic will be supplementary to the rail systems as regards conveyance at speeds of high value and perishable products. Existing rail systems will have to be modernised or remodelled and new links are being surveyed.

At present the Zambezi is navigable only for about 160 kilometres as far as Vila Fontes from its mouth.

With the regulated flow through the turbines and sluice gates of the dams at Kariba, Itezhitezhi, Kafue and Cabora Bassa with massive combined reservoir storage capacity will regulate downstream flow to the river mouth at the Indian Ocean in such a manner that improved draft for rivercraft will be available which could both lengthen the distance for navigation and permit increase in vessel size which could be used successfully.

The creation of these vast inland lakes and the regulation of the rivers lift the conceiving eye to the long range potential for navigation with special reference to the immense potential economic benefits to Mocambique and the landlocked countries of Malawi, Zambia, Rhodesia and Botswana stemming not only from cheaper but quicker transport of high value and perishable products — both for export and for import.

The water surface of Lake Cabora Bassa stretches to the Zambian and Rhodesian borders and with co-ordinated operations between Kariba and Cabora Bassa could be kept at a reasonably constant level. Thus a stretch of lake 270 km long to the dam from say two such ports located on each of the shores of these countries is available for rapid air cushioned vehicles or barges.

At that point cargoes would be "rolled off" on to special road vehicles which do not necessarily need very easy road gradients. In the first instance it could go by road all the way to near Tete where cargo could be "rolled on" to other hoverbarges which could then make the journey to the sea being either "hoisted" down or using the "roll on roll off" technique again to by-pass two barrages at Lupata and at Mutarara bridge. Thereafter the way is open to the sea and to Beira or ports to the north, such as Ncala.

Later on when the Mpanda Uncua and Boroma dams are built the hoverbarges could be used on these stretches of level waters also thus reducing the road haul.

At Moatize, near Tete, are the large deposits of coking coal which would be a most valuable export but for the present prohibitive transport costs by long railway lines. Lower down in the valley, near the sea, there is the vast acreage of fertile agriculturable land which straddles the river. Thus perishables could be taken out straight to Beira, or elsewhere, much more speedily than under present circumstances. The reverse holds good also. Needy imports such as special plant and machinery and other items from the outside world could also be brought in cheaply and quickly.

In conclusion, I repeat that water and energy — both electrical and human — are the keys to engineering for interdependence and peace in Southern Africa. All the other infrastructural developments will follow.

To achieve these objectives, with peaceful co-existence as the ultimate objective, will need long-term planning. In the past there has been too much of a tendency towards ad hoc planning to follow boom or depression patterns. This sort of adjustment to economic situations can still be accommodated within a long-term master plan. The Republic, by virtue of her strong economic situation and her great reserves of technical know-how, could and should, lead in the formulation of such long-term plans from which priorities could be determined to the mutual benefit of all the peoples of Southern Africa.

(I would like to acknowledge my indebtedness as regards agricultural statistics to Dr. W. A. Verbeek and other authors who contributed to the Symposium: "Resources of Southern Africa — Today and Tomorrow" held under the auspices of the Associated Scientific and Technical Societies of South Africa in Johannesburg, September 22-26, 1975).

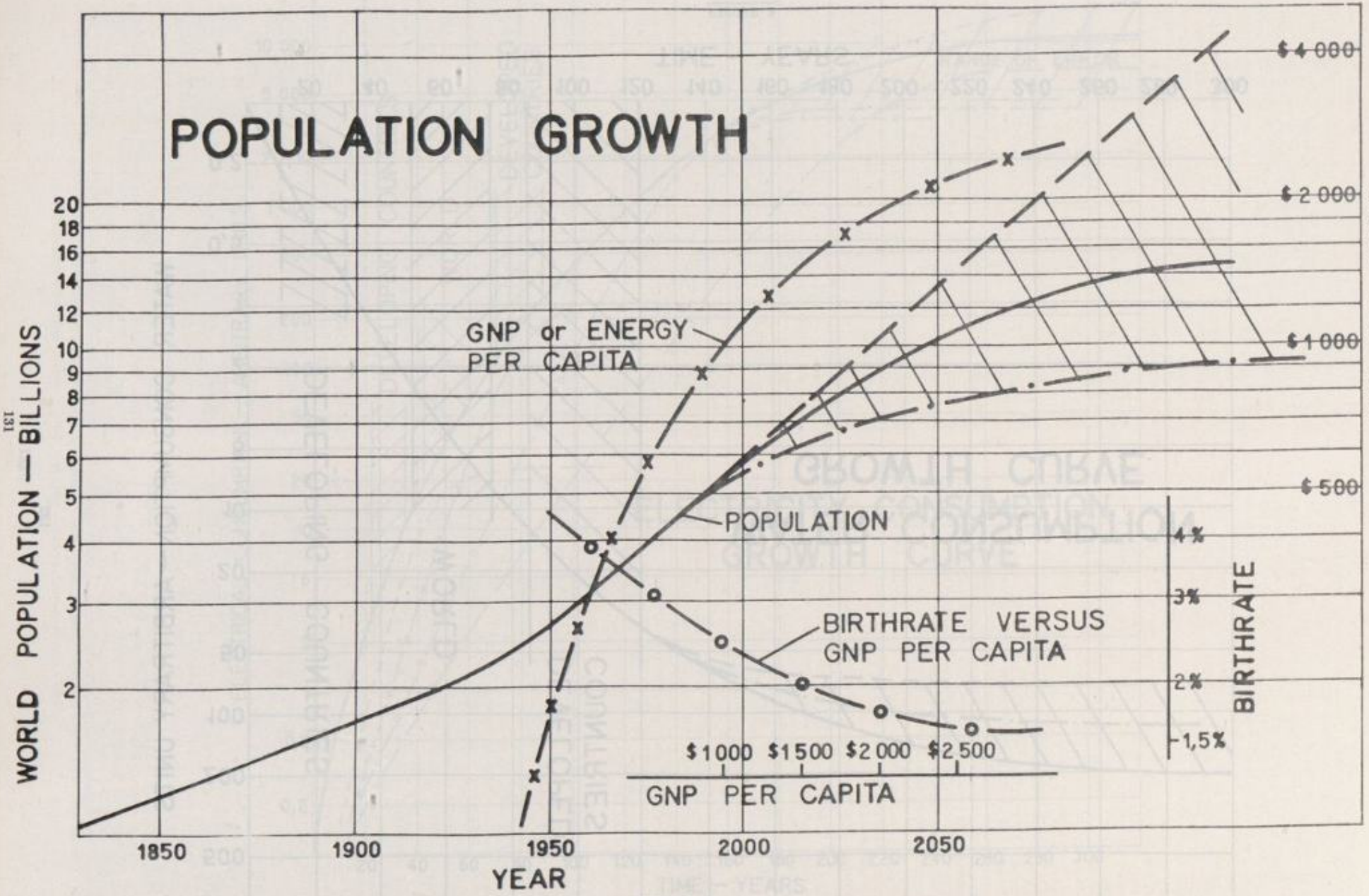
POPULATION GROWTH
WORLD POPULATION — BILLIONS
GNP PER CAPITA
$4 000
$2 000
$1 000
$500
20
18
16
14
12
10
9
8
7
6
5
4
3
2
GNP or ENERGY PER CAPITA
POPULATION
BIRTHRATE VERSUS GNP PER CAPITA
4%
3%
2%
1,5%
BIRTHRATE
$1000 $1500 $2 000 $2 500
GNP PER CAPITA
1850
1900
1950
2000
2050
YEAR

FIGURE 1

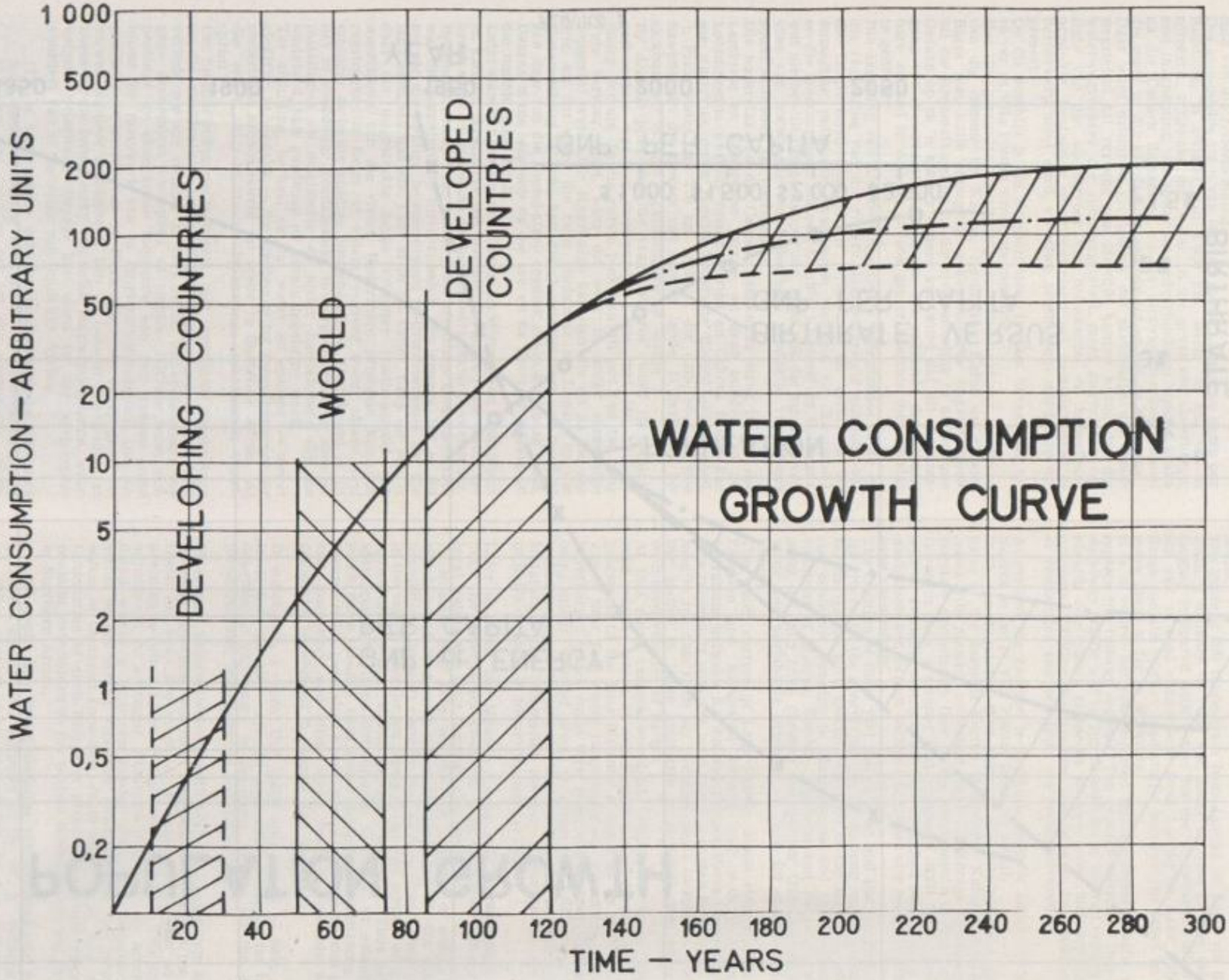
WATER CONSUMPTION — ARBITRARY UNITS
1 000
500
200
100
50
20
10
5
2
1
0,5
0,2
DEVELOPING COUNTRIES
WORLD
DEVELOPED COUNTRIES
WATER CONSUMPTION
GROWTH CURVE
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
TIME — YEARS

FIGURE 2

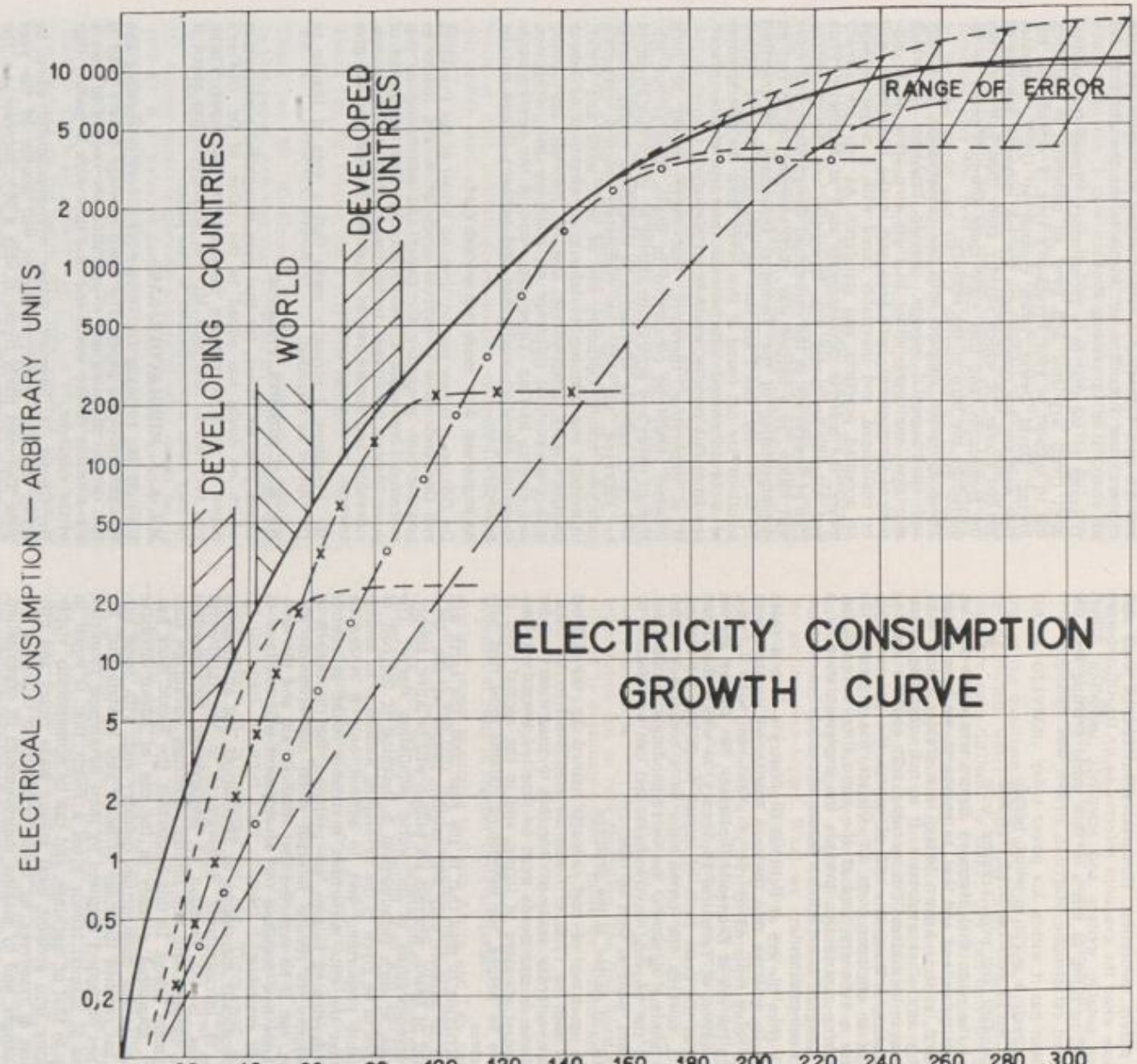
ELECTRICAL CONSUMPTION — ARBITRARY UNITS
10 000
5 000
2 000
1 000
500
200
100
50
20
10
5
2
1
0,5
0,2
DEVELOPING COUNTRIES
WORLD
DEVELOPED COUNTRIES
RANGE OF ERROR
ELECTRICITY CONSUMPTION
GROWTH CURVE
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
TIME — YEARS

FIGURE 3

MR. K. G. ROBSON, President:

Baie dankie, Dr. Olivier.

One is continually struck by the fact that the engineering community in Southern Africa is really a very small one and mentioned in Dr. Olivier's book on a number of occasions is the firm of Merz and McLellan, with which Dr. Olivier has been closely associated on a variety of projects and it is my particular pleasure this morning to ask Mr. Dan Howe to open the discussion on this paper.

MR. H. D. HOWE, Affiliate:

Mr. President, Dr. Olivier, gentlemen. I trust that the events of the last few days will not cause our deliberations to become purely theoretical. However, about twenty years ago, at a time when the evulsions referred to by Dr. Olivier were causing notable writers and scientists, including Albert Einstein, to think in terms of this world drifting into unparalleled catastrophe, Harrison Brown was stating,

> "Man has it within his power today
> to create a world in which people
> the world over can lead free and
> abundant and even creative lives . . . "

I make the point that Harrison Brown was a geo-chemist, not a politician, and add that, as engineers, we have shaped the world, as it is known today, to a greater extent than probably any other profession. It is not surprising, therefore, that in his address this morning, with sound evaluation of statistics, enthusiasm, and of course the in-house optimism of an engineer born, Dr. Olivier, has presented the case for a visionary, and at the same time a pragmatic, engineering contribution towards the implementation of a policy designed to establish a future of peaceful co-existence on this sub-continent.

Moving from the era of Political Diplomacy — but is there a reversion now, in that the once British red on the world map is being replaced by red of a different hue? — then through the era of Economic Diplomacy, Dr. Olivier arrives at the advent of Technical Diplomacy, in which the thrust is towards the grass roots of human needs and aspirations. That is, towards the formulation of a technology which makes minimal demands, has correspondingly minimal impact on the physical environment, and can be afforded by all nations, poor as well as rich.

"Afford", of course, is the problem.

On the question of cost, reports issued by the United Nations and the Club of Rome, as mentioned by the Hon. Minister yesterday, make it clear that to ensure survival for all nations, human needs must be directed towards a limited, modest standard of living, and in the second case, in order to be helped, the developing nations must first help themselves.

It is terrifying to read that in the year 2000, the earth will be able to support only 500 million people at the USA standard of living, whereas six billion will be alive; simply, will eleven-twelfths of the world population starve? The limitation of such consumerism is essential if the cost of assistance to be given to the developing nations is to assume managable proportions and, in adition, only if it can be seen that the élite minorities, invariably found in control of the developing nations, are prepared, for the benefit of the majority, to reduce internal social and economic disparities, can it be expected that financial aid and the technical know-how required for development will continue to be made available.

Not specifically mentioned by Dr. Olivier, but an essential aspect of infrastructure development in the third-world countries, is the creation of employment for unskilled labour, coupled with the foreign exchange advantage such employment brings. In this connection, the World Bank has, in fact, sponsored a study in the use of labour-intensive methods in the construction industry and, with some surprise, has reached the stage of being able to state that, for the types of project required by most developing countries, the use of manual labour gives a result that is equal in quality to that of machines, and can be economically viable. By taking into account local labour wage index and efficient use of resources, by being prepared to introduce design changes, and by making improvements in organisation, management and methods, it seems that again the engineer can make a worthwhile contribution to interdependence.

In fact the very next paper to be presented to you deals in detail with the type of changes in utilisation of manual labour which, in certain cases, could be adapted towards the economic replacement of machines by men.

At this point I hesitate. Faced with such impressive projections on water transport, particularly in connection with making the Zambezi and its tributaries navigable, it seems Dr. Olivier has said it all, and anything which I feel could be added must surely be completely impracticable. With considerable temerity, therefore, may I suggest that there could possibly, just possibly, be a revival of sailing ships which, making use of modern aerodynamics and light alloys, could transport cargoes cleanly and profitably in an era of high fuel costs. Also the French, I believe, have developed a sloping loch, and that may find a place in the overall concept.

From this point on I find that I am mainly underlining points made by your President in his address yesterday.

Not all of us will have the opportunity to participate in international affairs. Nevertheless, the need for interdependence exists at many levels and, in his office a few months ago, following a wide-ranging discussion on such matters, your President put words to the thought that, for all of us, "it is an exciting time".

It seems to me that in a recessionary climate the product most freely available and used ad nauseum, is statistics, but in support of your President's view, I venture the following: David Dewar, Town Planner at U.C.T., estimates that Africans are coming onto the job maket at the rate of 203 000 a year, of which slightly more than half are from the Homelands; and that eight more Soweto's could be required by the turn of the century!

These estimates, coupled with the conservation of energy and environmental aspects, provide problems by which municipal engineers, either in their own areas or in support of Government, both here and in the Homelands, will be challenged, and inevitably faced with a major re-think on accepted practices and standards. As you are already aware, the massive developments such as Mitchells' Plain and Atlantis are under way, Ennerdale and the electrification of Soweto are in the conceptual design stage, and more will follow. In a limited way, such schemes are in fact an implementation of the Technical Diplomacy, as described by Dr. Olivier, and I am sure he will agree that if correct solutions are not found at this level, then the effectiveness of a broader-based international interdependence, projected from this country, could be in jeapody.

It is imperative, therefore, that every aspect of such schemes should be considered in depth. This is our job. Human needs and aspirations should be given due attention and every possible alternative to traditional energy sources be surveyed, so that the completely correct corporate solutions result. Optimum use of sun, wind and water; utilisation and training of labour; development of labour intensive work programmes; use of domestic heat pump with consequential influence on materials and structures, and district heating. Those are some of the developments receiving attention world-wide and perhaps should not be neglected here.

As engineers, what more can we ask for?

Dr. Olivier, it is now my privilege on behalf of the President and the Association to express appreciation and thanks to you for both preparing the paper and addressing us this morning. I can state without hesitation that the impact of your "design for living" in Southern Africa has been considerable, and assure you of whatever support we can give towards its implementation.

Mr. President, I formally move that a vote of thanks to Dr. Olivier be recorded.

MR. K. G. ROBSON, President:

Thank you, Mr. Howe, for that very thoughtful contribution which no doubt has added to the value of Dr. Olivier's paper in its wide ranging treatment of his paper. Thank you very much. And now Mr. Pat Middlecote has asked if he may make a contribution to this paper.

MR. A. A. MIDDLECOTE, SABS:

I would like to thank Dr. Olivier for a very interesting and thought-provoking paper. The main message I have read is that careful planning and co-operation are needed to ensure a reasonable future world and that this work is mainly that of the engineer.

Dr. Olivier is, however, rather over-pessimistic when he states that the world population will double by the year 2000. The most likely figure is only a 50% increase, i.e. the population in 2000 will be between 6 and 7 billion. Population increase figures vary considerably from authority to authority but I am confident that the population increase will be contained mainly due to what Dr. Olivier calls "Engineering for Interdependence".

Figure 1, which I would like to show, indicates that the increase in rate of increase of population since the 1930's has been due mainly to a decrease in death-rate. This has been due more to engineering accomplishments than those of medicine — better communication, sanitation, transport,

etc. Soon, however, we will reach the minimum death-rate and the rate of increase of population will decrease because of a decrease in the birthrate. As the standard of living of sets of people, measured by GNP/capita or even energy or water per capita, rises so does the birthrate drop. It is again engineering accomplishments and in particular engineering for interdependence that brings about this rise in standard of living. So one can see that if we succeed in quickly raising the genuine standard of living of the peoples of the world we could even restrict the ultimate population of the world to 10 billion, though most people think that 15 billion is more likely, and this is the figure I favour. Supreme pessimists can see 20 billion in 2050 A.D.

Coming to water consumption I must query Dr. Olivier's statement that to maintain human activity at its present pace will require 3 cubic metres of water for every two cubic metres required today. If these 3 cubic metres are in addition to the 2 now used, thus making the increase in water 2,5 times what it is now, I would agree, but certainly an increase of 50% is not realistic. It is most likely that the world use of water in 2000 A.D. will be at least 2,75 times what it now is. I have developed a water consumption growth curve based on analysis of existing growth curves and believe that the form of curve is due to its being the sum of several classic logistic curves. This makes forecasts over the next 30 years for developed countries, 50 for the world and 100 for developing or third world countries, reasonably accurate but a guess as to when the last classic logistic component saturates means that forecasts beyond these times become difficult. Thus the ultimate saturated world demand for water could vary by a factor of 4.

I would like to show a similar growth curve for electrical energy which is very similar to that for water. This is logical since total growth of a country depends on action and reaction between parts, two of which are water and energy. This curve shows the possible individual logistic curves for parochial, national, common market and international growth components.

This again stresses the fact that all countries of Southern Africa could have a better growth curve should they have a common market component. This is what Dr. Olivier has really spelled out to us. We must act and react with the other neighbouring countries of Southern Africa — help our northern neighbours to become the main energy and food suppliers of the community and we will produce a Southern Africa that is greater than the sum of the parts.

I would like to end these comments with a few questions.

Firstly, does Dr. Olivier agree that by 2000 A.D. the demand for water in the Republic will be equal to the total annual run off? That by then we would either have to be obtaining our energy and additional food from our northern neighbours or start instituting desalination systems to increase our arable land and resorting to more and more nuclear power?

Secondly, should we have to resort to desalination, how practical is it really? Is there any hope of it becoming economically viable? Is its answer a byproduct of nuclear generating stations or are direct solar energy systems of desalination more likely to be successful?

Thank you, Dr. Olivier, for a very fine address.

MR. K. G. ROBSON, President:

Thank you, Mr. Middlecote, for your stimulating addition to that paper. And now may I call on Mr. John Grundy who has a contribution to make.

MR. JOHN GRUNDY, Springs:

Mr. President, the Author, Gentlemen,

Dr. Olivier paints a glowing picture of what **might be**. In 1975 Mr. R. S. Yates, of Johannesburg, received an invitation from the British APLE to present a lighting paper, "The African Scene". It was certainly a successful paper and well received. Nevertheless, Mr. Yates came under the criticism that his paper was mainly concerned with the RSA, to which his answer was: ". . . a lot of lighting was concentrated in the south. The RSA covered an area of only 5% of the African continent with 6% of the population. Yet in that small proportion of space and people, the industrial output exceeded 50% of that of the whole continent. Its generation and consumption of electricity also exceeded 50% of the total for the whole continent".

Dr. Olivier is calling for the investment of vast sums of money — by whom? The cupply of capital and its likely productivity are closely related. People who use capital productivity will either generate it for themselves or find others who will make it available to them on good commercial terms. One can easily see that, in many cases, even where a very small amount of effort would improve conditions, the effort has not been forthcoming. Is Dr. Olivier expecting huge investments with no concern for the return? In any event, I would most certainly challenge his statement that a Pan-African grid could be achieved in a decade.

To question our complacency in the RSA, may we ask Dr. Olivier why it should be that the average yield of produce is so much higher in Rhodesia compared with the RSA? Why a group of White farmers in Zambia in 1970 produced half the marketed agricultural production of that country? My final comment is in my view he can dismiss from his mind and his paper all ideas of "cheap" electricity in the future.

Thank you, sir.

MR. K. G. ROBSON, President:

Thank you, Mr. Grundy.

Dr. Olivier would like to make some comments before he forgets all the questions.

DR. H. OLIVIER:

One of the questions asked was "Do I agree that there will be insufficient water in the year 2000?" You know predictions are very difficult to make. One can only be guided by good statisticians. I am experienced in the use of water, not in predictions and all I can say is that by the year 2000 water supply in the Republic will be critical. That does not mean to say that we have no answers — I have hinted at some of them. Take the great Komati River system, up to now we have gone on happily with good neighbourliness — between the Portuguese to the north, the Swazis and ourselves — the old happy go lucky South African era went on and we thought there would always be water. We could pump it and use it for cooling in our power stations, which are getting even bigger. What we are entering now is an international era with frontiers that may not be friendly and we must now begin to study the question of sharing water for the first time in our history. This is being done slowly, quietly and unsung. There is the question of Angola and South West Africa — or Namibia as some people prefer to call it nodadays. Namibia will soon be independent and we hope will be friendly. We have begun recently, through the water research operation, a considerable study of the underground water potential. We do not know yet what this potential is — it depends not only on rain water and regeneration but on rock formation. The first question also referred to desalination and I think Dr. Straszacker would be able to answer that question better than I can, but we know that in a country where it had to be done, it was done — that country is Israel. They are working in Kuwait and it is expensive, but you can't do without water.

It has already cost about R1,98 per 1 000 gallons but the question of costs is another issue altogether.

Nuclear power is coming to South Africa and I do not know yet what it will cost, but I do know there are periods when it may not be able to be used because, to my knowledge, we have not yet found an accelerator. Therefore these generators must run at a constant load and you've got to have other forms of generation to cater for the peaks.

One must bear one thing in mind and that is that the cooling water situation is already critical and it is apparent that nuclear power plants must be placed near the coast to use sea water. South Africa is not as small as Israel or Kuwait, it is a vast mass rising to a plateau with an altitude of some 2 134 metres. If we can generate water cheaply at the coast we must then consider how to get it to the point where it is required for use. There was also the question of the water demand being much greater than I have tentatively suggested. Well, my figures come from an American source. There is something that an engineer and a politician have in common — the word "art". In the constitutional field, to civil engineers it is the art not the science of harnassing the forces of nature for the betterment of man. The politician's credo is the art of the possible, there we have parallel interests. I know what we would like round about the year 2000, but that is not what we are talking about. It is the "art of the possible" in this case — i.e. that which the engineer **can** provide. We know that every man in Soweto should have as much electricity or water as we have, but it has not been possible up to now for various reasons to provide this, so we have got to draw curves representing (a) what we'd like and (b) what is practically possible to achieve and engineers can only steer and guide the statesmen and politicians along the best way in which the idealistic needs can most nearly be attained.

The second question was that of capital.

Naturally, the projects I have discussed in general here will have to be subjected to a viability study. Nobody will get capital for a project if it is not viable. If a scheme is found

to be viable, capital generally seems to be the least of the problems. There is also a question of aid — aid is not always rational. This is one of the things that puzzled me in the nine to ten years I served with the World Bank, the credit rating of South Africa is very low whereas that of the Sudan is very high. On querying why this should be, the nearest they could come to explaining it was that South Africa didn't need money and if she did she only needed it for six to eight years. A credit rating goes by the extent of your needs and the length of time you need it. It seems I must take a refresher course on Economics.

As far as Rhodesia is concerned, they do have more water and since UDI they really have applied themselves to very high-powered agricultural efficiency. In Zambia during 1970 a small group of White farmers produced 50% of the marketed agricultural production and Dr. Kaunda's recent efforts, cajolings and threats to try and get his African farmers to improve their output have still been unsuccessful.

MR. K. G. ROBSON, President:

May I be permitted to make one final quote from Dr. Olivier's book. It concerns the question of money and is as follows: "One thing I learnt very forcibly: if the big project is right and the political climate is right then money is the least of the major worries. It just comes to the right project, sometimes like an avalanche". You are wondering, perhaps, after being stimulated by the author's presentation of the engineering possibilities for the future here on this continent of Africa, whether we will be left with the thought that there is an importance and value in the close co-operation and association between the civil and electrical engineering disciplines. That is why I believe a paper of such a wide ranging nature has done us all good and on your behalf I would like to thank Dr. Olivier most sincerely for having given up his time to be with us. It has been good to have had you here, Dr. Olivier, and may I, before asking the audience to express their appreciation in the usual way, say to you that I think you have deserved a second AMEU tie.

MR. K. G. ROBSON, President:

It is a special privilege for me to introduce to you my friend and colleague, Mr. Charles Adams, who is City Electrical Engineer of Port Elizabeth. He has a few troubles with people like Escom and one or two others in Port Elizabeth, but to look at him you would not believe that he has any at all. He is one of the new generation of young engineers and seemingly these troubles rest very lightly on his shoulders. He is going to present a paper on "Labour Productivity Improvement in Port Elizabeth" — a subject on which some very interesting work has been done in recent years.

Verbeterings van arbeidsproduktiwiteit in Port Elizabeth

Deur

C. E. ADAMS

INLEIDING:

Die produktiwiteitsveldtog het in 1970 in Port Elizabeth ontstaan toe die Direkteur van Organisasie en Metode 'n verslag aan die Raad voorgelê het insake proefstudies wat van die Raad se swart arbeidsmag gemaak is. Volgens sy bevindings was die gemiddelde produktiwiteit van die verskillende swart spanne tussen 40 en 50% en 'n aansienlike gedeelte van dié arbeid was nie geskik nie omdat die lone laag is en swak werkers derhalwe gewerf word. Hy het ook beklemtoon dat die produktiwiteit nie sal verbeter bloot deur lone te verhoog nie, maar dat daar eerder eers 'n verbetering in produktiwiteit moet intree alvorens lone styg. Na aanleiding van hierdie verslag, het die Raad 'n Aanvoorkomitee in die lewe geroep, bestaande uit senior amptenare van die diensdepartemente soos byvoorbeeld die Departemente van die Stadsklerk, Organisasie en Metode, en Tesourie. Die Aanvoorkomitee het uit die staanspoor besluit dat die gehalte van die swart arbeidsmag eers verbeter moet word alvorens 'n verbetering in produktiwiteit verkry kan word, en dat werkstudiespanne daarna gevorm behoort te word om die fisiese werk na te gaan en standaarde vas te lê. Die Raad het dus in 1971 'n aantal besluite geneem met die oog daarop om die gehalte van die swart arbeid te verbeter, en die belangrikste hiervan was:

1. Die maksimum ouderdom vir indienstreding by die Raad is op 55 jaar vasgestel.
2. 'n Aftree-ouderdom van 65 jaar is vir swart arbeiders vasgestel.
3. In die toekoms moet alle swart arbeiders jaarliks medies ondersoek word, wat oor die algemeen sal geskied wanneer werkers met verlof gaan.
4. 'n Lys moet opgestel word van beskermde of maklike werk wat spesifiek geskik is vir ou of half-geskikte werknemers wat nie meer in staat is om swaar hande-arbeid te doen nie.
5. Alle werke moet deur middel van taakwaardering in verskillende geskoolde kategorieë geklassifiseer word en lone moet volgens die vaardigheid wat die werk vereis, vasgestel word.

MR. C. E. ADAMS

Labour Productivity Improvement in Port Elizabeth

By

C. E. ADAMS

INTRODUCTION:

The productivity drive in Port Elizabeth first started in 1970, when the Director of Organisation and Methods presented a report to Council on pilot studies which he had carried out on the Council's black labour force. His findings were that the average productivity of the various black gangs was between 40 and 50% and that a significant proportion of the labour was unsuitable, due to the payment of low wages leading to the recruitment of poor workers. He also emphasised that merely increasing wages would not lead to improved productivity, but that rather productivity improvement should come first, leading to increased remuneration. As a result of this report, Council formed a Steering Commitee which was comprised of senior officials from the service departments such as Town Clerk's, Organisation and Methods and Treasury. The Steering Committee's first decision was that the quality of the black labour force would have to be improved before productivity could be improved, and that thereafter work study teams should be established to study the physical work and establish standards. In 1971 therefore Council adopted a number of resolutions aimed at improving the quality of black labour, the most important of which were:

1. A maximum age for entry into the Council's service was established at 55 years.
2. A fixed retiring age of 65 years was established for black workers.
3. Annual medical examination of black workers was introduced, generally taking place when workers proceed on leave.
4. The listing of sheltered or easy jobs which could be reserved for old or semi-fit employees who were no longer able to carry out heavy manual labour.
5. The classification of all jobs by means of job evaluation into different skilled categories, and the fixing of wages according to the skill content of the job.

CHARLES ADAMS obtained his B.Sc.(Eng.) at Cape Town University in 1955. After two years at AEI, Manchester, he returned to South Africa to join ESCOM at Simmerpan Test Department. He joined Germiston Municipality in 1959, and then joined Port Elizabeth Municipality in 1963 as Assistant Engineer. Promoted through the years to Distribution Engineer, Principal Engineer, Deputy City Electrical Engineer and finally to City Electrical Engineer in December, 1974.

Hierdie maatreëls het die gehalte van die arbeidsmag aansienlik verbeter. Verpligte uitdienstreding is versag deur die Raad se Aftreegratifikasieskema waarvolgens aan swart werknemers 'n gratifikasie betaal word ooreenkomstig hul diensjare. Waar ou en onbevoegde werknemers voorheen in die diens behou is totdat hulle te sterwe kom, kan hulle nou aftree sonder ontbering. Die jaarlikse mediese ondersoek het veel bygedra om die werkers wat onbevoeg was vir harde werk, uit te sif.

INSTELLING VAN WERKSTUDIE:

Die eerste werkstudiespan is in die lewe geroep, bestaande uit twee Blanke werkstudiebeamptes en twee Bantoe werkstudie-assistente. Die hoofde van die departement het reeds 'n geruime tyd besef dat produktiwiteitsverbetering deur middel van beter toerusting en werksomstandighede nou sy toppunt bereik het, en dat enige verdere verbetering van produktiwiteit teweeggebring sal moet word deur motivering van die personeel, en derhalwe is die geleentheid benut en die Aanvoorkomitee is versoek om die werkstudieveldtog in die Elektrisiteitsdepartement te begin. Aangesien die veldtog hoofsaaklik op Nie-blanke arbeiders gerig was, is daar aanvanklik werkstudies uitgevoer onder die kabellêspanne waar die meeste Nie-blanke werknemers is. Na 'n aansienlike tydperk van studie en werkmeting, het die span tot die volgende gevolgtrekkings gekom:

(i) Dat die werk van kabellêspanne gemeet en standaardtye vasgelê kan word.

(ii) Dat die kabellêspanne se produktiwiteit op ongeveer 50% gestel kan word.

(iii) Dat die spanne van tussen 40 en 50 man per span te groot is en dat verbeteringe bewerkstellig kan word deur hulle in kleiner spanne te laat werk.

(iv) Dat die Nie-blanke slootgrawers genoegsaam gemotiveer moet word ten einde meer werk gedaan te kry.

Die Elektrotegniese Stadsingenieur en die Direkteur van Organisasie en Metode het in November 1971 gesamentlik 'n verslag ingedien, en die verslag is uitvoerig deur die Aanvoorkomitee en die Organisasie en Metode-subkomitee bespreek. Die bespreking was hoofsaaklik gemoeid met die wyse waarop die Nie-blanke werkers gemotiveer kan word. In die gesamentlike verslag is aanbeveel dat finansiële aanspoormiddels gebruik moet word, maar daar was heelwat mense teen hierdie motiveringsmetode gekant, en wel om die volgende redes:

(i) Dat hoër lone vir Nie-blankes die afwesigheidsyfer sal opstoot, en

(ii) dat dit sielkundig verkeerd is om Bantoes deur middel van geld aan te moedig.

Daar is uiteindelik egter besluit om 'n proefskema toe te pas en die Raad was bereid om finansiële aanspoormiddels op die soort werk te laat toepas. Die spanne het een vir een vir aanspoorbonusse gewerk met baie goeie resultate.

Aangesien die skema op 'n groep eenvoudige slootgrawers en relatief eenvoudige kabellêers van toepassing sou wees, moes dit maklik en maklik begrypbaar wees. Om die rede is daar nie gebruik gemaak van die standaardbenadering wat in werkstudie gevolg word, nl. om 'n taak in 'n aantal klein deeltjies te verdeel en die tydsduur in minute te meet nie, maar 'n kleiner getal groter elemente is eerder geïsoleer en die tye in ure aangedui. Die take is verder ingedeel in elemente soos slootgrawery in verskillende soorte grond, die lê van kabels, intrek van kabels, die bedekking van kabels met merkers, die opvul van slote en die aanbring van padkruisings. 'n Voorbeeld van die taakwaardelyste word as Bylae 1 aangeheg.

Aanvanklik is drie verskillende soorte grond geïdentifiseer, maar dit was te min, aangesien die grond in Port Elizabeth van sagte strandsand tot harde rots wissel, en vyf verskillende soorte is uiteindelik as standaard geneem. Standaardbreedtes van slote is vir verskillende kabelgroottes en kabelspannings, sowel as vir verskillende kombinasies van kabels bereken.

Die skema werk kortliks soos volg:

Daar word tekeninge gemaak van alle kabels wat gelê moet word, en voordat met die werk begin word, meet die bonusklerk dit in sy kantoor. Elke element word afsonderlik gemeet en met die elementwaarde verleng ten einde die tyd in manure te kan bereken. Al die tye word dan opgestel en verdeel deur die getal werkers in die span ten einde 'n geraamde tyd in dae te verkry. Daar word ook toegewings gemaak vir onproduktiwiteit, soos 0,5 uur per man per dag om byvoorbeeld brandstof in hul voertuie te tap, na hul werkterrein te ry, ander klere aan te trek, ens., en die tye word na die vorige berekening bygevoeg om die totale tyd vir die werk in toegelate ure te bereken. Die tekening word dan aan die kabellêer oorhandig saam met die inligting oor tyd wat vir die werk toegelaat word. Dit is belangrik dat kabellêers en hul Bantoe-assistente moet weet wat die verwagte tydsduur van die werk is, aangesien dit blyk dat Nie-blankes verkies om te weet watter perke gestel is, en beter sal reageer as hulle weet dat 'n werk byvoorbeeld binne drie dae afgeThese measures have gone a long way towards improving the calibre of the labour force. Enforced retirements have been softened by the Council's Retirement Gratuity Scheme, under which black workers are paid a gratuity according to their number of years service. Where previously old and unfit employees had been kept in the service until they died, they could now be retired without suffering hardship. The annual medical examination has been very beneficial in weeding out workers unfit for heavy work.

INTRODUCTION OF WORK STUDY:

The first work study team comprising two European Work Study Officers and two Bantu Work Study Assistants was formed. It had been clear to the department's top management for some time that productivity improvement by improved equipment and working conditions had gone as far as it could, and that any further increase in productivity would have to be brought about by suitable motivation of the staff, and therefore the opportunity was grasped, and the Steering Committee was requested to commence the work study drive in the Electricity Department. As the drive was primarily directed towards non-white labour, the work studies commenced in the cable laying gangs, where the greatest numbers of non-whites were employed. After a lengthy period of study and work measurement the team's conclusions were:

(i) That the work of cable laying gangs could be measured, and standard times derived.

(ii) That the productivity of the cable laying force was approximately 50%.

(iii) That the gang sizes of between 40 and 50 men per gang were too large and that improvements could be made by reducing the gang sizes.

(iv) That to achieve an increase in output would require adequate motivation of the non-White trench diggers.

A joint report from the City Electrical Engineer and Director of Organisation and Methods was submitted in November, 1971, and discussed at length by the Steering Committee and Organisation and Methods sub-committee. The main discussion was centred around the method of motivating the non-White staff. The joint report had suggested that financial incentives be applied, but there was a considerable body of opinion against this method of motivation, the main objections being:

(i) That increasing the non-Whites' take home pay would merely lead to increased absenteeism and,

(ii) That financial incentives were psychologically wrong for the Bantu.

Eventually however, it was agreed to implement a trial scheme and Council agreed to the application of financial incentives to this type of work. The gangs were placed on incentive one by one, with very good results.

As the scheme was to be applied to a group of unsophisticated trench diggers, and relatively unsophisticated cable layers, it had to be simple and readily understood. For this reason the standard work study approach of dividing a job into a number of small elements and timing them in standard minutes was not followed, but a smaller number of large elements were isolated, the times being given in hours. The tasks were broken down into elements such as trench digging in various types of grounds, laying cables, pulling in cable, covering cable with markers, back filling, and installation of road crossings. An example of the work value sheets is given in Appendix 1.

Initially three different types of ground were identified, but this proved to be too few as the ground in Port Elizabeth varies from soft beach sand to hard rock, and eventually five different types were standardised upon. Standard widths of trenches were calculated for different sizes and voltages of cables and different combinations of cables.

The operation of the scheme is briefly as follows:

Drawings are made of all cables to be laid, and before the job is started, these are measured up in the office by the bonus clerk. Each element is measured separately, and extended by the element value to arrive at a time in man hours. All these times are then summed, and divided by the number of men in the gang, to arrive at an estimated time in days. There are also various non-productive allowances such as 0,5 hours per man per day for activities such as filling vehicles with petrol, travelling to job sites, changing clothes, etc., and these are added after the previous calculation, to arrive at the total time for the job in allowed hours. The drawing is then handed to the cable layer with the information on the allowed time for the job. It is important that cable layers and their Bantu assistants know how long the job is expected to take, as it has been found that the non-Whites prefer to know what their target is, and will respond better if they know that a job should be finished in, say, three days rather than in some indeterminate time. Each

handel moet wees, en nie dink dat daar geen tydsbeperking is nie. Elke week gaan die toesighouer die werk na wat afgehandel is en dui die vordering op die tekening aan. Die tekening word by die kantoor ingedien en die ure wat toegelaat is om werk in daardie week af te handel, word deur die bonusklerk bereken. Die toesighouer kan die elementtye aanpas om toegewings te maak vir harde grond of rotse wat onverwags teëgekom is. Al die tydopgawes gaan ook na die bonusklerk wat die span se werklike aanwesigheidstye vir die week bereken. Die verskil tussen die toegelate ure en die aanwesigheidsure is die bonusure wat dan pro rata op die werkers se afsonderlike tydkaarte aangebring word volgens hul aanwesigheid by hul werk.

Die resultate wat in die aanvangstadium met die spanne verkry is, was byna ongelooflik. Waar die werkverrigting voorheen om en by 50% was, het die eerste twee spanne op wie aansporingsbonusse van toepassing gemaak is, werkverrigting van 160% en 200% gelewer. Dit was seker toe te skryf aan die klompie werkstudie-assistente wat byderhand was om die kabellêer te help en die skema te laat vlot. Nadat die werkstudie-assistente weg was na ander spanne, het die werkverrigting na ongeveer 130% gedaal, d.w.s. die standaardwerkverrigting wat verwag is. In die praktyk beteken dit dat die spanne in werklikheid 2½ maal meer werk verrig het as wat voorheen die geval was. Die werkverrigting is gehandhaaf, en hoewel dit van week tot week wissel, is die gemiddelde werkverrigting nog steeds 130%. Die resultaat kan miskien beter toegelig word deur te kyk na die werklike hoeveelheid kabels wat gelê is. In 1971 het die Departement 131 000 meter kabels gelê met 234 Nie-blankes ingedeel in 8 kabelspanne. Ons het die jaar met 'n agterstand afgesluit vanweë 'n tekort aan Nie-blanke-arbeiders. In 1972 is bonusse ingestel en die spanne het op 'n nuwe manier begin werk. In 1973 het die Departement 172 000 meter kabels gelê met slegs 144 manne in die spanne, dus 'n afname van 38% in arbeiders, en 30% meer kabels gelê. Waar daar voorheen gemiddeld tussen 40 en 50 arbeiders in 'n span was, was daar nou gemiddeld 23 in 'n span. Die uitgawe bly min of meer dieselfde, want hoewel die arbeiders met 38% verminder is, word bonusse van tussen 30 en 40% verdien. Die werkverrigting het egter met 150% toegeneem en derhalwe is die eenheidskoste vir die lê van kabels per meter met ongeveer 30% verlaag. By hierdie berekening is nie die besparing van onkoste wat deur die verminderde arbeidsmag teweeggebring is, ingesluit nie.

BONUSBETALINGSVLAK:

Die soort besoldigings kurwe wat gebruik word, word in afbeelding 1 geïllustreer. Die verskil tussen hierdie aansporingsbonusse en stukwerk is dat terwyl daar in die geval van aansporingsbonusse 'n gewaarborgde basiese loonskaal is en bonusse betaal word vir werkverrigting bo en behalwe die gewone werksvlak, daar in die geval van stukwerk geen gewaarborgde basiese loon is nie. Die eerste besoldigingskurwe wat oorweeg is, is die een waar die betaling van bonusse by werkverrigting van sowat 50% begin en 'n hoër bonusbedrag betaal word vir werkverrigting bo 130%. Hierdie kurwe word deur middel van 'n stippellyn op afbeelding 1 aangedui. Daar is egter besluit om nie hierdie soort kurwe te gebruik nie, aangesien dit probleme sou oplewer as die skema na ander afdelings uitgebrei word. Die werkverrigting van verskillende afdelings verskil van die kabelspanne voor aansporing. Sommige is miskien laer as 50% terwyl ander miskien weer hoër as 50% is, en dit sou tot gevolg hê dat verskillende bonusse vir dieselfde beter werkverrigting betaal word. Daar is ook gevoel dat die Raad 'n mate van voordeel behoort te trek uit die verbeterde werkverrigting en dat die bonusbedrag eers bereken moet word vir werkverrigting wat beter is as die wat as gebruiklik of as 'n redelike dag se werk beskou word, nl. 100%. Daar is ook besluit om die bonus wat verdien kan word tot 100% te beperk sodat die werkers hulle nie ooreis net om hul finansiële posisie te kan verbeter nie. Die standaardwerkverrigting of die wat geag word binne bereik van die werker te wees sonder om hom te ooreis, word op 130% gestel, en as hy dit bereik, sal 'n bonus van 30% betaal word.

Daar is ook gevoel dat, indien werkers twee keer so hard moes werk en die werkvlak moet behou, sou 'n manier gevind moes word om hul stamina te verbeter. Baie werkers kom by die werk aan sonder dat hulle 'n behoorlike ontbyt gehad het, en hulle eet vir die eerste keer tydens teepouse om 10h00. Die Raad het dus ingestem om 'n voedingskema vir werkers wat vir 'n aansporingsbonus werk, in te stel, wat sou bestaan uit koffie en brood wanneer hulle by die werk aankom, 'n vleisrantsoen om 10h00 en dranke met hoë proteïnwaarde gedurende die dag. Die voedingskema is geesdriftig deur werkers verwelkom, en het aanleiding gegee tot talle versoeke van ander Bantoe-werkers om ook by die aansporingskema ingesluit te word sodat hulle ook voedsel kan ontvang. Die koste van ongeveer 35 sent per persoon per dag in 1973 is in gedagte gehou toe die verminderinge van bogenoemde eenheidskoste bereken is.

week the supervisor checks the work which has been done, and marks the progress on the drawing. This is then returned to the office and the allowed hours of work produced in that week are calculated by the bonus clerk. The supervisor can adjust the element times to allow for patches of hard ground or rock encountered. All the time sheets are also submitted to the bonus clerk, who calculates the actual attendance hours of the gang for the week. The difference between the allowed hours and the attendance hours is the bonus hours, and these are entered on the individual time cards pro-rata to the men's individual attendances on the job.

The results achieved on the gangs in the early stages were startling. Where previously the performance had been around 50%, the first two gangs placed on incentives turned in performances of 160% and 200%. This was no doubt due to the number of work study assistants who were on hand to assist the cable layer and keep the scheme working. Once these work study assistants moved on to other gangs, the performances fell back to approximately 130%, which was the standard performance expected. This means in practice that the gangs were actually turning out 2½ times as much work as they had done previously. This performance has been maintained, and although it fluctuates from week to week, the average performance is still approximately 130%. The result can perhaps better be illustrated by looking at the actual amount of cable laid. In 1971 the Department laid 131 000 metres of cable, utilising 234 non-Whites in 8 cable gangs. We finished the year with a backlog of work, due to a shortage of non-White labour. In 1972 bonuses were introduced and the gangs settled down to the new way of working. In 1973 the Department laid 172 000 metres of cable, utilising only 144 men in the gangs, a reduction of 38% in labour force, with 30% more cable laid. Where previously gang sizes had averaged between 40 and 50, they now average 23. Financially the expenditure is more or less the same, for although the staff is 38% lower the bonus earned is between 30 and 40%. The work output has however been increased by 150%, and therefore the unit cost of cable laying per metre has been reduced by about 30%. This calculation ignores the saving in overhead costs brought about by the reduced labour force.

LEVEL OF BONUS PAYMENTS:

The type of pay curve adopted is shown in Figure 1. The difference between these incentive bonuses and piece-work is that with incentive bonuses the base wage rate is guaranteed and bonuses are paid for work performed over and above the normal level of work, unlike piece-work where there is no guaranteed base wage. The first pay curve considered was one where the bonus payment commenced at approximately 50% performance, and a higher rate of bonus was paid above 130% performance, this curve is indicated by means of a dotted line in Figure 1. It was, however, decided not to adopt this type of curve, as it would bring problems when the scheme was extended to other sections. The performances of different sections differ from the before-incentive performance of the cable gangs, some might be lower than 50% whereas others might be higher than 50%, and this would lead to different bonuses being paid for the same improvement in performance. It was also felt that Council should derive some advantage from the improvement in performance, and that bonus should only commence after performance increased beyond that which was considered normal, or a fair day's work, i.e. 100% performance. It was also decided to limit the bonus earnable to 100% to avoid the danger of workers overtaxing their strength to increase their financial reward. Standard performance, or that regarded as attainable by the worker without undue stress, is 130%, and therefore attainment of this performance would lead to a 30% bonus being paid.

It was also considered that if workers were to double their output and maintain this level of performance, means would have to be found for improving their stamina. Many workers arrived on the job without having had a proper breakfast, and their first food intake was during the tea break at 10h00.

Council therefore agreed to introduce a feeding scheme for workers on incentive bonus, which would comprise coffee and bread on arrival at work, a meat ration at 10h00 and drinks of high protein type during the day. This feeding scheme was enthusiastically welcomed by the workers, and led to numerous requests from other Black workers to be included in incentive schemes so that they could also be fed.

The cost of approximately 35 cents per man per day in 1973 was taken into account when the reduction in unit cost mentioned above was calculated.

UITBREIDINGS VAN AANSPORINGSBETALINGS:

Die sukses van die aansporingsbonusskema vir kabellêers was baie bemoedigend, maar het gelei tot 'n ander probleem, aangesien die kabellaspersoneel nie met die vinniger pas van die kabellêery kon tred hou nie. 'n Tekort aan lassers het die situasie vererger, en daar is dus daaraan gedink om die aansporingsbonusskema ook na die kabellassers uit te brei.

Voordat daar egter besluit is om aansporingsbonusskemas na ander afdelings uit te brei, is die werkstudiepersoneel versoek om 'n studie te maak van die praktiese uitvoerbaarheid daarvan, aangesien nie alle werk gemeet kan word nie. Die verslag is in November 1972 ingedien en het getoon dat tussen 80% en 95% van die werk in die verskillende afdelings direk gemeet kan word. Die persentasies het van afdeling tot afdeling gewissel en was soos volg:

85% vir Oorhoofse Hoofleidings,
95% vir Straatligte,
80% vir Substasies,
90% vir Installasies,
95% vir Ondergrondse Hoofleidings.

Die Raad se toestemming is vervolgens verkry om bonusskema waar moontlik, uit te brei en studiewerk het in die lasafdeling begin. Daar is heelwat teenkanting van die lassers ondervind, aangesien hulle gevrees het dat die meer ervare lassers wat die hoogspanningslaswerk verrig, nie dieselfde geleentheid sal hê om 'n bonus te verdien as die minder ervare lassers wat in geringer laagspanningslasse spesialiseer nie, waar die toegelate tye gewoonlik korter is sodat dit die lassers in staat stel om die hele werkdag beter te gebruik.

Daar is besluit om te probeer om die lassers so ver te kry dat hulle die skema vrywilliglik aanvaar, eerder as om dit op hulle af te dwing, en lang onderhandelings is gevoer. Uiteindelik is die toegelate tye vir die laswerk gebruik, en „Beheer oor Standaarde" ingestel, en die lassers is verwittig van die tye wat vir hul aangewese werk toegelaat word. In die tydperk het die lassers se werkverrigting van 53% tot 105% verbeter en hulle het besef dat die tye regverdig was en dat hulle bonusse kan verdien. Hul besware is eindelik te bowe gekom deur hulle 'n groepbonusskema aan te bied waar al die individuele werkprestasies bymekaargegooi is en 'n bonus bereken volgens die gemiddelde werkverrigting van die groep, aan alle lassers betaal is. Die skema het ook goed inslag gevind en die gemiddelde werkverrigting staan nou op 130%. Sodra hierdie twee groepe afgehandel is, is die werkstudie na die ander seksies van die distribusieafdeling uitgebrei en tans is suksesvolle skemas vir die volgende werksaamhede ingestel:

(i) Ondergrondse Hoofkabellêery,
(ii) Kabellassery,
(iii) Straatlig-kabellêery,
(iv) Straatlig-kabellassery,
(v) Herstel van Straatlig-defekte,
(vi) Opknap van Straatligtoebehore,
(vii) Oorhoofse Hoofleidingkonstruksie,
(viii) Oorhoofse Hoofleidinginstandhouding,
(ix) Verf van Straatligpale en Substasies,
(x) Verf van Staaltralie-transmissiemaste,
(xi) Konstruksie van Substasies,
(xii) Instandhouding van Substasies,
(xiii) Skoonmaak van Substasies,
(xiv) Bedrading van ekonomiese en sub-ekonomiese Kleurlinghuise,
(xv) Oproepe insake sekerings en geringe installasie herstelwerk,
(xvi) Afskakeling van verbruikers se eiendom vir versuim om te betaal,
(xvii) Tekenkantoor.

INSTANDHOUDINGSWERK:

Instandhoudingswerk is die moeilikste tipe werk om 'n bonus op te betaal, aangesien dit dikwels onmoontlik is om die werklike hoeveelheid werk vooruit te bepaal. Die probleem is opgelos deur 'n groot aantal opnames te maak en die gemiddelde tye vir sekere defek-kategorieë te bereken. Die vakman deel die defekte waaraan hy gewerk het, onder die verskillende kategorie-opskrifte in, en die toegelate ure wat dit oplewer, word bereken deur die getal defekte in elke kategorie met die toegelate tyd vir daardie kategorie te vermenigvuldig. Vir die herstel van straatlig-defekte byvoorbeeld, is slegs twee kategorieë van defekte onderskei, 'n klas 1 defek met 'n toegelate tyd van 0,4 uur of 'n klas 2 defek met 'n toegelate tyd van 0,7 uur. Beskrywings van die verskillende soorte defekte wat elke kategorie behels, is uitgeskryf en aan die vakmanne gegee om hulle te help om die defekte in kategorieë te plaas. Dis vanselfsprekend dat hierdie soort skema strenger kontrole vereis as dié waar tye vooraf bepaal kan word, en dit is volgens statistiese grondslag gedoen. Die groot aantal opnames wat gemaak is, is gebruik om 'n statistiese verdeling van defekte in klas 1 en

EXTENSION OF INCENTIVE PAYMENTS:

The success of the incentive bonus scheme for cable layers was very encouraging, but did bring another problem as the cable jointing staff could not keep up with the increased pace of cable laying. A shortage of jointers was aggravating this position, and consideration was therefore given to extending the incentive bonus scheme to the cable jointers as well.

Before deciding to extend incentive bonus schemes to other sections however, the work study staff were asked to carry out a feasibility study, as it was known that not all work could be measured. This report was submitted in November, 1972, and indicated that between 80 and 95% of the work in the various sections was directly measurable. The percentages varied from section to section, and were:

85% for Overhead Mains,
95% for Street Lighting,
80% for Substations,
90% for Installations Section,
95% for Underground Mains.

Council permission was then obtained to extend bonus schemes wherever possible, and study work began in the jointing section. Considerable resistance was experienced from the jointers as there were fears that the more experienced jointers who carried out the high tension jointing would not have the same opportunity to earn bonus as the lesser experienced jointers, who specialised on the smaller low tension joints, where the allowed times were generally of shorter duration, enabling the jointers to more profitably utilise the full working day.

It was decided that attempts would be made to get the jointers to accept the scheme voluntarily, rather than force it on them, and protracted negotiations were held. Eventually the allowed times for the joints were used, and "Control Against Standards" introduced, with the jointers being informed of the times allowed for the work they were given. During this period the jointers' performance improved from 53% to 105% and they learned that the times were fair, and that bonus could be earned. Their objections were finally overcome by offering them a group bonus scheme, where all the individual performances are pooled, and all jointers paid a bonus calculated on the average performance of the group. This scheme has also settled down well and the average performance now stands at 130%. Once these two groups had been completed, work study was extended in turn to the other sections of the distribution division, and at the time of writing, successful schemes have been introduced for the following activities:

(i) Underground Mains Cable Laying,
(ii) Cable Jointing,
(iii) Street Light Cable Laying,
(iv) Street Light Cable Jointing,
(v) Street Light Fault Repairs,
(vi) Street Light Fitting Overhaul,
(vii) Overhead Mains Construction,
(viii) Overhead Mains Maintenance,
(ix) Painting Street Light Poles and Substations,
(x) Painting Lattice Steel Transmission Towers,
(xi) Substation Construction,
(xii) Substation Maintenance,
(xiii) Substation Cleaning,
(xiv) Wiring of Economic and Sub-Economic Coloured houses,
(xv) Fuse Calls and Minor Installation Repairs,
(xvi) Disconnection of Consumers for Non-Payment,
(xvii) Drawing Office.

MAINTENANCE WORK:

Maintenance work is the most difficult type of work on which to pay a bonus, as it is often not possible to determine the actual work content in advance. This problem was solved by taking a large number of studies, and calculating average times for a number of categories of fault. The artisan classifies the faults attended to under the various category headings, and the allowed hours produced are calculated by multiplying the numbers of faults in each category by the allowed time for that category. For Street Light Fault Repairs for instance, only two categories of fault were identified: a Class 1 fault with an allowed time of 0,4 hours, or a Class 2 fault with an allowed time of 0,7 hours. Descriptions of the various types of faults forming each category were written out and given to the artisans to assist them in categorising the faults. Naturally this type of scheme requires more stringent control than those where the times can be predetermined, and this has been done on a statistical basis. The large number of studies taken were used to determine a statistical division of faults into Class 1 and Class 2 faults, an d the percentage of Class 1 faults claimed per month is

klas 2 defekte te bepaal, en die persentasie van klas 1 defekte waarvoor per maand geëis word, word as kontrole gebruik, en steekproewe word op die vakmanne uitgevoer as die getal klas 1 defekte waarvoor geëis word, buite die statistiese perk is. Dit het suksesvol geblyk te wees want sodra die vakmanne besef dat hul werk gekontroleer word, is hulle eerlik met die opteken van defekte.

Daar is egter 'n aansienlike hoeveelheid instandhoudingswerk wat nie geskik is vir bonusbetaling nie, byvoorbeeld opsporing van kabeldefekte waar baie uitgrawingswerk gedoen moet word en die werkverrigting van die lassers of slootgrawers nie deur hul eie inspanning bepaal word nie, maar in 'n groot mate deurdat hulle vir die ander groep moet wag om hul taak te voltooi.

Roetine-instandhoudingswerk van redelike tydsduur word egter makliker hanteer, aangesien die hoeveelheid werk in die gevalle beter bekend is en tye vooraf bereken kan word. Suksesvolle aansporingskemas is ingestel vir instandhoudingswerk soos die verf van substasies en pale en opknapping van transformators, stroombrekers en tapwisselaars.

ONMEETBARE WERK:

Daar is ook sekere werk wat nie gemeet kan word nie, aangesien dit te ongereeld voorkom om 'n behoorlike opname te maak. Die uitvoerbaarheidstudie wat reg aan die begin van die produktiwiteitsveldtog gemaak is, toon aan dat daar in enige afdeling sowat 15% onmeetbare werk sal wees wat nie ondersoek kan word nie, en dit is in die praktyk bewys. In sommige afdelings is die persentasie onmeetbare werk so laag as 6%, maar dit kan so hoog soos 25% in die Afdeling Oorhoofse Hoofleidings wees. Wanneer take voorkom wat nie gemeet is nie, wys die toesighouer dit aan die werkers toe en neem die werklike tyd vir die verrigting van die taak, wat dan die toegelate ure teen 100% werkverrigting word.

Hierdie toegelate tyd vir onmeetbare werk, word by die toegelate ure vir meetbare werk gevoeg met die berekening van elke bonus. Daar word ook onmeetbare werk toegelaat ten opsigte van oponthoud soos die onklaarraking van 'n voertuig, persoonlike behoeftes en rus of onmoontlikheid om werk te verrig weens reën of ander faktore.

Daar is nou 'n opname gemaak van die meeste werk en die tweede fase van die onderneming begin, deurdat die werkstudie-personeel na elke afdeling toe teruggaan en probeer het om die persentasies onmeetbare werk te verminder. Die take wat die meeste voorgekom het, is geskei van die ontleding van onmeetbare werkgeëis en opnames moet van die take gemaak word, om te besluit hoeveel tyd daarvoor toegelaat moet word.

Ons mik daarna om onmeetbare werk in alle afdelings tot onder 10% te verminder. Die onderneming sal egter elke twee of drie jaar herhaal moet word, aangesien nuwe werk ontstaan as gevolg van•verandering van toerusting, metodes of ontwerpfilosofie.

BEPLANNING:

Een van die belangrikste aspekte wat aandag moet kry wanneer daar oorweeg word om 'n aansporingskema in te stel, is werkbeplanning. Die instelling van moderne aansporingskemas om die produktiwiteit van die arbeidsmag te verhoog, is van weinig nut as vooruitbeplanning van werk ontoereikend is, en werksmense klaar is met 'n taak voordat die volgende taak vir hulle gereed is.

Enige oponthoud deurdat werk nie beskikbaar is nie, sal ook 'n sterk demotiverende faktor wees, want mense wat vinniger gewerk het om 'n bonus te verdien, sal teleurgesteld wees en voel dat hulle in die steek gelaat is as hulle weens ondoeltreffende beplanning, nie 'n bonus kan verdien nie. Die aspek het dus in die vroeë stadium van die aansporingskema heelwat aandag geniet en meer gesofistikeerde beplanningsmaatreëls is ingestel. Magnetiese beplanningsborde is aangeskaf, wat gebruik word om alle bekende werk aan te dui hetsy definitiewe of slegs beoogde werk.Die Superintendente is daarvoor verantwoordelik om die beplanningsborde op datum te hou en moet seker maak dat daar altyd genoeg werk vir hul personeel vooruit beplan word en op hulle wag.

Die beplanningsbord vir die lê van Ondergrondse Hoofleidings word in Afbeelding 2 geïllustreer. Dit is in twee dele verdeel, die linkerkant vir definitiewe werk en die regterkant vir beoogde werk, alle private woonbuurtes word departementeel benut en maak 'n groot persentasie uit van die werklas van die afdeling ondergrondse hoofleidings. Wanneer 'n nuwe woonbuurt ontwikkel word, moet die dorpseienaar van die Raad toestemming kry vir die installering van dienste. Wanneer die versoek aanvanklik gerig word, word voorlopige berekenings gemaak van die hoeveelheid kabel wat nodig sal wees en van die tydsduur in weke, en die werk word op dié deel vir beoogde werk aangeteken. Sodra die ontwikkelaar die deposito vir die benetting betaal het, word die werk definitiewe werk en word na die deel van die bord vir definitiewe werk verskuif. Die Distribusieingenieur en die Superintendent vir Ondergrondse Hoofleidings beplan die werk van die afdeling drie tot vier weke vooruit, en in daardie stadium word die afsonderlike take aan die betrokke kabellêers toegewys.

used as a control, with spot checks being made on the artisans when the number of Class 1 faults claimed is outside the statistical limits. This has proved to be successful as once the artisans realise that checks will be made, they tend to book the faults honestly.

There is, however, a significant proportion of maintenance work which is not suitable for bonus, such as locating cable faults, where a considerable amount of excavation has to take place and the performance of the jointers or trench diggers is not governed by their own efforts but to a large extent by having to wait for the other group to complete their task.

Routine maintenance work of reasonable duration however, is more easily dealt with, as in these cases the job content is more accurately known, and times can be calculated in advance. Successful incentive schemes have been installed for maintenance tasks such as painting substations and poles and overhauling transformers, circuit breakers and tap changers.

UNMEASURED WORK:

There is also a certain amount of work which cannot be measured, as it occurs too infrequently for an adequate number of studies to be taken. The feasibility study which was carried out right at the beginning of the productivity drive indicated that in any section there would be approximately 15% of unmeasured work which could not be studied, and this has been borne out in practice. In some sections the percentage of unmeasured work is as low as 6%, but can be as high as 25% in the Overhead Mains section. When jobs occur which have not been measured, the supervisor allocates these, and checks the actual time taken to carry out the job, which then becomes the allowed hours at 100% performance. This allowed time for unmeasured work is added to the allowed hours for measured work at each bonus calculation. Unmeasured work allowances are also made for hold-ups such as vehicle breakdown, personal needs and rest, or inability to carry out work due to rain or other factors.

The majority of the work has now been studied and the second phase of the exercise is being commenced, with the work study staff going back into each section to try to reduce the unmeasured work percentages. The tasks which have occurred most frequently have been isolated from an analysis of unmeasured work claimed, and studies are to be taken on these jobs, in order to derive allowed times for them.

Our aim is to reduce unmeasured work in all sections to below 10%. This exercise will however have to be repeated at intervals of two to three years as new jobs arise due to changes in equipment, methods or design philosophy.

PLANNING:

One of the important aspects which must receive attention when the introduction of an incentive bonus scheme is contemplated, is the planning of work. It is of little use introducing sophisticated incentive schemes to increase the output of the labour force, if forward planning of work is inadequate, and men come to the end of a job without the next job being ready waiting for them.

Any hold-up in the availability of work will also be a strong demotivating factor, as men who have increased their pace of working in order to earn a bonus will feel let down and disappointed if they are not able to earn a bonus through inefficient planning. This aspect therefore received considerable attention in the early stages of incentive introduction, and more sophisticated planning aids were introduced. Magnetic planning boards have been obtained, and these are used to indicate all known work, whether firm or only prospective. The Superintendents are responsible for maintaining the planning boards, and ensuring that an adequate workload for their staff is always preplanned and waiting.

The planning board for Underground Mains laying is illustrated in Figure 2. It is divided into two sections, the one on the left being form work, while the one on the right is prospective work. All private townships are reticulated departmentally, and these form a large percentage of the workload of underground mains section. Whenever a new township is in the process of being developed, the township owner has to obtain permission from the Council to have the services installed. When this initial request is made, preliminary estimates of the amount of cable required and the duration of the job in weeks are made, and the job is entered on the prospective work section. As soon as the deposit for the reticulation is paid by the developer, the work becomes firm work, and is shifted to the firm work section of the board. The Distribution Engineer and the Underground Mains Superintendent plan the work of the section three to four weeks in advance, and at that stage the individual jobs are loaded against the relevant cable layers.

Beplande stelseluitbreidings kan op die bord aangebring word as beoogde werk sodra die jaarlikse kapitaalbegroting goedgekeur is, en kan na die deel vir definitiewe werk verskuif word wanneer die roetetekeninge voltooi is.

Die totale aantal weke van werk, beide definitiewe en beoogde werk, is 'n aanduiding van die afdeling se werklas en kan vir mannekragbeplanning gebruik word. 'n Grafiek van die hoeveelheid werk word op die beplanningsbord gehou, soos in Afbeelding 3 aangedui, en volgens die wisseling van die grafiek kan die kabellêers verminder of vermeerder word, wat ook al die geval mag wees.

Daar is altyd basiese werk aan stelseluitbreiding en die werk aan dorpsbenetting wissel. Uit ondervinding het geblyk dat die mannekrag aangepas moet word om die „vaste" werklas op ongeveer 24 weke se werk per span te handhaaf.

'n Verdere stadium in die beplanning van werk is die verkryging van genoeg kabel, aangesien daar in die verlede gevind is dat kabelaflewerings die beskikbaarheid van werk kan aantas. Sodra 'n taak op die beoogde werk-afdeling van die Beplanningsbord opgeteken word, word die nodige kabel op die kabelvoorraadlyste as toegewese kabel ingeskryf. Die voorraadlyste bevat besonderhede van kabel in voorraad, op bestelling, toegewys en beskikbaar vir toewysing. Hierdie lyste word gereeld gekontroleer en bestellings word geplaas om te verseker dat daar altyd genoeg kabel beskikbaar is. 'n Voorbeeld van 'n voorraadlys verskyn as Afbeelding 4.

Soortgelyke beplanningsmetodes is vir ander afdelings opgestel. Een van die voordele wat ontstaan as gevolg van die instelling van aansporings is die verbetering van beplanningspogings en, gevolglik, ook van die reëling van konstruksie- en instandhoudingswerk.

TOESIGHOUERS:

Die instelling van aansporingsbonusse plaas 'n veel swaarder las op die skouers van die toesighoudende personeel. Nie alleenlik versnel die werkstempo en word hul vooruitbeplanningslas vermeerder nie, maar die verantwoordelikheid van die toesighouers ten opsigte van die handhawing van gehaltestandaarde word ook groter. Vanselfsprekend sal daar altyd vir die werkers 'n versoeking wees om gehalte te laat vaar ten einde meer werk te kan doen en sodoende 'n groter bonus te kry. Om hierdie rede is die toesighouers se verantwoordelikheid om gehaltestandaarde te handhaaf soveel groter, en sal hulle noukeuriger toesig moet hou. Uit die staanspoor is daar besef dat die sukses van 'n aansporingskema feitlik geheel en al op die uitvoering van hierdie pligte deur die toesighouers aangewese is en dus is daar besluit dat ook die toesighouers vergoed moet word vir hul groter verantwoordelikhede. Die klaarblyklike metode sou wees om aan die toesighouers 'n bonus gebaseer op die werkverrigting van hul afdeling te betaal maar daar is gevoel dat dit nie gerade sou wees nie, aangesien die toesighouers hul bonus regstreeks sou kon beheer deur die wyse waarop hulle die werk toewys en daaroor toesig hou. Daar is besluit om hulle nie aan hierdie versoeking bloot te stel nie. Die oplossing wat dus in Port Elizabeth gevind is, is om die toesighouer van 'n besondere afdeling 'n vasgestelde bonus van 10% van sy bruto salaris te betaal mits sy afdeling se produktiwiteit op 'n bevredigende vlak gehou word. Daar word met die bonus begin eers nadat die afdeling se produktiwiteit verhoog word, en dit kan te eniger tyd weerhou word as die hoër vlak van produktiwiteit nie gehandhaaf word nie. Die reg om 'n bonus vir 'n sekere tydperk te kan weerhou, is 'n sterk tugmaatreël wat die hoofde se gesag aansienlik versterk en verseker dat die toesighouers aktief behulpsaam is by die toepassing van die aansporingskema. Tot dusver wat dit nog nie in Port Elizabeth nodig om 'n bonus te weerhou nie.

BEHEER:

Wanneer 'n aansporingsbonus van 60% of 70% van die basiese loonskaal uitbetaal word, is 'n groot hoeveelheid geld betrokke en is dit noodsaaklik om die aansporingskema behoorlik te beheer ten einde te verseker dat geld nie onnodig uitbetaal word nie. Dit kan wel gebeur as die toesigters nie die skema reg beheer nie en onverskillig word met hul toewysing van toegelate tye, of indien die werkers 'n uitweg in die administrasie van die skema gevind het waardeur hulle hul bonus kan opjaag. Vir elke skema is daar dus beheerparameters opgestel wat in elke bonustydperk opgeteken en in grafiese vorm aangetoon word. Deur middel van hierdie parameters kan die bestuur in 'n oogopslag sien of die skema goed werk al dan nie. Van die parameters word in alle skemas aangetref, soos byvoorbeeld persentasie onmeetbare werk, persentasie verlore tyd, persentasie tyd bestee aan defekte. Die parameters vir party van die afsonderlike skemas is soos volg:

(i) Lê van ondergrondse kabels: toegelate ure per 100 meter kabel gelê, sloot per manweek en gemiddelde uitgrawingswaarde.

(ii) Lê van dienskabels: persentasie dienste aan dieselfde kant van pad as die hoofkabel en aantal dienste gelê.

Planned system extensions can be loaded on the board as prospective work as soon as the annual capital estimates have been approved, and moved to the firm work section when the route drawings have been prepared.

The total number of weeks of work, both firm and prospective, are an indication of the section's workload, and can be used for manpower planning. A graph is kept of the amounts of work on the planning board, as indicated in Figure 3, and the trend of this graph can be used to run down the cable laying force, or augment it as the case maybe.

There is always a base load of system extension work, and a fluctuating load of township reticulation. Experience has shown that manpower strength should be adjusted to maintain the "firm" workload at about 24 weeks' work per gang.

A further stage in the planning of work is the procurement of sufficient cable, as cable deliveries have in the past been found to be one factor which can affect the availability of work. As soon as a job is entered on the prospective section of the planning board, the cable required is entered in the cable stock sheets as cable allocated. The stock sheets contain details of cable in store, on order, allocated and available for allocation. These sheets are reviewed regularly and orders placed in order to ensure that sufficient cable is always on hand. A specimen stock sheet is shown as Figure 4.

Similar planning techniques have been devised for other sections. One of the benefits accruing from the introduction of incentives has been the improvement of planning effort, and thereby the management of construction and maintenance work.

SUPERVISORS:

The introduction of incentive bonuses places a much greater burden on the shoulders of the supervising staff. Not only is the pace of work increased, and thereby their forward planning load, but the responsibility of the supervisors for maintenance of quality standards is also increased. It is obvious that there will always be a temptation to the workers to cut quality standards in order to increase their output and thereby their bonus. The supervisors' responsibility for maintaining quality standards is therefore much greater, and will require much closer supervision on their part. At the outset it was realised that the performance of these tasks by the supervisors would make or break an incentive scheme, and it was therefore decided that the supervisors should also be compensated in some way for their increased responsibilities. The obvious way would be to pay the supervisors a bonus, based on the performance of their section, but this was felt to be unwise, as the supervisors would be able to control their bonus directly by their way in which they allocated and supervised the work, and it was not felt that they should be subjected to this temptation. The solution adopted in Port Elizabeth therefore is to pay the supervisors of any particular section a fixed bonus of 10% of their gross salary, provided their section's productivity is maintained at a desired level. The bonus is only commenced once the section's productivity has increased, and can be withheld at any time if the higher level of productivity is not maintained.

Being able to withhold the bonus for a period, is a strong disciplinary measure which considerably strengthens the hand of top management in ensuring that the supervisors actively assist in making the incentive scheme work. So far it has not been necessary to resort to the withholding of bonus in Port Elizabeth.

CONTROL:

When an incentive bonus of up to 60 or 70% of the basic wage rate is being paid out, a large amount of money is involved, and it is essential to adequately control the incentive scheme in order to make sure that money is not paid out unnecessarily. This can be done if supervisors are not controlling the scheme properly, and are getting lax in their allocation of allowed times, or if the workers have found some loophole in the administration of the scheme whereby they can inflate their bonus. For each scheme therefore control parameters were devised which are recorded every bonus period, and portrayed in graphical form. These parameters enable management to see at a glance whether the scheme is running smoothly or is beginning to drift. Some of the parameters are common to all schemes, such as percentage unmeasured work, percentage time lost, percentage time spent on faults. The parameters for some of the individual schemes are as follows:

(i) Underground Cable Laying: allowed hours per 100 metres cables laid, trench per man week and mean excavation value,

(ii) Service Cable Laying: percentage of services on the same side as road as the main cable and number of services laid,

(iii) Instandhouding van straatligte: Klas 1 — defekte as persentasie van totale defekte.

Hierdie beheerparametergrafieke word elke twee weke na die hoofde gestuur sodat hulle navraag kan doen oor enige afwykings of abnormaliteite wat opduik. Dit is 'n uiters nuttige manier om toesig oor die lyntoesighouer te hou en by meer as een geleentheid kon verbeteringe daardeur aangebring word.

TEKENKANTOOR SE MIKPUNTAANSPORINGSKEMA:

Die Tekenkantoor se skema verskil van die gewone bonusaansporingskema en word dus effens breedvoeriger beskryf. Die werk van 'n Elektrisiteitsdepartement se Tekenkantoor kan nie vooraf gemeet word nie, en hierdie skema berus op 'n vooraf bepaalde tyd vir 'n taak wat dan die toegelate tyd word. Eers oorweeg die Hooftekenaar en 'n Senior Tekenaar elke afsonderlike taak en neem 'n besluit oor die toegelate tyd vir daardie besondere taak. Dit word daarna aan die tekenaars toegewys met 'n taakkaartjie waarop die toegelate tyd aangedui word. Die tekenaars gee hierdie kaartjies saam met die voltooide take aan die Hooftekenaar terug, met werklike tyd bestee daarop aangeteken. Na afloop van 'n maand word die werkverrigting van al die tekenaars bereken en, deur middel van 'n formule, tot 'n standaardwerkverrigting afgebring. Die maksimum bonus betaalbaar is R330 per maand, en hierdie bedrag word onder die tekenaars verdeel volgens hul aangepaste werkverrigtings. Hierdie skema is besonder suksesvol want, hoewel die tekenaars aan die begin daaroor twyfel gehad het, blyk dit tog dat die voorafbepaling van die tye deur die Hooftekenaar en Senior Tekenaar noukeurig en konsekwent is. Die yweriger tekenaars kan nou selfs R60 per maand bonus verdien, en met hierdie positiewe motivering het die tekenkantoor se produksie aansienlik gestyg. Voor die instelling van hierdie skema was daar 'n personeel van 11; daar is nou 9 aangesien twee tekenaars wat bedank het, nie vervang is nie. Ondanks hierdie vermindering van personeel word meer werk nou in die Tekenkantoor verrig as tevore, en heers daar oor die algemeen 'n baie beter groepsgees.

SKEMASPESIFIKASIES:

Aansporings van enige aard is omstrede, en daar is altyd diegene wat die instelling daarvan teenstaan, óf uit beginsel óf uit vrees. Die vreeselement is oorheersend by die ambagspersoneel, vrees van afdanking of verlaging van lone. Die ambagsgroepe vorm 'n hegte eenheid en ondersteun mekaar getrou, en die suksesvolle instelling van aansporings is daarop aangewese dat hulle oortuig kan word dat hul betrekkings nie in gevaar gestel word nie. In Port Elizabeth het ons hul vrese uit die weg geruim deur hulle mondelings en skriftelik 'n versekering te gee dat enige vermindering van personeel slegs om natuurlike redes, en nie deur afdanking nie, teweeggebring sou word. Die ander vrees in verband met loonverlaging het ontstaan vanweë die gebruik by sekere ander organisasies om toegelate tye te verkort sodat bonusverdienstes verminder kon word. Die gebruik word as immoreel beskou. Daar is dus besluit om 'n „spesifikasie" uit te reik, waarin elke bonusskema omskryf word.

Hierdie spesifikasie is in twee dele, Deel A wat op alle skemas betrekking het (Bylae 2) en Deel B, wat vir elke spesifike skema geld. Hierdie benadering was baie geslaagd. Die moontlikheid van beswaar deur die SAVMW is voorkom deur die Sekretaris van die plaaslike tak uit te nooi na al die vergaderings waartydens skemaspesifikasies met die ambagslui bespreek is. Die SAVMW was dus altyd op hoogte van sake en het geen beswaar teen enige van die skemas geopper nie.

GEVOLGTREKKING:

Wesenlike verbetering in produktiwiteit kan by munisipale voorsieningsondernemings bewerkstellig word. Die noodsaaklikste vereistes is opgeleide werkstudiepersoneel en vasberadenheid. Niemand behoort aansporingsbonusse te probeer instel nie tensy hy ten volle besef dat dit heelwat inspanning sal verg en die besteding van heelwat tyd aan die kant van die hoofde sal vereis. Die instelling van aansporings in Port Elizabeth het vyf jaar geneem en ongeveer 19 manjare se werk deur werkstudiepersoneel, wat tot dusver 686 toegelate tye vir verskillende werkelemente bepaal het.

Die ander noodsaaklike faktor is die hoofde se vasberadenheid om te slaag. Sonder die hoofde se voordurende aanmoediging en ywer, kan die traagheid en weerstand teen verandering aan die kant van eersterangbestuur tot algehele mislukking lei.

Ny vyf jaar kan ek eerlik sê dat dit die moeite werd was. Selfs sonder die instelling van aansporings, sou dit waardevol gewees het aangesien die vasstelling van gemete tye vir take die hoofde van 'n waardevolle bestuursinstrument voorsien vir die beheer van arbeid en die bepaling van personeelgetalle. Die volle voordeel word eers werklik besef wanneer aansporings ingestel word en die produktiwiteit van die arbeidsmag verhoog word.

(iii) Street Light Maintenance: Class 1 faults as percentage of total faults.

These control parameter graphs are circulated to top management each fortnight to enable them to raise queries on any deviations or abnormalities which have occurred. This is an extremely useful means of supervising the line supervisors and has on more than one occasion allowed corrective action to be taken.

DRAWING OFFICE TARGET INCENTIVE SCHEME:

The Drawing Office scheme differs from the normal bonus incentive scheme and will therefore be described in slightly more detail. It is not possible to premeasure all the work of an Electricity Department Drawing Office, and this scheme relies on a pre-agreed time for a job which becomes the allowed time. The procedure is that the Chief Draughtsman and a Senior Draughtsman consider each individual job and decide on the allowable time for that particular job. It is then handed out to the draughtsmen with a work ticket, indicating the allowable time. The Draughtsmen return these tickets with the completed jobs to the Chief Draughtsman, filling in the actual time taken. At the end of the month all the Draughtsmen's performances are calculated, and reduced to a standard performance utilising a formula. The maximum bonus payable is R330 per month, and this is divided amongst the Draughtsmen according to their adjusted performances. This scheme has been very successful, for although there was some sceptisism among the Draughtsmen at first, the pre-determining of the times by the Chief Draughtsman and Senior Draughtsman has proved to be very consistent, and the better draughtsmen are now able to earn up to R60 per month bonus. This has proved to be a good motivator and has considerably increased the output from the Drawing Office. The complement before introducing this scheme was 11, and this has been reduced to 9 by not replacing two Draughtsmen who resigned. Despite this reduction in complement, more work is now being produced in the Drawing Office than before, and there is generally a much improved "esprit de corps" in this group.

SCHEME SPECIFICATIONS:

Incentives of any sort are a very contentious subject, and there are always those who oppose the introduction of incentives, either on principle, or out of fear. The element of fear is the predominant one amongst the artisan staff, fear of redundancies or rate cutting. Many of the artisan groups are very close-knit groups who stand together fiercely. The successful introduction of incentives depends upon being able to convince them that their jobs will not be jeopardised, and in Port Elizabeth we overcame their fears by undertaking, verbally and in writing, that any reduction in staff would be by natural wastage, and not redundancies.

The other fear, that of rate cutting, arose due to certain other organisations having resorted to the practice of reducing allowed times to reduce bonus earnings. This practice can also be considered immoral. It was therefore decided to issue a "specification" describing each bonus scheme. These were in two parts, part A which is common to all schemes (Appendix 2) and part B, which was particular to each scheme. This approach has been successful.

The possibility of objections from SAAME was eliminated by inviting the Secretary of the local branch to all meetings where scheme specifications were discussed with the artisans. SAAME was therefore always in the picture, and raised no objections to any of the schemes.

CONCLUSION:

Real improvement in productivity can be made in municipal supply undertakings, the essential requirements being trained work study personnel, and determination. No one, however, should attempt to introduce incentive bonuses without fully appreciating the fact that a considerable amount of effort will be needed, and the expenditure of a considerable amount of top management time required. The introduction of incentives in Port Elizabeth has taken five years, and involved approximately 19 man years' work by work study staff, who have to date issued 686 allowed times for different work elements.

The other essential is determination to succeed on the part of top management. Without continual encouragement and drive by top management the inertia and resistance to change of first line management would lead to complete failure.

After five years, I feel that I can truly say that the effort has been worth while. Even without the introduction of incentives, it would have been worth while, as the establishment of measured times for tasks gives management an invaluable management tool for controlling labour, and setting manpower complements. The full benefit is however only realised if incentives are introduced, and the productivity of the labour force improved.

STAD PORT ELIZABETH
SPESIFIKASIE VIR AANSPORINGSBONUSSKEMA
DEEL A — ALGEMENE VOORWAARDES

1.0 INLEIDING

Deel A bevat die algemene voorwaardes van toepassing op die betaling van 'n aansporingsbonus, d.w.s. 'n geldelike beloning vir werk verrig bo en behalwe die hoeveelheid wat vir die grondloonskaal vereis word. 'n Tweede deel van die spesifikasie word opgestel met die voorwaardes van toepassing op spesifieke departemente, afdelings of take, soos die geval mag wees.

2.0 GRONDSLAG VAN SKEMA

2.1 Werkstandaarde

Normale werkstandaarde sal deur middel van Werkmeting, insluitende Tydstudie, Aktiwiteitstoetsing, Analitiese Ramings en Sintese van Standaardgegewens, vir alle meetbare elemente vasgestel word.

2.2 Aansporingsbetalings

Die standaarde sal teen 'n „Normale" werktempo vasgestel word, wat internasionaal aanvaar word as die hoeveelheid werk wat vir die grondloonskaal verrig moet word. Aansporingsbetaling is vir werk wat bo en behalwe hierdie normale standaard verrig is. Die standaarde word vir gespesifiseerde werkswyses, toestande, gereedskap en toerusting vasgestel en, tensy dit duidelik as 'n „tydelike" waarde uitgereik word afhangende van nadere studies, sal dit gewysig word slegs wanneer 'n verandering in sodanige werkswyses, toestande, gereedskap of toerusting plaasvind of indien 'n bewysbare skryffout in bogenoemde berekening opgespoor word.

3.0 WYSE VAN BETALING

Die praktiese betalingswyse van 'n departement, afdeling of taak sal in die toepaslike tweede deel van hierdie spesifikasie uiteengesit word. 'n Bonus sal egter gewoonlik so gou moontlik uitbetaal word nadat die werk waarvoor dit verdien is, voltooi is maar mag nie vir dieselfde tydperk as die grondloon wees nie (bv. die bonus kan vir korter tydperke as die loontydperk wees en hoef nie noodwendig daarmee saam te val nie).

4.0 BONUSGELEENTHEID

Bonus word betaal slegs vir werk wat teen vasgestelde standaarde gemeet kan word. Nie alle werk kan gemeet word nie. Bonus sal dus nie vir sodanige onmeetbare werk of vir tydperke van afwesigheid om enige rede betaal word nie. Alle aanwesigheidstye by gemete werke sal by die berekening van bonus in ag geneem word. Wag- of verlore tyd om welke rede ook al, sal dus by aanwesigheidstye ingesluit word, wat die bonus sal verminder of uitskakel.

Die Raad bied of waarborg dus nie enige minimum bonusgeleentheid of bonusverdienste nie maar sal poog om 'n gelyke geleentheid aan alle werknemers in 'n afdeling op aanporingskemas te verskaf. Die maksimum bonus vir enige berekeningstydperk sal 100% wees (d.w.s. gelyk aan grondloon).

5.0 GEHALTE

Gehalte standaarde soos vereis deur die Raad word deur die verantwoordelike beamptes vir die werk vasgestel. Indien werk wat verrig is, nie van die vereiste gehalte is nie, word dit nie vir bonusberekening en -betaling aanvaar nie. Waar herstellingswerk moontlik is, sal die tyd wat aan sodanige werk bestee is, ook nie vir bonusbetaling in aanmerking geneem word nie.

6.0 VEILIGHEID

Standaarde is vasgestel vir werk wat veilig en doeltreffend verrig is, met nakoming van alle veiligheidsregulasies en behoorlike omsigtigheid. Versuim om veiligheidsmaatreëls en regulasies of voorsorgmaatreëls na te kom, kan tot gevolg hê dat die werk ongeskik vir bonus betaling verklaar word.

7.0 WERKOPSKRYWING

Dit is 'n voorwaarde van bonusbetaling dat alle werk, hetsy geskik vir bonusbetaling al dan nie, noukeurig opgeskryf word op die wyse bepaal vir die betrokke afdeling. Waar foute opgespoor word, kan bonusbetalings weerhou word, of indien dit reeds betaal is, van latere verskuldigde betalings afgetrek word.

8.0 DISSIPLINE

Enige stappe ten opsigte van bonusbetalings ingevolge paragrawe 5, 6 en 7 word gedoen sonder om af te doen van enige tugmaatreëls wat deur die verantwoordelike beampte geneem word.

CITY OF PORT ELIZABETH
INCENTIVE BONUS SCHEME SPECIFICATION
PART A — GENERAL CONDITIONS

1.0 INTRODUCTION

This Part A specification outlines the general conditions governing the payment of Incentive Bonus, that is, a financial reward for work performed over and above the quantity required for the basic wage scale. A second part specification will be produced with the conditions specific to each department, section or task as appropriate.

2.0 BASIS OF SCHEME

2.1 Work Standards

Normal work standards will be established for all measurable elements by means of Work Measurement, including Time Study, Activity Sampling, Analytical Estimating and Synthesis from Standard Data.

2.2 Incentive Payment

The standards will be established at a "Normal" work pace, internationally accepted as the amount of work to be done for the basic wage scale. Incentive payment will be for work produced over and above this normal standard. These standards are established for specified methods, conditions, tools and equipment and unless clearly issued as a "temporary" value pending further studies, will only be amended when a change in such methods, conditions, tools or equipment occurs, or for a demonstrable clerical error in the above calculation.

3.0 METHOD OF PAYMENT

The actual method of payment for a Department, Section or Task, will be specified in the appropriate second part to this specification. Bonus will generally, however, be paid as soon as possible after the work for which it is earned has been completed, but may not be for the same periods as basic pay (e.g. the bonus may be for lesser periods than, and not necessarily coincident with, the pay period).

4.0 BONUS OPPORTUNITY

Bonus will only be paid for work done against established Standards. It will not be possible for all work to be measured. Bonus will not therefore be paid for such unmeasured work, or for periods of absence for any cause. All attendance time on measured jobs will be taken into account in the calculation of bonus. Waiting or lost time from whatever cause will therefore be included in attendance hours, tending to reduce or eliminate the bonus earned.

Thus the Council do not offer or guarantee any minimum bonus opportunity or bonus earnings, but will endeavour to provide an equal opportunity to all employees in a section on incentive schemes. The maximum bonus for any period of calculation will be 100% (i.e. equal to basic pay).

5.0 QUALITY

Standards are set for work of the quality required by Council as determined by the officers responsible. Where work done is not of the required quality, it will not be accepted for bonus calculation and payment. Where rectification work is possible, time spent on such work will also be not eligible for bonus payment.

6.0 SAFETY

Standards are set for work performed in a safe and efficient manner, observing all safety regulations and exercising due caution. Non-observance of safety rules and regulations or precautions may result in the work being declared ineligible for bonus payment.

7.0 WORK BOOKING

It is a condition of bonus payment that all work, whether eligible for bonus payment or not, be accurately recorded in the manner prescribed for the section concerned. Where inaccuracies are discovered, bonus payments may be withheld or if already paid deducted from subsequent payments due.

8.0 DISCIPLINE

Any action taken in respect of bonus payments under paragraphs 5, 6 and 7 shall be without prejudice to any disciplinary action taken by the responsible officer.

MAINS CABLE LAYING JOB VALUE AND INTERIM PAYMENT SHEET

Appendix 1

JOB NUMBER	N6/25/728	CABLE LAYER	J Vermaak	DATE ISSUED	10.11.76

W.V. No.	Operation	Description	M	Units	Val.	Hrs.	W/E 17.11.76 Hrs.	W/E 17.11.76 Bal.	W/E 24.11.76 Hrs.	W/E 24.11.76 Bal.	W/E Hrs.	W/E Bal.	W/E Hrs.	W/E Bal.	W/E Hrs.	W/E Bal.	W/E Hrs.	W/E Bal.	W/E Hrs.	W/E Bal.
S10	Excavation H.T.	1-2	25	14	7,4	104	104	-												
S 9	L.T.	2-3	70	25	4,4	110	110	-												
S 8	L.T.	3-4	65	23	2,9	67	20	47	47	-										
S11	R.X.	4-5	10	10	6,9	69			69											
S14	Cable	1-2	25	.25	40	10	10	-												
S13	Pulling	2-3	70	.70	30	21	21	-												
S13		3-4	65	.65	30	20			20											
	R.X.	4-5	10	-																
S15	Back	1-2	25	14	1	14			14											
S15	Filling	2-3	70	25	.6	15			15											
S15		3-4	65	23	.6	14			14											
	R.X.	4-5	10	-																
	Rain			20	1	20			20											
Blo	Camp Shift			1	40	40	40													
		Allowed Hours					305		199											
		Non Prod @1,5 Hrs / Man / Day					15		13											
		Total Allowed Hours					320		212											
		Total Attendance Hours					250		201											
		Performance					128%		105%											

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CABLE STOCK SHEET.

NEXT DELIVERY DUE

METRES x 1000

MIN. STOCK LEVEL 8000 m

DATE	NUMBER	ACTION	QUANTITY				BALANCE		
			ORDERED	RECEIVED	ISSUED	ASSIGNED	ON HAND	ASSIGNED	AVAILABLE
29/2/76		Issued	2 000		1 726		914		2 914
31/3/76		Issued	2 000		726		188		2 188
26/4/76		Bethelsdorp 20	2 000			1 480	188	1 480	708
30/4/76		Issued	2 000		164		24	1 316	708
14/5/76		Framesby	2 000			260	24	1 576	448
19/5/76		Ordered due 19/11/76 10 000	12 000				24	1 576	10 448
29/6/76		Fernglen Erf 1	12 000			180	24	1 756	10 268
30/6/76		Issued	12 000		24		-	1 732	10 268
14/7/76		Burt Drive/4th Avenue	12 000			175		1 907	10 093
26/7/76		Kwaford 1	12 000			120	-	2 027	9 973
30/9/76		Received	10 000	2 000			2 000	2 027	9 973
3/11/76		Amsterdamhoek 7	10 000			510	2 000	2 537	9 463
30/10/76		Issued	10 000		311		1 689	2 226	9 463
					FIG 4				

MATERIAL DESCRIPTION

PEM 1257 (11 / 72) Alum. 4 Core Lt. (0,15) 95 mm^2 31 227

FIGUUR 3.

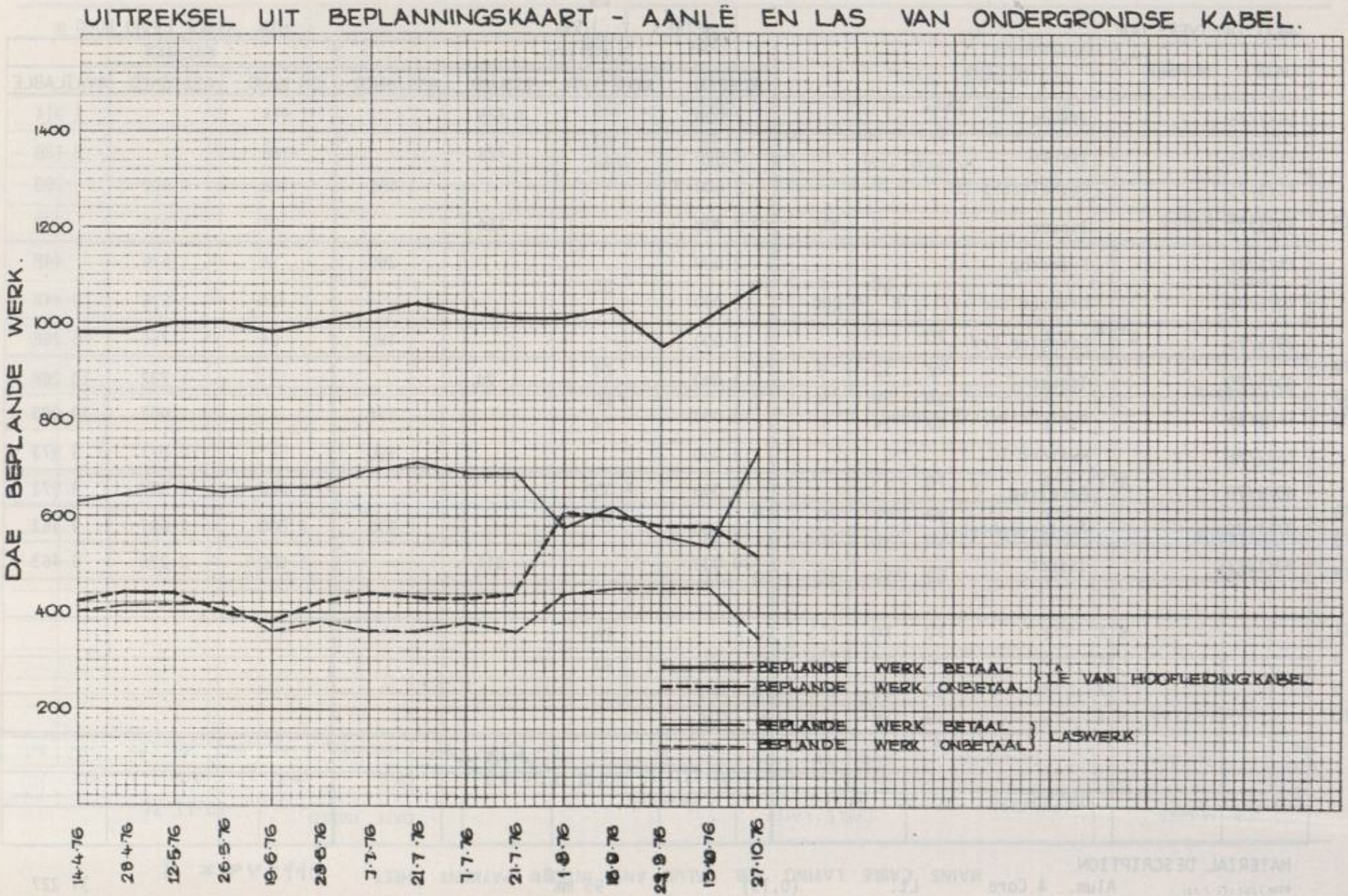
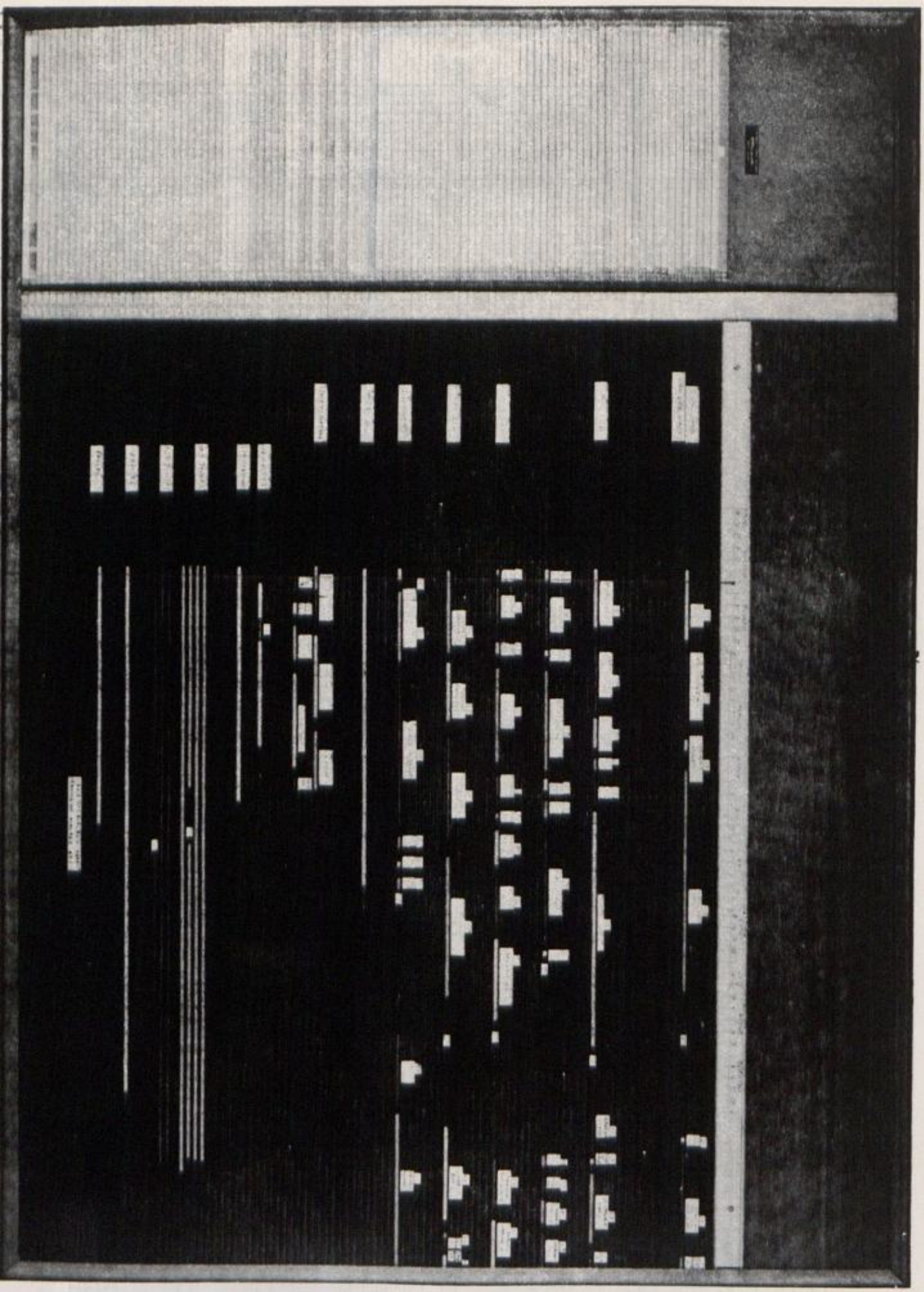

UITTREKSEL UIT BEPLANNINGSKAART - AANLÈ EN LAS VAN ONDERGRONDSE KABEL.
DAE BEPLANDE WERK.
1400
1200
1000
800
600
400
200
BEPLANDE WERK BETAAL
BEPLANDE WERK ONBETAAL
LE VAN HOOFLEIDING KABEL
BEPLANDE WERK BETAAL
BEPLANDE WERK ONBETAAL
LASWERK
14-4-76
28-4-76
12-5-76
26-5-76
9-6-76
23-6-76
7-7-76
21-7-76
7-7-76
21-7-76
1-8-76
15-8-76
29-8-76
13-9-76
27-10-76

FIGURE 3.

EXTRACT FROM PLANNING BOARD - UNDERGROUND CABLE LAYING & JOINTING.



FIGUUR 1.

AANSPORINGSBONUS : DIAGRAM VAN LOON/WERKVERRIGTING.

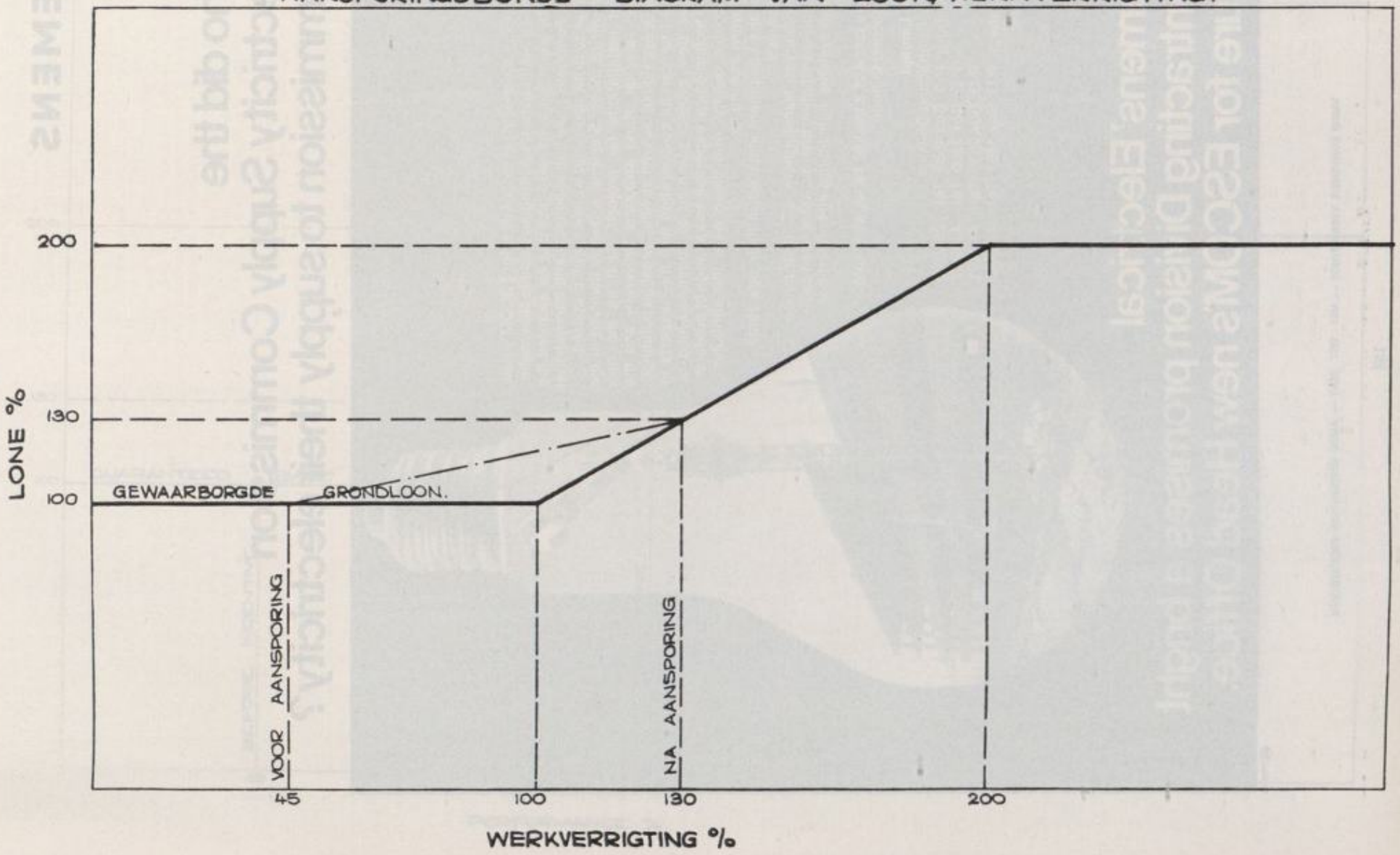
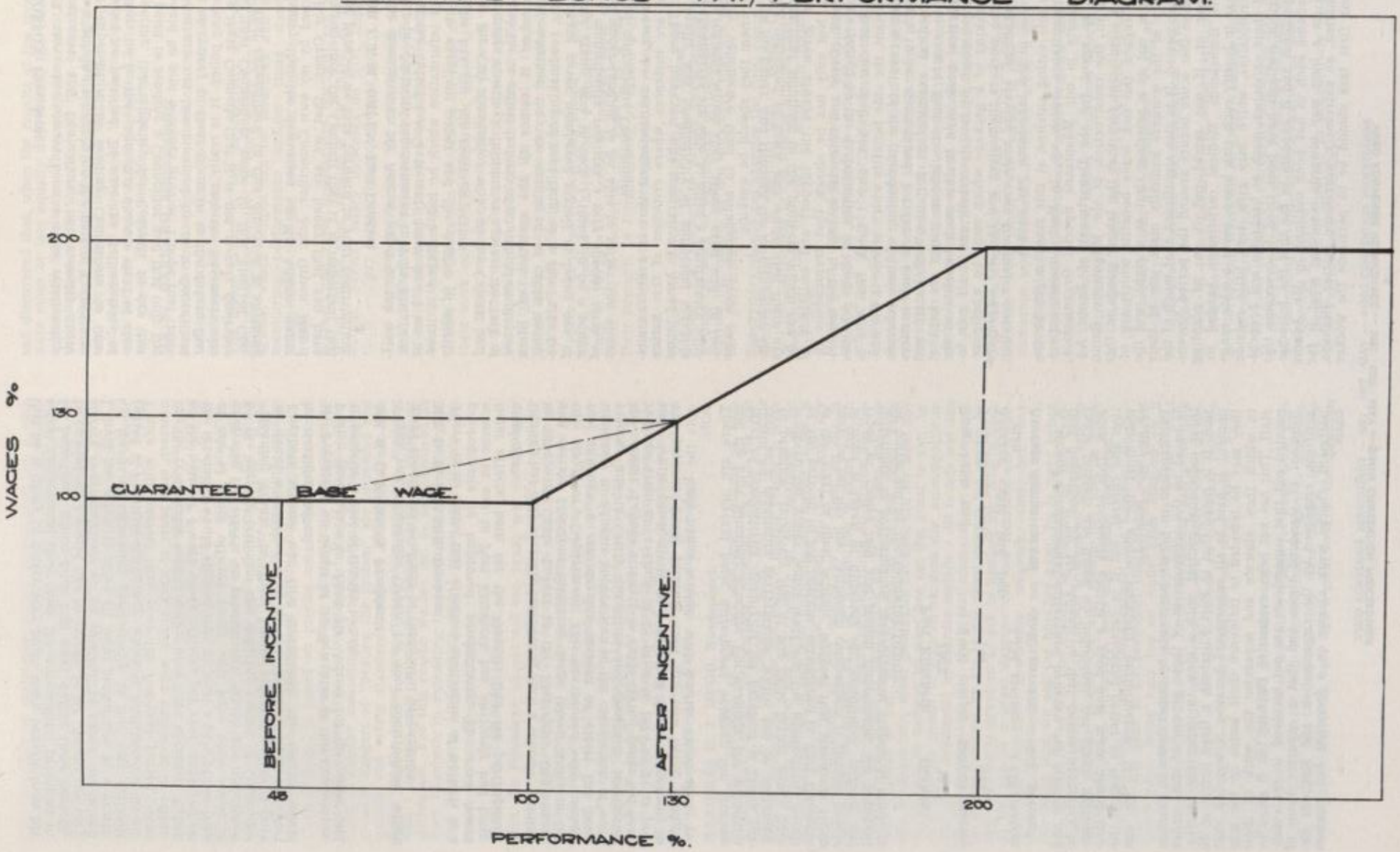


FIGURE 1.

INCENTIVE BONUS PAY/ PERFORMANCE DIAGRAM.



MR. K. G. ROBSON, President:

In the AMEU there has always been a close relationship between Engineers and Councillors, but recently there seems to be a growing tendency on the part of Councils to believe that expenditure in sending Councillors to Conventions cannot be justified. Because the deliberations of this Association lie in the somewhat obscure field of electrical engineering, the tendency for Councils to say that there is no point in sending a Councillor and that only the Engineer should be sent becomes greater. I hope that those Engineers who are not accompanied by their Councillors will be able to convey to their Councils in the future that this is the wrong policy. It is really only the Engineers who can convince their Councils that it is not merely desirable but essential that Councillors come to this kind of Convention and that expenditure in this direction is anything but wasted.

I am very happy that the discussion on Mr. Adams' paper is to be opened by my own Councillor, John Orpen. May I say, Councillor Orpen, that we are happy that you have been able to convince the Council that it is important that you should be here — we look forward to your contribution.

COUNCILLOR J. J. M. ORPEN, East London:

In opening the discussion on Mr. Adams' paper on the question of labour productivity improvement in Port Elizabeth, let me say at the outset how extremely impressed I am at the wealth of information which he has managed to incorporate into his excellent paper and the degree of clarity with which he has put his message across.

We all know the City Councillor who, at his Capital and Revenue Estimates meetings, fulminates against the lack of production and the so-called laziness of municipal employees, particularly when it comes to the question of Black labour gangs; whether they be employed in cable laying, trench digging, roadmaking or repairing, or in the Parks Department. I have never numbered myself as being one of that particular group and, in fact, I think to be a senior official in a municipality requires a very special form of patience and understanding to be able to suffer the slings and arrows of outrageous Councillors.

It must, however, be acknowledged that in every municipality there are instances where criticism of this nature be justified. Those, however, who generalise in broad terms as to the loyalty and productivity of municipal servants very seldom themselves are able to offer a satisfactory solution to the problems which they allege exist and, in fact, by their very vehemence tend to antagonise those same people with whom they should be working.

Mr. Adams, in his paper, and through the efforts of his Department, has indicated in black and white, that there are extremely practical solutions to the problem which **can** be implemented, given always the support and assistance of the Council. Not only has he shown that tremendous increases in productivity and financial savings to the municipality can be effected by the introduction of bonus schemes such as he has described but, and I think that this is equally important, the side benefits which accrue to the non-White staff as a result of the introduction of these schemes are very much to be encouraged. I refer to such matters as annual medical examination for non-White staff and the efforts to ensure that the labour gangs are kept at maximum physical peak. Add to this such benefits as the feeding scheme which he has described, and it all goes towards the making of a package which must be wholly acceptable to the workers themselves and to their employers in local Government, leaving aside even the major question of the increase in the take-home pay packet.

Perhaps an interesting sideline at this stage might be the peculiar circumstance which we, in East London, experience particularly in our Mdantsane Special Organisation, which acts as agent for the Department of Bantu Administration in the construction of the Mdantsane Bantu Dorp. It is a significant fact that the labour gangs in this organisation regard the sick leave benefits which are offered to them, not as a privilege, but as a right, and the vast majority of the workers annually make use of their full sick leave period. It is also significant that much of the absenteeism on this score occurs around the period November/December or, if one might put it so, at planting time in the Homelands. Medical certificates handed in, which appear to justify such sick leave, cover a wide range of vague complaints, which may give very little outside evidence of their existence, such as backache and bronchitis, etc. Various methods have been tried to overcome this persistent problem and it appears to me that the introduction of a scheme such as has been outlined by Mr. Adams might well go a long way towards resolving what is for this organisation, an extremely worrisome matter. Perhaps, however, our first task should be to persuade the worker that he is likely to derive very much more benefit from his actual employment than from the agricultural problems in his homelands which draw him away during these periods. In conclusion, I would like to extend to Mr. Adams my very sincere congratulations on an outstanding paper, one which I think has much to offer all local authorities as a practical means of increasing productivity in this very difficult period of financial stringency, which is hamstringing us all. I note with interest that, over the five-year period, some nineteen man years of work study were employed in effecting the remarkable results which have been obtained. Taken on the basis of 4 work study officers per year employed on the scheme, I would suggest that at least a part of the time of one of these officers could well have been spent in analysing the effects on productivity, which are occasioned by the carping criticism and delaying tactics of Councillor "Moaning Minnie" to whom I have referred before. I have no doubt whatsoever that, as was the case when the Port Elizabeth scheme was first introduced, the results would be startling indeed.

Mr. President, on behalf of the delegates at this Convention, I wish once again to thank Mr. Adams for his paper and to propose a vote of thanks to him.

MR. K. G. ROBSON, President:

Thank you, Councillor Orpen, for your contribution, which gives abundant evidence of thoughtful preparation.

MR. D. H. FRASER, Durban:

There is no doubt that effective motivation of workers is a pre-requisite to improved productivity. The cash bonus scheme in use in Port Elizabeth has obviously had beneficial effects, both for the Council and for participating employees.

Durban has only recently introduced such a scheme, starting in 1974 with Cable Layers in the Electricity Department and certain functions involving large labour units in the City Engineer's Department. This has proved very successful, although a considerable amount of effort has been necessary to educate supervisors in the completion of work returns and to verify quantities and generally administer the scheme. Labour strength in cable laying gangs has been reduced from an average of 28 prior to 1974 to 21 at present, while productivity has increased from 68 percent to 110 percent. Cable jointing staff are now being brought onto the cash bonus scheme with similar encouraging results.

There are several basic differences between the Durban and the Port Elizabeth schemes. For example, the maximum level of productivity qualifying for payment is 133⅓ percent as a maximum performance which can be sustained. In practice, relatively few of our cable laying gangs have achieved the upper bonus level and the productivity levels of 160 percent to 200 percent, established in Port Elizabeth at the start of their scheme, suggest that standards there may be set too low. Although comparison is invalid unless account is taken of differing soil conditions, number and types of cables laid and trench dimensions, the apparent difference in performance measurement standards tends to be borne out by the following figures:-

	Port Elizabeth 1973	Durban 1973
Total cable laid	172 000 metres	350 000 metres
Total labour force	144	246
Average cable laid per man	1 194 metres	1 420 metres
Average bonus earned ..	30-40 percent	5-10 percent

A second fundamental difference between our scheme and that described by Mr. Adams is that bonus payments to cable jointers are based on individual, not group performance. This obviously entails a good deal more administration and control, but it is considered better to reward the individual for above standard performance, if this can readily be calculated.

Participation in bonus payments by supervisors in Durban is based on the achievement of those groups of staff under their individual control, with a view to improving motivation. It is noted that in Port Elizabeth a fixed bonus of 10 percent is paid to all supervisors because it was felt that they may be tempted to influence their bonus by the way in which they allocate and supervise the work of their staff. This has not been evident in Durban, but it must be pointed out that supervisors are not involved in the establishment of standard times and that a separate team of verifiers, employed by the Organisation and Methods Department, checks work claims on a frequent but random basis.

The inclusion of maintenance and faults work on a cash bonus scheme based on measured work is extremely difficult and it is interesting to note the way in which Port Elizabeth have approached the problem. At first sight, it appears that the standards are somewhat loose and, while the system is likely to increase productivity, it does not appear to ensure that bonus payments correctly reflect the level of work performance. It is unlikely that such a scheme would be acceptable to our Audit Section of the Trade Unions in Durban.

To my way of thinking, one of the biggest problems in introducing an incentive bonus scheme is that of making the opportunity of increasing earnings available to all workers. The specialist non-repetitive work categories, where the better artisans are usually employed, are often the most difficult to analyse into components for which standard times can be set and the danger exists that these artisans will be attracted to the less demanding routine activities, with the prospect of earning bonus payments.

If the scheme is based on precise measurement and strict control, it will involve a large administrative organisation and take a long time to implement fully. If, on the other hand, a simpler assessment of above standard performance is used, dangers of "beating the system" are increased and quality and safety standards may be eroded. Durban has opted for the former more conservative approach, realising that a scheme once introduced cannot easily be varied or withdrawn. For this reason we are not as far advanced as Port Elizabeth in extending the scheme to all sections of the Electricity Undertaking and I must congratulate Mr. Adams on his apparent success.

MNR. J. A. LOUBSER, Benoni:

Mnr. die President, ek het net een vraag wat ek aan mnr. Adams wil vra en ek wonder of hy dieselfde probleme as ons ondervind het. Tot ongeveer so drie jaar gelede of miskien langer het ons geen probleme gehad om van ons swart werkers te kry om vir ons oortyd te werk nie. Die Raad het sedertdien goed gedink om die personeel se salaris h e e l w a t te verhoog waarvoor ons baie dankbaar was, maar dit het ongelukkig tot gevolg gehad dat dit nou 'n probleem is om werkers te kry om oortyd te werk. Met ander woorde dit skep nie indruk dat hulle genoeg geld kry — hulle wil nie nog oortyd werk om 'n groter inkomste te kry nie. Sal dit nie 'n invloed hê op hierdie bonusskema van mnr. Adams nie? Dankie, mnr. die President.

RAADSLID H. J. HUGO, Roodepoort:

Mnr. die President, ek wil net aan mnr. Adams sê baie dankie vir hierdie interessante referaat. Ek glo vir die Raadslede sal dit baie leersaam wees. Ons doen ook hierdie ding in Roodepoort, maar ons gaan 'n bietjie verder, u weet ons kry die spanne van Pietersburg en die tuislande af en dis verbasend om te sien hoe onkundig dié mense is om 'n graaf te hanteer en gevolglik, wanneer ons so 'n span kry van die tuislande af, dan besoek hy 'n skool en dit is interessant om te sien as jy so 'n man nou 'n graaf gee en sê vir hom: „laai die grond in die kruiwa en jy sien die metode wat hy toepas is onmoontlik en jy leer hom dan hoe om 'n graaf te vat. Weet u,nadat hy uit die skool kom, kry jy amper 50% meer produksie uit hom uit. Hy weet hoe om die pik te hanteer hy weet hoe om die graaf te vat, hy weet hoe om grond te gooi en ek dink die munisipaliteite kan gerus belangstel in daardie metode - dit is iets wat ons by die myne geleer het. Hulle laat niemand toe om te werk in 'n myn voordat hy nie in die skool gewees het, waar hy leer hoe om sy graaf en sy pik te hanteer nie. Nog 'n saak ek het gehoor u praat daarvan dat oor Kersfees en Nuwejaar die werkers gewoonlik wegraak. Ons het ook dieselfde probleem in ons dorp en dit is tog net menslik. Die swart man wil ook tog huis toe gaan: hy is meer geheg aan sy familie as wat ons blankes is, daarom hy hou daarvan om oor Kersfees by sy familie te wees en toe het ons op hierdie gedagte gekom om alle spanne tot niet te maak oor Kersfees en Nuwejaar, selfs die blanke personeel.

Ons werk met 'n minimum-personeel oor Kersfees en Nuwejaar, dan gaan al die personeel, die blankes sowel as die nie-blankes, terug huis toe en hulle gaan ontspan en u weet u het baie minder moeilikheid want die werker weet hy gaan Kersfees huis toe. Ander Raadslede kan gerus dink aan hierdie gedagte om die mense, jou blankes sowel as nieblankes, 'n kans te gee om Kersfees en Nuwejaar huis toe te gaan en dan is hy baie angstiger om weer terug te kom. Dankie.

MR. K. A. H. ADAMS, Johannesburg:

I have been involved in incentive wages for some time, starting with my period with Metropolitan Vickers in Manchester in 1947, and I found that they were falling into disfavour in certain areas so I had a good look at the question and discovered that, when the results of the incentive wages were more or less equally distributed, the incentive bonus scheme fell into disuse. Thus, over the years I have given this question much thought, and have come to the conclusion that, if you plot the distribution of incomes of people who are receiving incentive wages on a "log - log" scale and the gradient is below 0,1 the scheme probably will not work for very long, but if it is above 0,3 it will work very well indeed. Thank you Mr. President.

MR. W. BARNARD, Johannesburg:

Mr. President, management is seldom criticised for lack of technical expertise. It is productivity that gives top management cause for concern.

The major causes of low productivity are poor planning and inadequate control. If work study can provide standards against which output can be measured and a system of monitoring performance against those standards, then management has the tools with which to function effectively.

Workers can raise productivity but will not apply themselves unless they receive a fair share of the increased output. Normal salary increases do NOT improve productivity — "pay for performance" must apply.

This does not mean that the conventional scheme is the only method of increasing productivity. The fundamental principle of incentives is that of increased earnings in relation to work done.

Grades of workers can be created on rates of pay based on their work output. The important aspect is that the workload must be defined and subjected to work study so that performance can be controlled against proper standards. Output must be monitored through an effective performance control system. (As the control is the same, a conventional group bonus scheme can be introduced as easily — possibly with additional benefits).

I agree that incentive schemes should be geared to achieve 133⅓% (a bonus of 33⅓%) but I disagree entirely with a limit of 100%, which seems to indicate loose standards and could lead to abuses of the system or workers overtaxing their strength. In Johannesburg we favour a degressive scale above 33⅓% bonus earnings with a ceiling of 50% of basic salary.

Bonuses for Supervisors should be based on a multi-factor scheme, e.g. subject to proper pre-planning to eliminate waiting for work or equipment or transport or other factors outside the control of the workforce that are detrimental to their performance.

Supervisors should not exercise the final control over bonus determination. It is essential that a Bonus Controller who will not participate in the scheme should control the scheme and ensure that the work is accurately recorded and is in fact done.

Management control-information based on established criteria must be produced to monitor the results of the scheme and should be circulated to all concerned for the necessary action.

Reasons for low productivity should be recorded on daily work record sheets so that manegement is kept well informed of the actual work situation and is placed in a position to take immediate remedial action. Performance controls show up errors and weaknesses outside the control of the actual workforce and can pinpoint planning deficiencies.

Too much emphasis is often placed on speed of work. An accurate work study will assist in the introduction of numerous improvements in other areas which are equally important, e.g.:-

1. Poor methods (Proposed improvements and standardisation).
2. Unsuitable Black labour (Improved selection techniques introduced).
3. Untrained Black labour (Procedures Manual being compiled).
4. Inadequate tools and equipment (List of requirements compiled).
5. Inadequate on-site accommodation (Trucks now provided).
6. Lack of toilet facilities (In some cases portable toilets now provided).
7. Fluctuating strengths of gangs (Labour pools introduced to counteract this).
8. No time standards (Accurate standards now available).
9. No performance controls (Controls introduced).
10. Inadequate co-ordination/allocation of work (Centralised Control proposed).
11. General lack of interest in productivity (Being revived by Performance Controls).

12. Poor use of Black Supervisors (Good training has been provided).
13. No forward planning (Pre-planning essential for Incentive Scheme).

In conclusion, may I congratulate Mr. Adams on his extremely interesting paper.

MNR. G. C. THERON, Vanderbijlpark:

Die Hoof van Bestuursdienste van Vanderbijlpark het die volgende skriftelike kommentaar gelewer oor die referaat van mnr. Adams, nl.:-

Inleiding — punt 4: Beteken dit nie dat onproduktiewe werkers „versteek" word nie, die doel is seer sekerlik om **alle** afdelings en nie net die handelsafdeling nie so doeltreffend moontlik te laat funksioneer.

Bl. 2 — laaste paragraaf: Was hierdie bykomstige administratiewe kostes in ag geneem by die berekening van „besparing"?

Aansporingsbonus: Daar word aanvaar dat in die geval van die uitgrawings vir kabels die bonusse per span betaal is en dan gelykop tussen die lede van die span verdeel is.

Bl. 4 — Voedingskema: 1. Hoe is die koste verbonde aan die administrasie van die skema bestry? 2. Wat was die reaksie van die werkers — het hulle dit nie beskou dat dit „hulle geld" is waarmee die voedsel voorsien word en dat hulle liewer die kontant wil hê nie?

Bl. 6 — Beplanning: Wat is die posisie waar daar gedurende 'n opbloei in die ekonomie vir sekere uitbreidings beplan word maar weens 'n skielike slapte in die ekonomie geen uitvoering aan hierdie uitbreidings gegee kan word nie — word personeel verminder om die res nog 'n „bonus" te laat verdien?

Bl. 7 — Toesighouers: 1. Dit is nie duidelik wie bedoel word onder „die Toesighouer vir 'n besondere afdeling nie"? Sluit dit die Ingenieur in? 2. Is dit gewens dat bestuurspersoneel bonusse moet ontvang — hulle salarisse vergoed hulle vir hul beplannings- en beheerfunksies en die verantwoordelikhede daaraan verbonde?

Bl. 7 — Beheer: Hoe vergelyk die „koste van beheer" met die „besparings"?

Bl. 8 — Tekenkantoor: 1. Is dit nie 'n erkenning van swak toesig en beheer nie? 2. Kan die werk na-ure gedoen word? Indien wel, kom dit op oortydbesoldiging neer?

Bl. 9 — Gevolgtrekking: 1. Was die standaarde wat voor die instelling van die bonusskema toegepas is, nie die oorsaak van die „swak" produktiwiteit nie? 2. Sou beter standaarde, toesighouding, ens. nie dieselfde resultate gelewer het nie? 3. Wat gebeur indien daar nie „genoeg werk" is om die betaling van die bonus moontlik te maak nie?

Mnr. President in afsluiting net my eie woorde van dank aan mnr. Adams vir 'n baie interresante toespraak. Ek dink ons kan gerus 'n diepte studie daarvan maak. Dankie.

MR. J. K. VON AHLFTEN, Springs:

Mr. President, I would like at the outset to congratulate Mr. Adams on his paper. I have two questions on the control of incentive schemes. Firstly, there is the loophole whereby workmen can inflate the bonus. I can mention an incident on a mine where the electrician had to repair a cable. He actually entered a through joint and two adjacent joints on his bonus claim and after a period of a few years they found that he had actually made the adjacent joints with only compound in the boxes. No fault had existed! I am not quite sure how Mr. Adams can achieve complete control over all types of work in a situation like this. Secondly, I would like to ask Mr. Adams whether he can give us any idea of what the overall cost was of the time spent by top management on this scheme. Thank you, Mr. President.

MNR. H. BARNARD, Geaffileerde:

Mnr. die President vergun my die geleentheid om ook vir mnr. Adams te sê baie dankie vir 'n baie goeie referaat. Ek is van mening dat om mense net altyd meer en meer te betaal om te probeer om sodoende meer werkverrigting uit hulle te kry is die verkeerde houding. Ek voel dat daar moet meer kompetisie wees en sodoende sal die werkverrigting wat die mense het verbeter.

Ek voel nie baie gelukkig oor 'n bonusstelsel as sulks nie. 'n Ander punt is die regte verbruik van arbeid. Soos u self weet word produktiwiteit geweldig geaffekteer as die mense wat die werk self moet uitvoer nie ook 'n bietjie inisiatief aan die dag lê om toe te sien dat hulle die regte materiale en regte gereedskap betyds reg het nie. Bonus stelsel kan sekerlik kan baie probleme uitskakel, maar ek voel nogtans dat indien daar kompetisie is dit definitief makliker sal gaan. 'n Punt wat voorheen ook genoem was deur ander sprekers voor my is hoe ver moet hierdie bonusskema ingebring word by instansies soos die munisipaliteite. Die bepaling of die vasstelling van die tye of toelaatbare tye wat die mense sou gebruik om byvoorbeeld 'n brief te skryf is baie moeiliker as wanneer dit sou wees om 'n kabel end af te maak, maar dit was altyd nog 'n koue emmer water op enige van die planne om 'n bonusskema in te voer by meeste van die munisipaliteite. Dankie.

MNR. E. P. E. W. TRAUTMAN, Ladysmith:

Mnr. die President, mnr. Adams het 'n amper ongelooflike taak gedoen om sy afdeling op die grondslag van bonus of stukwerk te plaas, en ek wens hom geluk daarmee. Soos hy self sê, dit neem jare om so 'n sisteem te ontwikkel en ek is seker dat daar ook 'n elektroniese rekenaar beskikbaar moet wees om so 'n stelsel op te bou. Mnr. die President, ons departmente in die munisipaliteit werk in 'n kapitalistiese land, waar private ondernemings die hef in die hand het om aansporings elemente te gebruik ter bevordering van doeltreffende arbeid. Maar ons eie elektriesiteits afdelings, is geintegreer in 'n burokratiese sisteem wat dieselfde is as die van die sosialistiese sisteem in 'n staat agter die ystergordyn. Daar is geen aansporings elemente in daardie sisteem. In ons stelsel met ons duisende regulasies sal die private onderneming wat dit toepas in ons kapitalistiese wêreld noodwendig bankrot gaan.

Dit mag eendag oorweeg word dat elektrisiteitsondernemings soos in Europa uit die munisipale verband uitgeneem en in maatskappye omgevorm word, om in staat te wees, om aanspoor elemente vir die verbetering van die doeltreffendheid te gebduik. Mnr. Adams is op die regte pad — maar ons is in die verkeerde sisteem. Sal al die rade so 'n ingewikkelde sisteem toelaat, en wat sal die houding wees van die administratiewe afdelings soos die van die Stadsklerk en die van die Stadstesourier! Sal hulle salarisse na verhouding aangepas word! Dankie.

MR. R. E. OWEN, Affiliate:

May I first congratulate Mr. Adams on his Paper. It appears to me that some of the standards seem to be rather loose, but it is the measure of efficiency that matters. However, I would like to mention some aspects which few people realise when establishing an incentive scheme. Firstly, one must carry out a very close study of existing conditions and this in itself creates an improvement in labour output. This is a very definite move forward. Secondly, in order to run a scheme effectively, there will have to be a rather detailed recording of stoppages and so on, and thus you will have built in an automatic supervisor. Thirdly, if you extend the scheme a bit further to include the people who have to provide services for the work, for example if you bring in the lorry drivers who are feeding the men on the site, you will find that they will help to improve efficiency. But as a word of warning, may I say if you have established an incentive scheme and you ever discontinue it, you will drop in effectiveness by between 15 and 20%. Thank You.

MR. J. T. GRUNDY, Affiliate:

Mr. Adams reports an amazing increase in the productivity of Black workers. How much influence does Mr. Adams consider is involved by the 'Hawthorne Effect'. In case Mr. Adams is not entirely familiar with this, I would explain that, years ago in the Hawthorne Plant in the U.S.A., the lighting people proved to their satisfaction that, by repeatedly increasing the lighting levels, they improved productivity. On being told to put the lighting back to where it was, the productivity still increased. Thus, the effect was simply due to the workers realising that someone on Management was interested in their work. In regard to the P.E. incentive bonus systems, what allowances are made for different weather conditions?

MR. C. E. ADAMS, Port Elizabeth:

Mr. President I must say that I am very pleased to have heard all the comments this morning. I never expected the Paper to invoke quite as much comment, and I have listened to it all with great interest, particularly the comments from Durban and Johannesburg, where they are also experimenting with bonus schemes. I will try to answer all the questions or as many of them as I can remember.

First of all, Councillor Orpen raises the question of absenteeism around Christmas; now this has always been a problem, it is still a problem today, even with the bonus scheme, but in a slightly diferent form because we now find the White cable layers want to take their leave at Christmas, and that means that we have to double up on gang size, and immediately our productivity goes down, because we get away from the optimum number of bantu per gang, and that is a problem throughout the year. If a cable layer is sick and you have to double up on gang size, then productivity drops. We have not overcome that problem yet.

I was very interested in Mr. Fraser's comments, particularly his comparison of the amount of cable laid and the maximum bonus. One reason for the better productivity in Durban, I suspect, might be the different type of Bantu they are dealing with. In Durban they have Zulus, in Port Elizabeth there are Xhosas and I may be wrong, but I think the Zulu is inherently a better worker than the Xhosa. The maximum bonus of 130% set in Durban, I feel, is too low because, internationally, work study staff expect to get about a 30% improvement, in other words for the performance to settle at about 130%. Obviously that must be an average figure and there will be some performances better and some worse than 130. Therefore I feel that 130 is too low. On reflection, we might have set our too high at a 100% bonus, in other words a 200% performance level. We only achieved these very high performance levels when in the initial stages, we had a lot of supervisors and work study officers on the job. In other words, when we were experimenting and trying to educate the layers. As soon as the additional work study staff and supervisors were withdrawn, the performances dropped again to the expected level of around 130. Our overall long term average in the Council service at the moment is between 120 and 130, say 125% — so possibly we should have it slightly lower than we did, but probably higher than Durban has done. I might have created the wrong impression about group bonus schemes; we have a mixture of group bonuses and individual bonuses — we introduced the group bonus scheme for the cable jointers because they are always a very closely knit group; they form a little community within the Department and they were very much against individual bonuses because the other jointers would not have the same opportunity. To make a 22kV joint takes a lot longer than to make LT service joints and obviously the 22kV jointer could not utilise his time to the same extent. So they were against individual bonuses and we introduced a group bonus scheme primarily to persuade them to adopt this scheme, but we do have individual bonuses, the overhead linesmen are on individual bonuses and each cable laying gang is on an individual bonus, so we use a mixed scheme. Opportunity for all was mentioned by Mr. Fraser and we said right at the outset that we could not guarantee opportunity for everybody. We felt that we could study 85-90% of the work and we have endeavoured to put as many as possible of the staff on the scheme. We have not yet tackled areas like meter testing or installation work. There was a suggestion that we put installation inspectors on bonus, but we resisted this because we felt that inspection work is not one that one wants to speed up. An inspector is there for the safety of the public and we want him to take his time and do a good job. Mnr. Loubser van Benoni het oortyd gepraat, ons het nie eintlik probleme ondervind om iemand te kry om oortyd te werk nie. Al verdien hulle 'n hoër loon, kom hulle nog uit wanneer dit nodig is, ons het geen probleme in daardie verband gehad nie.

Mr. K. A. H. Adam's comment was very interesting. I was very interested to hear that the gang sizes in Johannesburg and the level of productivity compared closely to ours. That does indicate that our work study staff are working on the same "wave length". The practice of making all gangs mobile is very interesting, we haven't done that yet, although we have looked at it. And we have adopted another method — we have entered into an agreement with a bus company and they now lay on special buses and transport for all our bantu workers to the work sites. We find that this is a very good scheme, they get there early, they are at the site before 07h30 in the morning and they leave at 17h15. It is cheaper to do this than to run our own transport. We have achieved savings of something like R60 per day on transport by utilising the buses. So far this scheme is working very well and we hope it will continue.

Mnr. Theron het baie vrae gevra, ek glo nie ek het hulle almal neergeskryf nie. Ek dink baie van hulle was in verband met koste — koste van die voedsel en die koste van die administrasie van die skema. Dit kos eintlik nie veel om hierdie skema dit administreer nie, dit is net een klerk wat nodig is en sy salaris is maar baie min as u dit vergelyk met die onkoste van die hele department, so die koste van die skema self is maar laag. Daar was 'n vraag oor oortyd van mnr. Theron, maar ek kan nie onthou wat dit was nie.

Mr. von Ahlften mentioned the control of the scheme and cost of top management time — we have never said that we would achieve 100% control, we have always realised there is the danger of a jointer closing up a hole over a bad joint. What we do in a case like this, is to make him go back and rectify the job in his own time and we cancel his bonus. It very seldom hapens, but it does place a much greater responsibility on the supervisor; he has to get around a lot more and has to see a lot more of the work to make sure standards are being maintained. So far we have achieved a reasonable standard of control without a drop in quality of the work. The cost of top management time has not been estimated. I think it would be quite high, but it is like the cost of work study. Once you have finished the study and adopted the scheme and you achieve the anticipated savings over the years, the savings will far exceed the cost of top management time, but it does take a lot of top management effort, in other words top management has to motivate this all the way through. You can't start the scheme and then leave it to the middle management staff to carry out — it needs top management push all the way through until it is established.

M. Owen mentioned the drop in effectiveness. We did actually experience this with the scheme for disconnections. The scheme was introduced and then there was an objection from anotner department, because these were administrative types to whom we were paying the bonus, and the committee decided to cancel the scheme as far as they were concerned. The performance increased to about 130-140 when the scheme was introduced. As soon as we withdrew the bonus scheme the performance dropped off markedly and it went down below 70. Obviously this had a demotivating efect when they had in fact had something taken away from them. Then we got together with the treasury and we showed the Council the backlog of disconnections that was building up. They agreed to re-introduce the bonus scheme and the performance went up again and is now running around 140%. Therefore if you take away a bonus scheme your performance will drop to below what was the pre-bonus level, but let us hope that we don't have to do that.

Ek het mnr. Theron se vrae nou hier. Die inkomste en administratiewe koste. Dit was net die een klerk soos ek alreeds gesê het en sy salaris is nie baie hoog nie, dit is maar baie min in vergelyking met die besparing wat ons gevind het. Beplanning — die posisie gedurende 'n opvloei in die ekonomie, sover het ons nog nie hierdie probleem ervaar nie.

In verband met die tekenkantoor het hy gevra is dit nie 'n erkenning van swak toesig in beheer nie — dit mag so wees maar ek glo nie dit is heeltemaal so nie want 'n bonus skema moet meer werk kry as wat 'n man gewoonlik sou doen, met ander woorde ons wil 'n persentasie van meer as 100 kry, en dus nie net 'n saak van toesig nie, want as jy goeie toesig het dan sal dit verbeter tot omterent 100 maar nie hoër as 100 nie. Jy moet die personeel motiveer om meer as 100 uit te gee.

MR. K. G. ROBSON, President:

Mnr. Adams ek wil u geluk wens met hierdie referaat wat u vandag hier gelewer het. The number and range of contributions that we have received this morning demonstrates, I believe, the value of the Paper you presented to this Convention and I am quite sure that it is going to serve as a basis for study by a number of Undertakings that haven't considered or discussed the problem with their work study people. Obviously there is a good deal of stimulating thoughts that we should take back and apply in our own particular situations. May I also have the pleasure of presenting you with a second tie.

It is a pleasure to welcome our next speaker, Mr. S. G. McCullough. I got to know Mr McCullough through telephone conversations and correspondence and it was very nice to meet him in person. I think it is particularly fitting that I should record the appreciation of the AMEU to the Johannesburg Electricity Department for their continuing contributions to the work of the AMEU.

We had a most timely paper from Mr Vic Raynal at the Durban Convention two years ago and we are now to hear another timely paper — this time from Mr McCullough. To you, Mr. Barnard and the Electricity Department of the Johannesburg City Council our appreciation.

In Mr. McCullough's present capacity of Management Services Engineer he is involved in departmental budgeting and tariffs and is responsible for the statistical and computer sections of the Electricity Department. Mr. McCullough, you certainly have an interested and attentive audience.

Electrisiteitsvoorsieningstariewe met besondere verwysing na Johannesburg

Deur

S. G. McCULLOUGH
B.Sc.(Ing.)(Natal)

1.0 INLEIDING

Daar is reeds baie geskrywe oor die onderwerp van elektrisiteitstariewe maar daar bly steeds wyduiteenlopende menings oor wat beskou word die regte benadering behoort te wees. Vir hierdie rede sal geen poging aangewend word om die ideale elektrisiteitstarief te omskryf nie. Instede word beplan om grondliggende begrippe te bespreek, om die Johannesburgse elektrisiteitstariewe oor die afgelope 25 jaar te skets en dan die huidige tariefstruktuur meer besonderlik te ondersoek; met sy voordele en tekortkomings. In besonder sal die vereiste vir 'n outomatiese tariefaanpassing, om te vergoed vir skommelings in Evkom se pryse, oorweeg word.

Die doel van enige elektrisiteitstarief is om 'n inkomste te verseker wat genoegsaam is om onkostes te verhaal en om enige benodigde surplus te verskaf. 'n Nie-tegniese persoon se onmiddellike reaksie hierop kon heel moontlik wees dat daar hoegenaamd geen probleem behoort te wees om 'n geskikte elektrisiteitstarief op te stel nie. Al wat blykbaar nodig skyn te wees is om die benodigde inkomste te verdeel deur die beraamde aantal elektrisiteitseenhede wat verkoop sal word in dieselfde tydperk en dit sal die verkoopsprys per elektrisiteitseenheid aangee. Indien so 'n teorie volledig was, sou die benodigde inkomste wel daar wees. Slegs 'n oppervlakkige ondersoek van die toestand is egter nodig om die gebreke van so 'n eenvoudige tariefstruktuur bloot te lê, en dit sal faal omdat dit nie REGVERDIG is nie. Dis onregverdig omdat dit nie die laseienskappe van die verskillende tipes verbruikers in aanmerking neem nie en dit sal spoedig die voorsieningsoutoriteit in tegniese probleme en bankrotskap laat beland.

Om suksesvol te wees moet 'n elektrisiteitstarief:-

(a) Aanvraagsverwante kostes (meestal kapitaal) verhaal,
(b) Vasstaande kostes verhaal,
(c) Energieverwante kostes verhaal,
(d) Hoë lasfaktor aanmoedig,

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Electricity supply tariffs with special reference to Johannesburg

By

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1.0 INTRODUCTION

Much has been written on the subject of electricity tariffs but there still remains a wide divergence of opinion of what is considered to be the correct approach. For this reason no attempt will be made to formulate the ideal electricity tariff.

Rather it is proposed to discuss basic concepts, outline the electricity tariffs of Johannesburg over the past 25 years and then examine in greater detail the present tariff structure — its merits and deficiencies. In particular, the need for an automatic adjustment in tariff to compensate for variations in Escom charges for electricity will be considered.

The purpose of any electricity tariff is to bring in income sufficient to recover costs and to provide whatever surplus is necessary. The immediate reaction of a non-technical person could easily be that there is no problem whatsoever in determining a suitable electricity tariff. All that would seem to be needed is to divide the required income by the anticipated number of units of electricity to be sold in the same period to obtain the selling price per unit of electricity. If such theory was complete the required income would accrue.

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However, only a superficial examination of the situation is all that is necessary to reveal the major flaws of such a simple tariff structure which fails because it is NOT FAIR.

It is not fair because it does not give recognition to the load characteristics of the various classes of consumers and would soon lead the supply authority into technical difficulties and to bankruptcy.

To be successful an electricity tariff must

(a) Recover demand related costs (mostly capital),
(b) Recover fixed costs,
(c) Recover energy costs,
(d) Encourage high load factor,

(e) Belasting met hoë arbeidsfaktor aanmoedig,
(f) 'n Bedryfsoorskot voorsien,
(g) Aanneemlik en prakties wees.

1.1 AANVRAAGSVERWANTE KOSTES

Die aanvraag vir, of tempo waarteen, elektrisiteit verbruik word, bepaal die vermoë van die opwekkingstoerusting en verspreidingsstelsel wat aangebring moet word om die las te voorsien, en daardeur die kapitaalkostes van die aanleg. Wanneer hierdie kapitaalkostes eens aangegaan is, word rente en redempsiekostes gevorder, normaalweg oor 'n tydperk van 25 jaar, en hierdie kostes moet verhaal word, ongeag of elektrisiteit verbruik word of nie. Die erkende wyse waarop hierdie aanvraagsverwante kostes verhaal word is as volg:-

(a) Deur 'n beskikbaarheidsheffing in die tarief in te sluit, wat betaalbaar is ongeag of toevoer geneem word al dan nie;
(b) Deur gebruikmaking van 'n „kamerbasis" waarvolgens 'n hoë aanslag gemaak word ten opsigte van 'n gegewe aantal eenhede vir elke kamer in die veronderstelling dat aanvraag verwant is aan die getal kamers;
(c) Deur 'n bloktarief te gebruik waardeur die eerste en tweede blokke eenhede teen hoër eenheidstariewe aangeslaan word as die daaropvolgende eenhede;
(d) Deur volgens gemete aanvraag aan te slaan.

1.2 VASSTAANDE KOSTES

Ongeag die werklike aanvraag vir elektrisiteit, word maandelikse kostes aangegaan in die bedryf en onderhoud van die kragsentrales en verspreidingsstelsel sowel as in die administrasie van die voorsieningsliggaam. Hierdie kostes moet uit die verkoop van elektrisiteit verhaal word. Met 'n bietjie nadenke sal daar besef word dat baie van die sogenaamde „Vasstaande kostes" in werklikheid aanvraagsverwant is. Kragstasies word opgerig volgens 'n eenheidsmaatstaf waarvolgens elke eenheid sy eie bedryfspersoneel vereis en 'n gegewe opwekkingsvermoë het. 'n Groter en duurder verspreidingsinrigting word nodig om swaarder belasting te kan dra en administrasiekostes wissel volgens die aantal verbruikers.

1.3 ENERGIEVERWANTE KOSTES

Die volgende kostes is direk verwant aan die hoeveelheid elektrisiteit wat opgewerk word:-

(a) Brandstof (steenkool en brandolie) aankope;
(b) Koste van water, smeerolie en gries, verbruiksmateriaal en voorrade sowel as rookgasbehandeling en voorrade en vervangings vir verpoeieringsmeulens, waar toepaslik;
(c) 'n Persentasie (teenswoordig 20% vir Johannesburg) van herstel- en onderhoudsuitgawes. (Die balans van H en O uitgawes is vir salarisse en lone van die bestaande onderhoudspersoneel, en is derhalwe nie direk verwant aan die hoeveelheid elektrisiteit wat opgewerk word nie).
(d) I^2R verliese in verspreiding.

Hierdie energieverwante kostes word normaalweg verhaal as 'n aanslag per kWh op die verbruikte elektrisiteit.

1.4 LASFAKTOR

Indien die beste opbrengs van die kapitaalbelegging verkry moet word, moet die gebruikmaking of lasfaktor van die kapitaalaanleg so hoog moontlik wees. Dit word op sy beste bereik deur verbruik gedurende tye van swaar stelselbelasting te beperk of te ontmoedig en verbruik van elektrisiteit aan te moedig in buitespitstye. In toepassing word die doel gewoonweg bereik.

(a) Deur die gebruik van tweeslagtige meting waarvolgens elektrisiteit, gedurende sekere tye van die dag verbruik, teen hoër of laër koerse aangeslaan word;
(b) Deur heffing van 'n aanvraagaanslag op die aangetekende aanvraag;
(c) Deur gebruik van lasbeheer.

Al drie metodes is ongelukkig duur en gaan gemoeid met aansienlike kapitaal- en onderhoudsuitgawes. Dit is gevolglik slegs moontlik om aanvraagsmeting aan te bring by groot verbruikers, wat dan 'n gedurige aansporing het om bedryfsgebruike in oorweging te neem teneinde hulle elektrisiteitsrekeninge te verlaag.

Die hoë koste sluit gewoonweg die gebruik van aanvraagsmeting op huishoudelike persele uit. Indien 'n elektrisiteitstarief bedink kan word wat 'n aansporing vir hierdie klas verbruiker inhou om die koste te dra vir aanbring van spitslasbeheer toerusting vir water- en ruimteverwarmingskoste gedurende tye van belasting, sal geweldige besparings in kapitaalkoste van opwekkings- en verspreidingsstelsels volg. Dit is verreweg goedkoper en meer doelmatig om die aanvraag op 'n stelsel te verminder as om die gelykwaardige bykomstige vermoë te voorsien.

(e) Encourage high power factor loads,
(f) Provide an operating surplus,
(g) Be acceptable and practical.

1.1 DEMAND RELATED CHARGES

The demand for, or rate at which electricity is consumed, determines the capacity of the generating plant and distribution network which has to be installed to supply the load and therefore the capital cost of the plant. Once these capital items have been purchased, interest and redemption charges are incurred usually over a period of 25 years and these costs have to be recovered whether or not electricity is consumed. The recognised methods of recovering these demand related costs are as follows:-

(a) By the inclusion in the tariff of an availability charge which has to be paid whether supply is taken or not;
(b) By the use of a "room basis" whereby a high charge is made in respect of a given number of units for each room on the assumption that demand is related to the number of rooms;
(c) By the employment of a block tariff whereby the first and second blocks of units consumed are charged at higher rates than follow on units;
(d) By charging for measured demand.

1.2 FIXED CHARGES

Irrespective of the actual demand for electricity, monthly costs are incurred in the operation and maintenance of the power stations and distribution network as well as in the administration of the supply organisation. These costs have to be recovered from the sale of electricity. If a little thought is given to the matter many of these so called "fixed charges" can in fact be seen to be demand related. Power stations are built on a modular basis with each module requiring its own operating staff and providing a given generation capacity. A larger and more costly distribution organisation is required to carry heavier loads and administration costs vary with the number of consumers.

1.3 ENERGY CHARGES

Directly related to the quantity of electricity produced are the following costs:-

(a) Fuel (coal and furnace fuel oil) purchases;
(b) Cost of water, lubricating oils and greases, waste and operating stores as well as flue gas treatment and spares and replacements on pulverising mills, where applicable;
(c) A percentage (at present 20% in the case of Johannesburg) of Repairs and Maintenance expenditure. (The balance of R and M expenditure is for salaries and wages of the fixed maintenance staff, and are therefore not directly related to the quantity of electricity produced);
(d) Distribution I^2R losses.

These energy related costs are normally recovered as a charge per kWh of electricity consumed.

1.4 LOAD FACTOR

If the greatest return on Capital Investment is to be gained, the usage or load factor on the Capital plant should be as high as possible. This is best done by limiting or discouraging consumption at times of high system demand and encouraging the consumption of electricity at off-peak periods. In practice this is usually achieved

(a) By the use of two rate metering whereby electricity consumed at certain periods of the day is charged at higher or lower rates;
(b) By the imposition of a demand charge on recorded demand;
(c) By the use of load control.

Unfortunately all three methods are expensive and involve considerable capital outlay and maintenance charges. It is therefore only practical to install demand metering at large consumers who therefore will have constant incentive to review operating procedures to reduce their electricity bill.

The high cost generally precludes the use of demand metering on domestic premises. If an electricity tariff can be devised to provide the incentive for this class of consumer to bear the cost of providing load control apparatus for the control of water and space heating loads at times of high system demand, enormous reductions in capital costs of generation and distribution plant will result. It is far cheaper and more effective to reduce the demand on a network than it is to provide the equivalen additional capacity.

1.5 ARBEIDSFAKTOR

Die verhoogde stroom vereis deur 'n las met 'n swak arbeidsfaktor kan vir 'n voorsieningsoutoriteit duur te staan kom omdat transformators, skakeltoerusting en die verspreidingsstelsel as 'n geheel hoër aangeslaan moet word om die las te dra. Swak spanningsreëling as gevolg van laste met veranderende arbeidsfaktor kan ook ernstige gevolge hê.

In die algemeen is ons gelukkig dat die las arbeidsfaktor van die gemiddelde huishoudelike verbruiker, waaroor weinig beheer uitgeoefen kan word, baie naby eenheidswaarde het. Probleme word egter ondervind met die industriële verbruiker en die voorsieningsoutoriteit het 'n keuse van drie maatreëls:-

(i) Aanvaar die toestand en die koste;
(ii) Dwing 'n laer perk van aanneembare arbeidsfaktor af;
(iii) Laat die verbruiker betaal vir sy swak arbeidsfaktor.

Die afdwing van 'n laer perk op arbeidsfaktor is duur omdat dit gereelde arbeidsfaktor-meting op alle verbruikerspersele vereis en dit beteken die gebruik van vaardige personeel en betreklik ingewikkelde toerusting.

Die gebruik van kVA aanvraagmeters is die geredelik aanvaarde manier om verbruikers te laat betaal vir die swak arbeidsfaktor van hulle las en gee hulle die gedurige geldelike aansporing om die toestand te verbeter.

1.6 BEDRYFSOORSKOT

Goeie besigheidsbeginsels vereis dat enige elektrisiteitstarief 'n bedryfsoorskot moet wys. Die grootte van hierdie oorskot, of dit nou aangewend word vir belastingsverligting, kapitaalbesteding of vir 'n tariefbestendigingsfonds, is egter 'n bestuurbeleidsbesluit. Bespreking van die aangeleentheid val buite die bestek van hierdie verhandeling.

1.7 TARIEF AANVAARBAARHEID EN PRAKTIESE TOEPASSING

Die begrippe soos hierbo aangebied, behoort die grondslag te vorm van enige elektrisiteitstarief, maar ander faktore, ekonomies, polities en sosiaal, moet ook in aanmerking geneem word.

Daar mag byvoorbeeld, besluit word dat, omdat Industrie sake doen om geld te maak, dit verlang moet word om meer vir elektrisiteit te betaal as ander seksies van die samelewing wat nie in staat is om geldelike voordeel te trek uit die gebruik daarvan nie.

Politieke en sosiale faktore kan maklik afwykings van die tariefsamestellings, opgestel volgens gesonde matematiese beginsels, voorskryf.

Dit is derhalwe noodsaaklik dat, voordat enige tariefsamestelling aangeneem word, die finansiële gevolge vasgestel moet word, nie slegs wat die oorsigtelike beeld betref nie, maar ook vanuit die oorweging van hoedat dit individuele groepe verbruikers sal raak. Die beste manier om so 'n analise te doen is deur 'n komperloop van vorige rekeninge, of 'n verteenwoordigende monster van sulke rekeninge, waardeur uitsonderlinge afwykings van die verwagte uitslag vanself uitgewys sal word.

Elektrisiteitstariewe behoort eenvoudig te wees en behoort nie teenstrydighede te veroorsaak, soos byvoorbeeld waar 'n verhoogde elektrisiteitsverbruik 'n verlaging in die maandelikse rekening veroorsaak, nie.

Dit is met hierdie oorwegings in gedagte, dat die elektrisiteitstariewe van Johannesburg oor die afgelope 25 jaar in oorsig behandel word.

2.0 JOHANNESBURG SE ELEKTRISITEITSTARIEWE: GESKIEDKUNDIG

Beginnende met die 1952 elektrisiteitstarief as 'n verwysingsbasis, is veranderings in die tariefsamestelling aangebring in 1956, 1959 en in 1972, toe die huidige tariefsamestelling opgestel is. In November 1973 het die Administrateur die invoeging van 'n steenkoolpryswisselingsklousule in die tarief goedgekeur sodat 'n outomatiese wysiging in die eenheidspryse gemaak kon word om te vergoed vir prysstygings van steenkool, wat tot dan toe slegs in rekening gebring was ten tyde van tariefshersienings.

Wysigings in die prysvasstelling van die 1972 tarief is aangebring in Oktober 1975, April 1976 en Desember 1976. Hierdie wysigings het die vorm aangeneem van konsolidasie van eenheidspryse en die steenkoolpryswisseling aanpassing op eenhede as 'n persentasietoename in alle heffings om die toenemende bedryfskoste van die Afdeling in aanmerking te neem, in besonder die groot toename in betalings aan Evkom vir steeds toenemende hoeveelhede elektrisiteit ingevoer teen vinnig stygende pryse.

2.1 OORSIG VAN TARIEWE 1952 - 1972

Die jare van 1952 - 1972 was gekenmerk deur 'n betreklik bestendige finansiële klimaat met min van die huidige inflasionêre neigings te bespeur, en dit is weerspieël in die bestendigheid van die Raad te tariewe. Gedurende daardie jare is 'n tariefstabilisasiefonds gebruik om inkomste oorskotte of tekorte wat voorgekom het, op te neem totdat 'n tariefverandering nodig geword het.

1.5 POWER FACTOR

The increase in current drawn by a load of poor power factor can be very costly to a supply authority because transformers, switchgear and the distribution network as a whole have to be uprated to take the load. Poor voltage regulation resulting from loads of changing power factor can also have serious consequences.

We are generally fortunate that the power factor of the load of the average domestic user, over which little control can be exercised, approaches unity. Problems do, however, arise from the industrial consumer and three choices are open to the supply authority:-

(i) Accept the situation and the cost;
(ii) Enforce a lower limit of acceptable power factor;
(iii) Make the consumer pay for having a bad power factor.

The enforcement of a lower limit of power factor is expensive because it necessitates periodic measurement of the power factor on all consumers' premises and involves the use of skilled personnel and relatively sophisticated equipment.

The use of kVA demand meters instead of kW demand meters is the readily accepted means of making consumers pay for their bad power factor load and provides them with the ever present financial incentive to improve the situation.

1.6 OPERATING SURPLUS

Good business principles dictate that any electricity tariff should provide an operating surplus. However, the magnitude of such surplus, whether it be directed towards the relief of rates, capital expenditure or to a tariff stabilisation fund is a management policy decision. Discussion on this subject does not fall within the scope of this paper.

1.7 TARIFF ACCEPTABILITY AND PRACTICAL APPLICATION

The concepts which have been presented above must form the basis of any electricity tariff structure but other factors, Economic, Political or Social, have to be taken into consideration as well.

It might, for example, be decided that because Industry is in business to make money it should be called upon to pay higher charges for electricity than those sections of the community which are not able to benefit financially from its use.

Political and Social factors can easily dictate departures from tariff structures constructed from mathematically sound principles.

It is imperative, therefore, that before any tariff structure is adopted, its financial consequences be ascertained not only in respect of the overall picture but as it might affect individual groups of consumers. Such analysis is best done by a computer run of previous accounts or representative samples of such accounts whereby abnormally high deviations from the anticipated average result can automatically be highlighted.

Electricity tariffs should be uncomplicated and not lead to anomolous situations whereby, for example, a higher consumption of electricity can lead to a reduction in the monthly account.

It will be with these concepts in mind that the electricity tariffs of Johannesburg over the past 25 years are reviewed.

2.0 JOHANNESBURG'S ELECTRICITY TARIFFS: HISTORICAL

Commencing with the 1952 electricity tariff as a reference, basic changes in the structure of the tariff were made in 1956, 1959 and in 1972 when the present tariff structure was formulated. In November, 1973, the Administrator approved the inclusion of a coal escalation clause in the tariff in order that an automatic adjustment in the unit rates could be made to compensate for price rises of coal which had hitherto only been taken into account at the time of tariff revisions.

Amendments in the pricing of the 1972 tariff were made in October 1975, April 1976 and December 1976. These amendments took the form of a consolidation of unit prices and the coal price adjustment for units, as a percentage increase of all charges, to take into account the growing running costs of the Department and in particular the large increases in payments to be made to Escom for ever increasing quantities of electricity imported at rapidly escalating prices.

2.1 REVIEW OF TARIFFS — 1952 - 1972

The years from 1952 - 1972 were characterised by a relatively stable financial climate with little of the present inflationary trends in evidence and this was reflected in the stability of the Council tariffs. During these years a Tariff Stabilisation Fund was employed to absorb excesses or shortfalls in income that accrued until a tariff revision became necessary.

So vroeg reeds as 1952 is aansporings gemaak om die gebruik van elektrisiteit aan te moedig en om die lasfaktor en arbeidsfaktor te verbeter, maar dit was slegs werklik van 1959 af aan dat die beginsel van groter aansporing teneinde die stelsel se lasfaktor te verbeter, deur middel van 'n meer aantreklike „buitespitstyd" skaal, gevolg is. Hierdie „buitespitstyd" skaal, gewysig om in besonder op massa waterverwarming van toepassing te wees, was gemik op die vermindering van die omvang van lugbesoedeling, wat op daardie tyd sorg gebaar het, deur 'n ekonomies aanvaarbare alternatief teenoor steenkool te verskaf, terwyl dit terselfdertyd die naglas op die Raad se kragsentrales verhoog het.

Gedurende hierdie tydperk het die Raad ook sy tarief van heffings gewysig en is daar vordering gemaak in die rigting van rasionalisasie en vereenvoudiging van die tariefstruktuur. Dit het beide die toepassing daarvan en die meterlesingsprobleme vereenvoudig terwyl dit terselftertyd tred gehou het met die veranderende tendense van elektrisiteitsverbruik en die voorspelbare, steeds toenemende, kostes.

2.2 1972 - 1977 ELEKTRISITEITSTARIEF

Die huidige elektrisiteitstarief van Johannesburg is in 1972 opgestel en is baie eenvoudig.

Bloktarief Skaal 1: Huishoudelik

Die aanslag op die huishoudelike verbruiker word hieronder uiteengesit:-

Eenhede Verbruik/ Units Consumed	Tarief soos aangekondig c/eenheid/ Tariff as published c/unit				Toepaslik/Applicable (1)
	Julie/July 1972	Julie/July 1975	April/April 1976	Des./Dec. 1976	Des./Dec. 1976
0 - 300	1,6	1,95	2,33	2,85	2,871
Volgende 1 000 Next	0,65	0,84	1,05	1,37	1,391
Balans/Balance	0,5	0,66	0,84	1,13	1,151

(1) Eenheidskoste sluit 'n steenkoolprys aanpassing van 0,021 c/eenheid in.

Hierdie tarief is die eerste wat afwyk van die tevore aangenome kamerbasis tipe vir die algemene huishoudelike verbruiker en dit skakel die moeilikhede verbonde aan die onderhoud van besonderhede oor die aantal kamers van elke verbruiker en die gepaardgaande administratiewe koste, uit. Omdat dit ook van die blok tipe is, bevredig dit die besware van 'n verbruiker wat 'n rekening moet betaal as geen verbruik geregistreer was nie (verbruiker met vakansie) omdat daar geen staande- of diensheffing is nie.

Meeste van die aanvraagsverwante kostes word verhaal uit die eerste blok van 300 eenhede, wat die minimum verbruik van verreweg die meeste verbruikers uitmaak. Enige oorblywende aanvraagsverwante kostes word verhaal in die volgende blok van 1 000 eenhede. Ontleding het bewys dat, waar die verbruik deur 'n huishoudelike verbruiker ongeveer 1 300 eenhede oorskry, sodanige verbruik oor die algemeen gedurende buitespitstyd geneem word en die lae prys van die opvolgeenhede moedig daardeur die gebruik van elektrisiteit vir ruimteverwarming of lugreëling aan. Terselftertyd help hierdie verbruik gedurende buitespitstye, soos dié bygedra deur waterverwarmers, om die noodsaaklike las wat nodig is om die kragstasies doelmatig te gebruik, te verkry. Dit geld in besonder deur die nag wanneer opwekkingstoerusting nie gedurig in en uit diens geneem kan word nie behalwe met aansienlike moeite en uitgawes wat voortspruit uit die gebruik van groot hoeveelhede brandolie benodig om stoomketels aan die gang te kry.

Huishoudelike verbruikers met 'n aanvraag wat 50 kVA oorskry het die keuse om gemeet en aangeslaan te word volgens die Raad se skaal 3 aanvraagtarief.

Bloktarief Skaal 2: Nie-Huishoudelik

Vir die nie-huishoudelike verbruiker met 'n toevoer wat nie 60 kVA te bowe gaan nie, is die volgende tarief van toepassing:-

Eenhede Verbruik/ Units Consumed	Tarief soos aangekondig c/eenheid/ Tariff as published c/unit				Toepaslik/Applicable (1)
	Julie/July 1972	Julie/July 1975	April/April 1976	Des./Dec. 1976	Des./Dec. 1976
0 - 1 500	2,1	2,54	3,00	3,62	3,641
Volgende 3 500 Next	1,7	2,07	2,46	3,00	3,021
Balans/Balance	0,55	0,72	0,91	1,21	1,231
Diensheffing/ Service Charge	R3,00	R3,50	R4,00	R4,60	R4,60

(1) Eenheidskoste sluit 'n steenkoolprys aanpassing van 0,021 c/eenheid in.

As early as 1952 incentives to encourage the use of electricity and to improve load factor and power factor were being employed but it was only really from 1959 onwards that the question of trying to provide bigger incentives for improving system load factor by means of a more attractive "Off-peak" scale was pursued. This "Off-peak" scale, amended to apply in particular to bulk water heating, was aimed at reducing the amount of pollution which was causing concern at the time by providing an economically viable alternative to coal, whilst at the same time increasing the night loading on the Council's power stations.

During this period the Council also amended its tariff of charges and progressed towards a rationalisation and simplification of its tariff structure which reduced both application and meter reading problems whilst at the same time keeping pace with changing patterns of electricity consumption and predictable though steadily increasing costs.

2.2 1972 - 1977 ELECTRICITY TARIFF

The present Johannesburg electricity tariff was formulated in 1972 and is one of great simplicity.

Block Tariff Scale 1: Domestic

The charges to the domestic consumer are set out below:-

(1) Unit charge includes coal price adjustment of 0,021 c/unit.

This tariff is the first to depart from the previously accepted room basis variety for the normal domestic consumer and eliminates the difficulties of maintaining up-to-date records of the number of rooms for each consumer and the associated administrative costs. Being of the block variety it also meets the objection of the consumer to paying an account when no consumption has been recorded (consumer on holiday) because there are no standing or service charges.

Most demand related costs are recovered in the first block of 300 units which is the minimum consumption of by far the majority of consumers. Any remaining demand related costs are recovered in the next block of 1 000 units. Analysis has shown that where the consumption by a domestic consumer exceeds about 1 300 units/month, such consumption is in general made at off-peak times and the low cost of follow on units thereby encourages the use of electricity for space heating or air conditioning. At the same time this off peak consumption, like that contributed by water heaters, assists in maintaining the essential load required for efficient operation of power stations, particularly at night, when generating plant cannot continually be taken in and out of service, except at considerable inconvenience and expense, resulting from the use of large quantities of fuel oil necessary to get boilers under way.

Domestic consumers with a demand exceeding 50 kVA may elect to be metered and charged in accordance with the Council's Scale 3 demand tariff.

Block Tariff Scale 2: Non-Domestic

For the non-domestic consumer with a demand not exceeding 60 kVA the following tariff applies:-

(1) Unit charge includes coal price adjustment of 0,021 c/unit.

Verbruikers met 'n aanvraag wat 50 kVA te bowe gaan, het die keuse om gemeet en aangeslaan te word volgens die Raad se aanvraagtarief.

As gevolg van die laseienskappe van hierdie klas verbruiker, met sy algemene afwesigheid van diversiteit en met spitsaanvraag wat meestal saamval met die stelsel se spitsaanvraag, is aanvraagsverwante kostes noodwendig hoër as dié van huishoudelike verbruikers. Die prys van opvolgeenhede is nogtans baie laag en gee aanmoediging vir elektrisiteitsgebruik oornag, soos vir winkelvensterverligting en sekuriteitsmaatreëls.

Skaal 3: Aanvraagtarief

Die aanvraagtarief is beskikbaar vir alle verbruikers met 'n aanvraag wat 50 kVA te bowe gaan en is verpligtend vir alle nie-huishoudelike verbruikers met 'n aanvraag hoër as 60 kVA. Die heffings word hieronder aangegee.

Consumers with a demand exceeding 50 kVA may elect to be metered and charged in accordance with the Council's demand tariff.

Because of the load characteristics of this class of consumer with its general lack of diversity and peak demand mostly coinciding with the peak system demand, demand related charges are of necessity higher than those for domestic consumers. The price of follow on units is nevertheless still very low and gives encouragement for the use of electricity at night for application such as shop window lighting and security.

Scale 3: Demand Tariff

The demand tariff is available to all consumers with a demand exceeding 50 kVA and is mandatory for all non-domestic consumers with a demand exceeding 60 kVA. The charges are as set out below:-

	Tarief soos aangekondig c/eenheid/ Tariff as published c/unit				Toepaslik/Applicable (1)
	Julie/July 1972	Julie/July 1975	April/April 1976	Des./Dec. 1976	Des./Dec. 1976
Aanvraagsheffing per kVA Demand charge/kVA	R 1,40	R 1,65	R 1,90	R 2,19	R 2,19
Eenheidskoste Unit charge	0,6c	0,78c	0,98c	1,29c	1,311c
Diensheffing Service charge	R 3,00	R 3,50	R 4,00	R 4,60	R 4,60
Min. Aanvraagsheffing (2) Min. Demand charge (2)	R50,00	R60,00	R70,00	R80,00	R80,00

(1) Eenheidskoste sluit 'n steenkoolprys aanpassing van 0,021 c/eenheid in.

(2) Mits die bedrag nie minder is as 70% van die bedrag betaalbaar ten opsigte van die hoogste aanvraag aangeteken gedurende enige een maand van die vorige Mei, Junie, Julie of Augustus, nie.

Aan verbruikers word 'n korting op hulle totale rekening toegestaan vir enige verbetering in lasfaktor bokant 25% teen 'n koers van 0,6% vir elke 1% verbetering bokant 25%. Hierdie korting is egter nie van toepassing op verbruikers wat toevoer neem onder die buitespits tarief nie.

Bo en behalwe die lasfaktor korting word 'n afslag van 10% toegepas op die bedrag waarmee enige rekening R2 000 per maand oorskry.

Hierdie aanvraagstarief is duidelik aansporend van aard deurdat dit aanmoediging gee vir 'n goeie lasfaktor met 'n bestek van 45% afslag indien 'n 100% lasfaktor bereik word, of 'n 33% afslag vir 'n meer daadwerklike lasfaktor van 80%. Selfs 'n verbruiker met 'n lasfaktor van 50% verkry 'n 15% afslag.

In die verlede was geskikte kVA meters nie geredelik beskikbaar teen 'n redelike koste nie en alle aanvraag, behalwe in die geval van 'n klein getal verbruikers met lasse van buitengewone lae arbeidsfaktor, was gemeet en aangeslaan op 'n kW basis. Die grootste meerderheid van verbruikers was derhalwe nie geraak deurdat hulle lasse onder eenheids arbeidsfaktor was nie.

Met die koms van die gelykrigter-termiese tipe van aanvraagmeter 'n paar jaar gelede het dit prakties moontlik geword om 'n kVA aanvraagstarief in te stel en die aanbring van kVA aanvraagsmeters het nou 'n standaardpraktyk in Johannesburg geword. Die aansporing bestaan derhalwe vir alle aanvraagsverbruikers om maatreëls te tref om die arbeidsfaktor van hulle las te verbeter in hulle eie belang en ook tot voordeel van die Raad.

Skaal 4: Buitespitstoevoer

Enige verbruiker wat volgens aanvraag gemeet word, word toegelaat om aparte meting vir buitespits voorsiening te hê, welke voorsiening beskikbaar is vir 'n 10 uur tydperk wat begin tussen 18h00 en 21h00 volgens die oordeel van die Elektrotegniese Stadsingenieur. Die tarief vir buitespits toevoer is as volg:-

(1) Unit charge includes coal price adjustment 0,021 c/unit.

(2) Subject to the amount not being less than 70% of the amount payable in respect of the highest demand recorded during any one month of the previous May, June, July or August.

Consumers are granted a rebate on their total monthly bill for any improvement in load factor above 25% at the rate of 0,6% for every 1% improvement above 25%. This rebate, however, is not applicable to consumers taking supplies in terms of the off-peak tariff.

In addition to the load factor rebate a discount of 10% is applied to the amount by which any account exceeds R2 000 per month.

This demand tariff can be seen to be promotional in nature by offering encouragement for good load factor to the extent of a 45% discount if a 100% load factor is achieved or a 33% discount for a more realistic load factor of 80%. Even a consumer with a load factor of 50% benefits by a 15% discount.

In previous years suitable kVA demand meters were not readily available at reasonable cost and all demand, except in the case of a comparatively small number of consumers with loads of particularly low power factor, was measured and charged on a kW basis. The vast majority of consumers were therefore in no way penalised for having loads with less than unity power factor.

With the advent of the rectifier-thermal type of demand meter a few years ago, it became practical for a kVA demand tariff to be introduced and the installation of kVA demand meters has now become a standard practice in Johannesburg. The incentive therefore exists for all demand consumers to take steps to improve the power factor of their load to their own advantage and also to the benefit of the Council.

Scale 4: Off-Peak Supplies

Any consumer metered on demand is permitted to have separate metering for off-peak supplies which are available for a 10-hour period commencing between 18h00 and 21h00 at the discretion of the City Electrical Engineer. The tariff for off-peak supplies is as follows:-

	Soos angekondig/As published				Toepaslik/Applicable
	Julie/July 1972	Julie/July 1975	April/April 1976	Des./Dec. 1976	Des./Dec. 1976
Eenheidsheffing Unit Charge	0,375c	0,55c	0,72c	0,99c	1,011
Min. maandelikse heffing Min. Monthly Charge	R30,00	R35,00	R40,00	R46,00	R46,00

Met hierdie tarief is aansporing gegee vir gebruik van elektrisiteit vir grootmaat waterverwarming tot voordeel van die verbruiker, en van die Raad deurmiddel van verbeterde lasfaktor van die stelsel.

2.3 OORSIGTELIKE WAARDEBEPALING

Johannesburg se elektrisiteitstariewe kan moontlik gekritiseer word as „oor-aanmoedigend". Pryse is betreklik laag en baie aansporing word gegee vir die verbetering van las en arbeidsfaktor asook die gebruik van elektrisiteit gedurende die nag, selfs in hierdie tye van energiekrisis.

Hierdie faktore kan egter na waarde geskat word slegs wanneer hulle oorweeg word volgens die volgende inligting. Die Stadsraad van Johannesburg hanteer die volgende steenkoolbrandende kragsentrales:-

Under this tariff incentive is therefore given for the employment of electricity for water heating in bulk to both the advantage of the consumer and the Council by virtue of improved system load factor.

2.3 OVERALL EVALUATION

Johannesburg electricity tariffs could possibly be criticised as being "over promotional". Rates are comparatively low and great encouragement is given towards the improvement of load and power factor and the sale of electricity at night even in these days of energy crisis.

These factors can only be appreciated when viewed in the following light.

The City Council of Johannesburg operates the following coal-fired power stations:-

TABEL 1 TABLE

Sentrale/Station	Aanleg/Plant	Aangebring/Installed	Vermoë MW Capacity
Orlando	10 x 30 MW	1941 - 1956	300
Kelvin "A"	6 x 30 MW	1957 - 1960	180
Kelvin "B"	7 x 60 MW	1962 - 1970	420
			900

Verder is daar 2 x 22 MW gasturbine aangedrewe opwekkers aangebring op die perseel van die ou Stedelike Kragsentrale naby die middestad van Johannesburg vir spitsafsnydingsdoeleindes en beperkte noodgebruik.

Hierdie aanleg was tot ongeveer 3 jaar gelede in staat om die elektrisiteitsbenodighede van Johannesburg te voorsien. Johannesburg se tariewe was, tot dan toe, gevolglik slegs geraak deur 'n betreklik lae maar voorspelbare inflasiekoers en faktore wat onder die beheer van die Raad was. Die aangroei van Johannesburg het egter gelei tot 'n groeiende afhanklikheid van Evkom vir die voorsiening van elektrisiteit aan Johannesburg soos aangedui deur die volgende tabel:-

In addition 2 x 22 MW gas turbine-driven alternators are installed at the site of the old City Generating Station near the centre of Johannesburg for peak lopping purposes and limited emergency use.

This plant had, until about 3 years ago, been able to supply the electricity needs of Johannesburg. Johannesburg's electricity tariffs were, until then, therefore only influenced by a comparatively low but predictable rate of inflation and factors which were under the control of the Council.

Johannesburg's growth has led to an increasing dependence by Johannesburg on Escom for the supply of electricity as shown in the following table:-

TABEL 2 TABLE

Jaar wat in Junie eindig/ Year ending June	Aanvrag MW/ Demand MW	% Voorsien deur Evkom/ % Supplied by Escom	Eenhede (miljoene)/ Units (millions)	% Voorsien deur Evkom/ % Supplied by Escom
1970	758	Nul/Nil	2 754	Nul/Nil
1972	828	4,8	3 265	0,002
1974	934	5,7	3 759	1,6
1976	1 037	17,6	4 364	20,2
1978	1 164	29,2	4 965	39,7
1980	1 320	37,6	5 585	50,6
1982	1 496	44,9	6 582	58,7
1984	1 697	51,7	7 592	65,8

'n Vergelyking van die beraamde aanvraag- en energiekostes vir die Johannesburgse Stadsraad soos vir Januarie 1977 is as volg:-

A comparison of the estimated demand and energy costs to the Johannesburg City Council as at January, 1977, is as follows:-

TABEL 3 TABLE

Bron/Source	Beraamde koste vir Januarie 1977/ Estimated cost for January 1977		Termiese redement vir Sentrale (1)/ Station (1) Thermal Efficiency
	Aanvrag kW Demand	Eenhede/Units	
Orlando	R0,95	0,671 c	20,37%
Kelvin "A"	R1,74	0,685 c	20,39%
Kelvin "B"	R1,23	0,537 c	26,33%
Evkom	(2) R3,13	(2) 0,627 c	—

(1) Bereken September 1976.
(2) Met in agneming van korting en toeslag.

(1) Measured September, 1976.
(2) Taking into account discount and surcharge.

Vir die jaar wat met Junie 1977 eindig sal Evkom slegs 25% van Johannesburg se elektrisiteitsaanvraag voorsien en sal Johannesburg in staat wees om sy aanvraagsheffing van R2,19 per kilowatt vol te hou ten spyte van die feit dat Evkom se heffing R3,13 per kilowatt is. Soos meer en meer aanvraag van Evkom geneem word is dit egter duidelik dat Johannesburg se aanvraagsheffing moet styg totdat dit uiteindelik dié van Evkom sal benader.

Met die veroudering van Johannesburg se kragsentrales, en die feit dat die toerusting al hoe meer vir spitsbelasting gebruik word, toon die redement van die sentrales 'n daling

For the year ending June, 1977, Escom will be supplying only 25% of Johannesburg's electricity demand and Johannesburg will be able to maintain its demand charge of R2,19 per kilowatt until then, in spite of Escom's charge being R3,13 per kilowatt. As more and more demand is taken from Escom it is obvious that Johannesburg's demand charge must rise until it eventually approaches that of Escom.

With the ageing of Johannesburg's power stations, and the fact that plant is being used more and more for peaking purposes, the overall station efficiency is showing a decline

en die koste van eenhede sal gevolglik toeneem.

Daar bestaan geen twyfel dat Evkom, deur sy toenemende gebruikmaking van opwekkingstoerusting van groter vermoë, in staat sal wees en eenhede te voorsien teen laer pryse as dié wat in die kragsentrales van die Johannesburgse Stadsraad, met hulle in die algemeen ouer en kleiner eenhede, opgewek word nie.

Die dalende redement van die Raad se kragsentrales is onvermydelik maar nie ernstig nie omdat dit veroorsaak word deur 'n dalende lasfaktor. Van veel meer finansiële belang is die vermoë van die Raad se kragsentrales om soveel van Johannesburg se spitsaanvraag te voorsien. Verwysing na die aanvraagskostes in Tabel 3 hierbo sal die stelling toelig.

Daar is 'n neiging om die lewering van elektrisiteit in die Raad se kragsentrales te verlaag gedurende buitespitstye ten einde so 'n hoog as moontlike lasfaktor op invoer vanaf Evkom te behou en daardeur die koste van die ingevoerde elektrisiteit te verlaag. Dit laat 'n aansienlike hoeveelheid luierreserwe in die Raad se kragsentrales wat beter benut kon word in opwekking van elektrisiteit. Vir hierdie rede moedig Johannesburg se elektrisiteitstariewe die gebruik van elektrisiteit aan deur goedkoop opvolgeenhede te voorsien en deur elektrisiteit oornag teen lae koste beskikbaar te stel vir buitespits verbruikers.

3.0 TOEKOMSTIGE TARIEFOORWEGINGS

Johannesburg se toenemende afhanklikheid van Evkom vir die voorsiening van elektrisiteit het die lang tydvak waarin tariefbestendigheid die kenmerk was, aangebring. Die toestand is vererger deur die huidige ernstige geldtekort wat gelei het tot 'n besluit om Johannesburg se elektrisiteitstariewe so laag moontlik te hou en om geen voorsiening te maak vir 'n oorskot wat oorgedra kan word na die tariefstabilisasiefonds om as 'n demper teen toekomstige kostestygings te dien nie.

In plaas daarvan word elke poging aangewend om uitgawes so laag moontlik te hou deur die spitsaanvraag te verlaag om daardeur die lasfaktor te verbeter en beter gebruik te maak van die kapitale aanleg. Dit word bereik, bo en behalwe die toepassing van aansporende tariewe, deur die gebruikmaking van lasbeheer toerusting in Lenasia, deur verlagings in die stelselspanning en die afskakeling van huishoudelike las vir kort tydperke op 'n gespreide tydgrondslag.

Die Elektrisiteitsafdeling se begroting is gegrond op 'n 90% beskikbaarheid van opwekkingstoerusting, wat 60 MW stoom toerusting en 44 MW gasturbine aangedrewe toerusting toelaat om te sorg vir onklaar rakings, om te voorsien in buitengewone strawwe winterstoestande en om 'n beperkte mate van spitsafsnyding te bereik.

In sulke toestande waar min speelruimte vir foute in die balans tussen inkomste en uitgawe gelaat kan word, word besondere akkurate beramings van verwagte uitgawes vereis. Die items van uitgawe vir die Elektrisiteitsafdeling van Johannesburg kan onder die volgende hoofde gelys word:-

(a) Salarisse, lone en toelaes,
(b) Herstel en onderhoud,
(c) Kapitaalkostes,
(d) Steenkool aankope,
(e) Aankoop van elektrisiteit van Evkom,
(f) Algemene uitgawes.

Slegs items (d) en (e) sal hier bespreek word.

3.1 STEENKOOL AANKOPE

Ongeveer 2,23 miljoen ton steenkool word jaarliks in die kragsentrales van die Johannesburgse Stadsraad verbrand en teen die huidige pryskoers verteenwoordig dit 'n uitgawe in die orde van R20 miljoen. Om uitgawes in die verband te beraam is deesdae 'n waagstuk. Voorsiening vir 15% kostevermeerdering gemaak, wat as 'n redelike beraming vir die inflasiekoers beskou kon word, kan deur die optrede van die pryskontroleur en die Minister van Vervoer in werklikheid uitloop op 25% verhoging. Hierdie mistasting in begroting kan gevolglik uitloop op die behoefte om 'n bykomstige uitgawe van R2 miljoen die hoof te bied.

Voor 1972 is elektrisiteitstariewe opgestel om 'n inkomsteoorskot te lewer by die begin van hulle bestaan, welke oorskot dan oorgedra word aan 'n tariefbestendigingsfonds vanwaar dit later onttrek word om toenemende uitgawes te dek.

Ten spyte van die beskikbaarheid van so 'n fonds het dit teen ongeveer die helfte van 1973 duidelik geword dat steenkool meer dikwels onderworpe gaan wees aan prysstygings as in die verlede en dat sulke stygings ernstige geldelike gevolge vir die Raad gaan inhou. Vertoë is gevolglik aan die Administrateur gerig en in November 1973 het hy goedkeuring gegee dat 'n klousule in die Raad se elektrisiteitstarief ingevoeg word waarvolgens vir elke 2½ sent verhoging in die beheerde prys van steenkool, 'n toepaslike verhoging van 0,0015 sent in die eenheidsprys van alle elektrisiteit deur die Raad verkoop, aangebring sal word.

Hiervolgens is die Johannesburgse Stadsraad in staat gestel om verhoogte kostes deur steenkool prysstygings veroorsaak,

and the cost of units will therefore increase. There can be no doubt that Escom, by its increasing use of larger capacity generating plant, will be able to supply units at lower cost than those generated in the Johannesburg City Council's power stations with their generally old and smaller capacity machines.

The lowering efficiency of the Council's power stations is unavoidable and is not serious because it arises from a decreasing load factor. Of far more financial importance is the ability of the Council's power stations to supply as much as possible of Johannesburg's peak demand. Reference to the demand costs shown in Table 3 above will illustrate the point.

There is a tendency to reduce production of electricity in the Council's power stations at off-peak periods in order to maintain as high a load factor as possible on imports from Escom and thereby reduce the cost of imported electricity. This leaves a fair amount of spinning reserve in the Council's power stations which could better be utilised in the generation of electricity. It is for this reason that Johannesburg's electricity tariffs encourage the use of electricity by providing cheap follow on units and making available electricity at night to off-peak consumers at low cost.

3.0 FUTURE TARIFF CONSIDERATIONS

The growing dependence of Johannesburg on Escom for the supply of electricity has signalled the end of a long era in which tariff stability was the keynote. The situation is worsened by the current severe shortage of money which has led to a decision to keep Johannesburg's electricity tariffs as low as possible and make no provision for a surplus which could be transferred to the tariff stabilisation fund to act as a buffer against future increased costs.

Instead every effort is being made to keep costs as low as possible by reducing the peak demand in order to improve load factor and obtain better utilisation of capital plant. This is achieved in addition to the application of incentive tariffs, by the use of load control apparatus in Lenasia and by reductions of system voltage and the shedding of residential load for short periods on a staggered time basis.

The Electricity Department's budget is based on a generating plant availability of about 90% which leaves 60 MW of steam plant and a 44 MW of gas turbine-driven plant to take care of breakdowns, to cater for abnormally severe winter conditions and provide a limited measure of peak lopping.

In such circumstances where little margin for error is permissible in the balance of income and expenditure, extremely accurate estimates of anticipated expenditure are required. The items of expenditure for the Johannesburg Electricity Department can be listed under the following headings:-

(a) Salaries, wages and allowances,
(b) Repairs and maintenance,
(c) Capital charges,
(d) Coal purchases,
(e) Purchase of electricity from Escom,
(f) General expenses.

Only items (d) and (e) will be discussed here.

3.1 COAL PURCHASES

Some 2,23 million tons of coal are burnt annually in the Johannesburg City Council's power stations and at the current price represents an expenditure of approximately R20 million. The hazards of estimating expenditure on this item are now very real. Provision might be made for a 15% increase in price which could be considered as a reasonable estimate of inflation but actions by the price controller and Minister of Transport could result in an increase of 25%. This error in estimating could therefore result in the need to meet an additional expenditure of R2 million.

Prior to 1972 electricity tariffs were designed to bring in a surplus income at the commencement of their life which surplus was transferred to a Tariff Stabilisation Fund from which it was later withdrawn to meet rising expenditure.

Notwithstanding the availability of such a fund it became obvious about the middle of 1973 that coal was to be subjected to more frequent price variations than in the past and that such variations would have serious financial consequences to the Council. Representations were therefore made to the Administrator and in November, 1973, he approved the inclusion of a clause in the Council's electricity tariff whereby for every 2½ cents variation in the statutory price of coal an appropriate variation of 0,0015c must be made in the unit charge of all electricity sold by the Council.

By this means the Johannesburg City Council has been able to pass on to the consumer increased costs resulting from

aan die verbruikers oor te dra sonder om vertoë vir tariefverhoging by elke geleentheid te maak.

3.2 AANKOOP VAN ELEKTRISITEIT VANAF EVKOM

Kragtens sy lisensie om elektrisiteit te verkoop, word daar van Evkom vereis om sy eenheidsprys kwartaalliks te hersien om skommelings in die prys wat vir steenkool betaal word, in berekening te bring. Evkom bring ook van tyd tot tyd veranderinge in sy tarief aan deur middel van 'n korting of toeslag wat op die rekenings toegepas word. Dit is ook nie uitgesluit dat Evkom 'n verandering in sy tariefsamestelling kan aanbring nie. Al hierdie faktore bring skommelings mee in die prys wat betaal word vir elektrisiteit aangekoop van Evkom.

Die Johannesburgse Stadsraad was, tot groot voordeel van sy verbruikers, in staat om verhoogde heffings van Evkom op te maak deur onttrekkings uit die tariefstabilisasiefonds, deur strenge ekonomiese beheermaatreëls en besnoeiïngs in beplande uitgawes, tot met die einde van die 1974/75 finansiële jaar wat in Junie eindig. Teen die tyd is 11,4% van die eenhede wat in Johannesburg verkoop word, van Evkom ingevoer.

Die beraming vir die opvolgende finansiële jaar het aangedui dat die syfer sal aangroei tot meer as 20%. Die Raad se tarief is in Junie 1975 gewysig om groter inkomste in te bring ten einde die verhoogde uitgawes die hoof te bied en die maatreël moes herhaal word in April en Desember 1976. Hierdie laaste tariefverhoging is beplan om slegs die bekende verhogings in Evkom se heffing tot die einde van Junie 1977 in berekening te bring, na welke datum 'n verdere tariefwysiging nodig sal wees.

3.3 VOORSIENING VAN OUTOMATIESE AANPASSING AAN EVKOM PRYSSKOMMELINGS

Dit is hoogs onwenslik dat die huidige toestand, waarin tariefveranderings met sulke kort tussenposes vereis word, sal voortbestaan. Dis nou tyd dat by die Administrateur aansoek gedoen word vir die invoeging van 'n klousule in die Johannesburgse elektrisiteitstarief waardeur 'n selfwerkende wysiging van tariefwaardes kan plaasvind om rekening te hou met Evkom se prysskommelings, soortgelyk aan wat gedoen is om steenkool prysstygings die hoof te bied.

Die probleem is egter baie ingewikkeld deurdat die koste van elektrisiteitsaankope van Evkom drie faktore inhou: eenheidskoste, aanvraagkoste en 'n toeslag, enige of almal waarvan aan wysiging onderworpe is. Omdat Johannesburg slegs 'n gedeelte van die elektrisiteit wat dit verkoop, van Evkom aankoop, kan Evkom prysskommelings nie direk aan die verbruikers oorgedra word nie aangesien die verhouding van Evkom se „gemoeidheid" in die Raad se elektrisiteitsverkope in aanmerking geneem moet word.

Hierdie gemoeidheid moet die verhouding van eenhede deur Evkom voorsien teenoor die wat in die Raad se kragsentrales opgewek is, in ag neem, asook die gedeelte van Johannesburg se aanvraag wat deur Evkom voorsien word. Dit word nog meer ingewikkeld deurdat hierdie faktore gedurig wissel, dat die wisseling seisoeneienskappe het, en dat hulle elke jaar sal vermeerder.

Enige aanpassingsformule wat poog om elke faktor op sigself in aanmerking te neem, moet noodwendig ingewikkeld wees en die toepassing daarvan in die praktyk sal moeilik wees, indien nie onmoontlik nie. Verbruikersnavrae kan maklik reusagtige afmetings aanneem.

'n Eenvoudige finansiële benadering word dus as volg voorgestel:-

(1) Stel die werklike finansiële uitwerking van Evkom se prysskommelings met kwartaallikse tussenposes vas. Dit is met dieselfde tussenposes waarmee Evkom sy eenheidskoste aanpas;

(2) Verbruikersrekeninge word aangesuiwer deur die toepassing van 'n toeslag of korting gedurende die opvolgende kwartaal om die prysskommelings van die vorige kwartaal in berekening te bring.

Om hierdie voorstelle in werking te stel is dit nodig om 'n verwysingsdatum vas te stel, van wanneer af die finansiële uitwerking van Evkom se prysskommelings vasgestel kan word. So 'n verwysingsdatum sal wenslik die datum van die afkondiging van 'n nuwe elektrisiteitstarief wees en Evkom se elektrisiteitstarief op daardie datum sal die verwysingsbasis wees waarvolgens Evkom se toekomstige prysskommelings bereken word.

Met kwartaallikse tussenposes moet die som van Evkom rekeninge vir die voorafgaande drie maande vergelyk word met die som van die maandelikse rekeninge, herbereken volgens die Evkom tarief op die verwysingsdatum. Deur die twee bedrae een van die ander af te trek kan die werklike finansiële uitwerking van enige Evkom prysskommelings wat gedurende die betrokke kwartaal mag plaasgevind het, bepaal word, hetsy dit 'n vermeerdering of 'n vermindering in prys is.

Die bedrag van hierdie prysverandering moet dan uitgedruk word as 'n persentasie van die inkomste verkry uit die ver-

coal price variations without having to make representations for a tariff increase on each occasion.

3.2 PURCHASE OF ELECTRICITY FROM ESCOM

In terms of its licence to supply Electricity, Escom is required to review its price for units at quarterly intervals to take into account variations in the price paid for coal. Escom also makes periodic changes in its tariff by an adjustment to its rebate or surcharge which is applicable to the account. It is not inconceivable also that Escom could make a change in its tariff structure. All these factors result in a change of the price which has to be paid for electricity purchased from Escom.

The Johannesburg City Council was able, very much to the benefit of its consumers, to absorb increased charges levied by Escom by withdrawals from the Tariff Stabilisation Fund, rigid economy measures and cuts in planned expenditure until the end of the 1974/75 financial year ending in June. By then 11,4% of the units of electricity sold in Johannesburg were being imported from Escom.

The forecast for the next financial year indicated that this figure would rise to more than 20%. The Council's tariff was revised in July, 1975, to bring in increased revenue to meet the increased expenditure and the position had to be repeated again in April and December, 1976. This last tariff increase has been planned only to take into account known increases in Escom charges up until the end of June, 1977, after which a further tariff revision will be necessary.

3.3 PROVISION FOR AUTOMATIC ADJUSTMENT FOR ESCOM PRICE VARIATIONS

It is highly undesirable that the present situation, where tariff changes are being forced at such frequent intervals, should continue. The time has therefore come when application must be made to the Administrator for the inclusion in the Johannesburg Electricity Tariff of a clause permitting an automatic adjustment of tariff rates to take into account variations in Escom's charges as is done to cater for variations in the price of coal.

The problem, however, is a complex one because the cost of Escom electricity involves three factors, unit charge, demand charge and a surcharge, any or all of which are subject to variation. Because Johannesburg purchases only a portion of the electricity it sells from Escom, any Escom price variation cannot be passed on directly because the proportion of Escom's "involvement" in the Council's sales of electricity must be taken into account.

This involvement should take into account the ratio of units supplied by Escom to those generated in the Council's Power Stations and also the proportion of Johannesburg's demand which is supplied by Escom. It is complicated by the fact that these factors very continually, have seasonal characteristics and will increase each year.

Any adjustment formula which attempts to take cognizance of each factor individually must of necessity be complex and its application in practice difficult if not impossible. Consumer queries could easily take on mammoth proportions.

A simple financial approach is therefore proposed as folows:-

(1) Establish the exact financial consequence of Escom price variations at quarterly intervals which is the same frequency as Escom adjusts its unit charges;

(2) Adjust consumer accounts by the application of a surcharge or rebate during the next quarter to take into account the price variations of the previous quarter.

To give effect to these proposals it is necessary to establish a reference date from which the financial effect of Escom's price variations can be determined. Such reference date ideally is the date of promulgation of a new municipal supply tariff and the Escom electricity tariff applicable on that date will become the reference against which Escom's future price variations are calculated.

At quarterly intervals, the sum of the three Escom accounts for the preceding three months must be compared with the sum of the same three accounts re-calculated on the basis of the Escom tariff rates applicable on the reference date. By subtraction of the sums, one from the other, the exact financial consequence of any Escom price variations which might have taken place during the quarterly period under review can be established whether it be an increase or decrease in price.

The amount of this price variation must then be expressed as a percentage of the income derived from the sale of elec-

koop van elektrisiteit gedurende dieselfde kwartaal.

Om verhoogde koste te verhaal moet 'n toeslag volgens die maatstaf hierbo bepaal, toegepas word op die rekeninge van alle verbruikers vir die opvolgende kwartaal. 'n Korting sal van toepassing wees as Evkom se aanslag verminder het.

Omdat Evkom se betrokkenheid elke kwartaal verander, en ook omdat daar seisoenswisselinge in die verkope van elektrisiteit voorkom, sal die toepassing van 'n toeslag of korting soos hierbo, nie noodwendig akkuraate aanpassing vir Evkom se prysskommelings van een kwartaal na die volgende meebring nie.

Derhalwe is dit nodig om 'n eenvoudige boekhoustelsel daar te stel waardeur enige opgehoopte bo- of onderverhalings van een kwartaal bygetel of afgetrek word van die bedrag wat in die opvolgende kwartaal verhaal word. Deur die aanhoudende toepassing van 'n wisselende kwartaallikse toeslag of korting op verbruikersrekeninge soos hierbo bereken sal vir Evkom se prysskommelings oor die lang duur akkuraat gesorg word.

Daar is egter verliese gemoeid met die aankoop en herverkoop van elektrisiteit sowel as ander onkostes wat verhaal moet word en dit noodsaak dat Evkom prysskommelings op 'n koste-plus grondslag verhaal word. Dit kan gedoen word deur die toepassing van 'n gepaste persentasie op die bedrae wat kwartaalliks verhaal moet word.

Ongetwyfeld sal 'n puntenerige persoon baie kritiek kan uitoefen op die voorgestelde stelsel. Geen poging is aangewend om te onderskei tussen veranderinge in Evkom se eenheids, aanvraags of toeslagsheffings, of selfs in veranderinge van Evkom se tariefsamestelling nie. Die hoofdoel is om verhoogde koste op die eenvoudig moontlikste manier te verhaal deur die toepassing van 'n persentasie toeslag op alle verbruikersrekeninge. Onder huidige toestande, met gedurige toename van Evkom se heffings en toenemende aankope van elektrisiteit deur Johannesburg van Evkom, kan die toepassing van 'n toenemende toeslag op verbruikersrekeninge as volg verwag word.

Foute in die verhouding tussen aanvraagverwante- en energieheffings wat deur die voorgestelde verhalingsproses veroorsaak word, sal gewoonweg van die tweede rangorde wees. Met die groter oorsake vir kostestygings op 'n selfwerkende grondslag verhaal, d.w.s. veranderings in steenkoolprys en in die koste van Evkom se elektrisiteit, sal die behoefte vir herhaalde wysigings van Johannesburg se elektrisiteitstariewe verdwyn. Indien sulke wysigings egter nodig word as gevolg van toenemende Departementele kostes of enige ander omstandighede, dan kan die samestelling van die Johannesburgse elektrisiteitstarief verander word om 'n paslike verhouding tussen aanvraag en energiekostes op te stel vir alle tariefskale, met inagneming van die dan bestaande verhouding van dié elemente in Evkom se heffing aan die Raad. Terselftertyd kan die kostesamestelling van die tarief aangepas word om die toeslag in te sluit en dit gevolglik tot niks te verminder. 'n Nuwe verwysingsdatum sal dan in werking tree en toekomstige prysskommelings van Evkom vasgestel word volgens Evkom se tarief op hierdie nuwe verwysingsdatum.

Indien Evkom 'n ingrypende verandering in sy tariefstruktuur aanbring wat sal uitloop op 'n onaanneembare wanverhouding tussen Evkom en Johannesburg se aanvraag- en energieheffings, sal dit 'n wysiging in Johannesburg se elektrisiteitstarief regverdig, met 'n gevolglike insluiting van enige bestaande toeslag of korting sowel as die vasleging van 'n nuwe verwysingsdatum.

Daar is geen rede waarom die voorgestelde sisteem nie gebruik kan word deur óf opwekkende óf nie- opwekkende voorsieningsoutoriteite nie. In die geval van nie- opwekkende outoriteite sal die verhouding tussen die finansiële gevolge van Evkom se prysskommelings en die inkomste uit die verkoop van elektrisiteit, wat die persentasie van toeslag of korting bepaal, groter wees as vir 'n opwekkingsoutoriteit. Al wat nodig is, is om vas te stel watter oorpersentasie tot die bedrag wat verhaal moet word ten opsigte van Evkom se prysskommelings, toegevoeg moet word om Departementele behoeftes te bevredig en verliese te dek. Dit sal diepgaande ondersoek verg en die voorgestelde oorpersentasie sal die goedkeuring van die Administrateur vereis.

In die toepassing van die stelsel sal probleme ongetwyfeld opduik. Omdat daar 'n vertraging van verskeie weke is in die ontvangs van Evkom se rekeninge en die beskikbaarheid van inligting aangaande die waarde van inkomste verkry van die verkoop van elektrisiteit oor dieselfde tydperk, kan die toeslag of korting op sy beste slegs 'n maand laat bereken word. Dit sal daarom toegepas moet word vir die opvolgende driemaandelikse tydperk en nie op die kwartaal wat onmiddellik volg op die Evkom kwartaal waarvoor dit bereken was nie. Die enigste geldelike verlies sal wees weens die rente wat verdien kon word op die bedrag wat as gevolg van die toeslag gedurende daardie maand kon verhaal geword het.

Die grootste probleem sal nie in die uitvoering van die stelsel setel nie, maar in die aanvaarding daarvan — aanvaarding van die feit dat Evkom prysskommelings, ongeag hoedat

tricity during the same quarterly period.

To recover increased costs a surcharge of the value calculated above must be applied to all consumers' accounts for the following quarter. A rebate will apply should Escom's charges have been lowered.

Because Escom's involvement varies each quarter and also because there are seasonal variations in the sales of electricity the application of a surcharge or rebate as described above will not necessarily adjust accurately for Escom price variations from one quarter to the next.

It therefore becomes necessary to establish a simple bookkeeping system whereby any accumulated over or under recoveries from one quarter are added to, or subtracted from, the amount to be recovered in the following quarter. By the continuous application to consumer accounts of a variable quarterly surcharge or rebate, calculated as above, Escom price variations will in the long term be accurately taken care of.

There are, however, losses involved in the purchase and resale of electricity as well as other costs which have to be recovered and this necessitates that Escom price increases be recovered on a cost plus basis. This can be done by the application of an appropriate percentage to the amounts which have to be recovered quarterly.

There is no doubt that purists could find much to criticize in the proposed system. No attempt has been made to differentiate between changes in Escom's unit, demand or surcharge rates or even in changes in Escom's tariff structure. The prime object is to recover increased charges in as simple a manner as possible by the application of a percentage surcharge on all consumer accounts. Under present day conditions with Escom's charges continually increasing and more and more electricity being purchased by Johannesburg from Escom, the application of an increasing surcharge on consumer accounts can therefore be expected.

Errors in the relationship between demand related and energy charges brought about by the proposed recovery process will normally be of a second order. With the major causes of cost increases being recovered on an automatic basis, namely changes in the cost of coal and changes in the cost of Escom electricity, the need for frequent revisions of the Johannesburg electricity tariff will fall away. However, when such revisions become necessary because of rising departmental costs or any other factors, the structure of the Johannesburg electricity tariff can then be changed to establish an appropriate relationship between demand and energy charges for all scales bearing in mind the current relationship of these factors in Escom's charges to the Council. At the same time the cost structure of the tariff can be adjusted to consolidate the surcharge which can then be reduced to zero. A new reference date will then become effective and future Escom price variations established on the basis of the Escom tariff applicable on that date.

Should Escom make a major revision in its tariff structure which would result in an unacceptably large discrepancy in the relationships between Escom's and Johannesburg's demand and energy charges, it would justify an amendment in the Johannesburg electricity tariff with a consequent consolidation of any existing surcharge or rebate and the establishment of a new reference date.

There is no reason why the proposed system cannot be employed by either generating or non-generating supply authorities. In the case of non-generating authorities, the relationship between the financial consequences of Escom price variations and the income from the sale of electricity which determines the percentage of the surcharge or rebate, would be higher than for a generating supply authority. All that is necessary is to establish what percentage margin must be added to the amount to be recovered in respect of Escom price increases to meet departmental needs and recover losses. This will require careful study and the proposed margin will need the approval of the Administrator.

In the implementation of the system problems will no doubt arise. Because there is a delay of several weeks in the receipt of Escom accounts and the availability of information regarding the value of income derived from the sale of electricity during the same period, the surcharge or rebate can only be calculated at best a month late and will therefore have to apply for the next three-month period and not the quarter immediately following the Escom quarter for which it was calculated. The only financial loss will be the interest which could be gained on the amount which should have been recovered by virtue of the surcharge for that month.

The biggest problem will not be in the implementation of the system but in its acceptance — acceptance of the fact that Escom price variations no matter how caused can be

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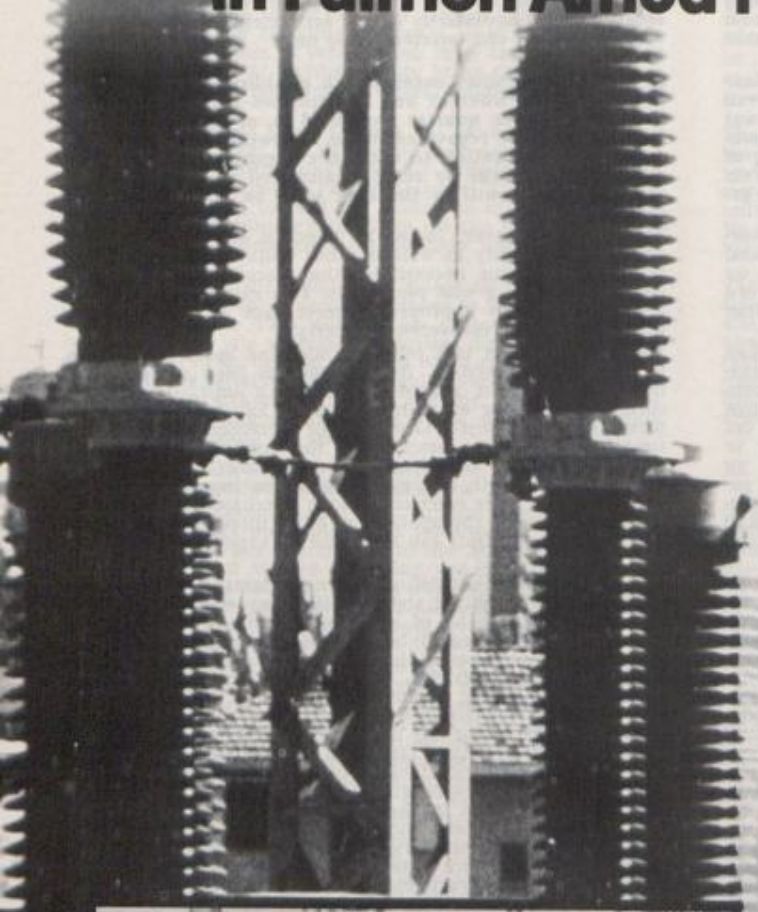

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hulle ontstaan, verhaal kan word deur die eenvoudige toepassing van 'n wisselende toeslag op verbruikersrekeninge. Die volgende haakplek sal wees om die voorstelle op so 'n wyse te bewoord dat hulle ondubbelsinnig is, en bondig omskryf kan word in die elektrisiteitstarief.

Die stelsel soos voorgestel pas homself aan by ouditering omdat die verwantskap tussen Evkom prysskommelings en die bykomstige inkomste wat ontstaan weens die toepassing van die toeslag of korting, maklik bepaalbaar is. Vir suksesvolle toepassing daarvan is dit egter noodsaaklik dat die toeslag tussen vasgestelde kwartaallikse datums toegepas word. Tariefbewoording wat prysaanpassings toelaat „na die volgende gewone meterlesing" sal nie werk nie.

'n Wysiging aan die elektrisiteitstarief van die Johannesburgse Stadsraad, op 17 November 1976 afgekondig, neem aan dat elektrisiteit gelykmatig verbruik word oor elke 24 uur tydperk tussen meterlesings en laat toe dat verhoogde kostes met betrekking tot steenkool prysaanpassings en tariefwysigings van onmiddellike uitwerking gemaak kan word. So 'n voorsiening sal noodsaaklik wees in verband met prysskommelings van Evkom as en wanneer 'n klousule aangeneem word wat 'n selfwerkende tariefwysiging toelaat.

4.0 SLOTSOM

Die samestelling van 'n elektrisiteitstarief kan van óf 'n ingewikkelde óf van 'n eenvoudige aard wees. Dit sal ingewikkeld wees as pogings aangewend word om die laseienskappe van 'n groot verskeidenheid verbruikers in aanmerking te neem. Of dit kan eenvoudig gemaak word as daar aangeneem word dat daar slegs twee hoofklasse verbruikers is.

(i) Diegene wie se lasfaktor in sigself redelik van aard is, met beperkte moontlikheid vir verbetering;

(ii) Diegene wie se lasfaktor in sigself swak van aard is, met baie verbeteringsmoontlikhede.

Huishoudelike verbruikers met hulle meer gespreide aanvraag sal onder die eerste groep, terwyl meeste besigheids- en industriële verbruikers in die tweede groep val. As aansporing voorsien moet word vir die tweede groep verbruikers om hulle lasfaktor te verbeter, is aanvraagsmeting noodsaaklik. Indien kVA tipe aanvraagsmeters gebruik word, word 'n aansporing vir arbeidsfaktor verbetering ook terselftertyd voorsien.

Wanneer die verhouding tussen aanvraag en energieverwante koste eers vasgestel is vir elke groep verbruikers, kan 'n tariefsamestelling ontwerp word om die verlangde finansiële uitwerking te verkry.

Johannesburg se elektrisiteitstariewe is oor die afgelope 25 jaar geleidelik vereenvoudig en die huidige tarief is grotendeels ontwerp volgens die begrip wat nou voorgestel is.

Met die behoefte om nou voorsiening te maak vir Evkom se elektrisiteitstarief, is dit baie wenslik dat die eienskap van eenvoudigheid in die tariefsamestelling behoue bly.

Dit is vir hierdie rede dat die skrywer se keuse is om die begrip van toepassing van 'n wisselbare persentasie toeslag of korting met kwartaallikse tussenposes op alle verbruikersrekeninge, om rekening te hou met Evkom se prysskommelings, ongeag hulle oorsprong, aan te bied.

5.0 ERKENNINGS

Die skrywer wens sy dank te betuig teenoor die Elektrotegniese Stadsingenieur van Johannesburg, mnr. W. Barnard vir toestemming om die verhandeling uit te gee. Sodoende wil hy ook betuig dat die sienswyses uiteengesit sy eie is en nie noodwendig die sienswyse van die Johannesburgse Elektrisiteitsafdeling is nie.

Dankbetuiging gaan ook aan kollegas in die Afdeling wat gehelp het in die gereedmaking van die verhandeling.

recovered by the simple application of a variable surcharge on consumer accounts. The next hurdle will be to phrase the proposals in a manner which is unambiguous, and can be concisely defined in the electricity tariff.

The system proposed lends itself to audit because the relationship between Escom price variations and the additional revenue accrued from the application of the surcharge or rebate is easily established. For its successful application however, it is essential that the surcharge be applicable between specified quarterly dates. Tariff wording which permits price variations to be made "after the next ordinary reading of the meter" will be unworkable.

An amendment to the Johannesburg City Council's electricity tariff promulgated on 17 November, 1976, deems electricity to be consumed evenly during every 24-hour period between meter readings and permits increased charges in respect of coal price adjustments and tariff variations to be made with immediate effect. Such provision will be essential in the case of Escom price variations if and when a clause permitting an automatic adjustment in tariff charges is adopted.

4.0 CONCLUSION

The structure of an electricity tariff can either be of a complicated or of a simple nature. It will be complicated if attempts are made to take cognizance of the load characteristics of a wide variety of consumers or it can be made simple if it is accepted that, in general, there are only two main classes of consumers:-

(i) Those who inherently have a reasonable load factor and limited ability for improvement;

(ii) Those who inherently have a poor load factor with much opportunity for improvement.

Domestic consumers with their more diversified demand fall into the first category while most business and industrial consumers fall into the second. If incentive is to be provided for the second category of consumers to improve its load factor, demand metering is essential and if kVA type demand meters are employed an incentive for power factor improvement is automatically provided as well.

Once the relationship between demand and energy related costs has been established for each category of consumer, a tariff structure can be designed to achieve the desired financial consequences.

The electricity tariffs of Johannesburg have, over the past 25 years, gradually been simplified and the present tariff has been modelled very much on the concept just presented.

With the need now to make provision for Escom electricity price variations in Johannesburg's electricity tariff, it is highly desirable that the aspect of simplicity in the tariff structure remain.

It is therefore for this reason that the author has chosen to present the concept of applying, at quarterly intervals, a variable percentage surcharge or rebate to all consumer accounts to take into account Escom price variations irrespective of their cause.

5.0 ACKNOWLEDGEMENTS

The author wishes to thank the City Electrical Engineer of Johannesburg, Mr. W. Barnard, for permission to publish this paper. In doing so he also wishes to state that the views expressed are his own and do not necessarily represent the views of the Johannesburg Electricity Department.

Thanks must also go to colleagues in the Department who have assisted in the preparation of this paper.

MR. K. G. ROBSON, President:

Thank you Mr. McCullough. Now I have pleasure in calling on Councillor Ken Shepstone of Durban to open the discussion and propose a vote of thanks. Councillor Shepstone will be speaking to you this afternoon both as a councillor and an engineer.

COUNCILLOR A. K. L. SHEPSTONE, Durban:

Mr. McCullough introduced his paper by stating that the purpose of any electricity tariff is to bring an income sufficient to recover costs and to provide whatever surplus is necessary. You dit not say that was the only purpose, because you qualified your statement by adding in your list of objects of tariffs that an electricity tariff must encourage high load factors and high power factors. In other words what you are saying is that the tariffs should be framed to encourage sound engineering and with a maximum conservation of energy, with which I agree entirely. I recall discussing in Durban a few years back whether we should instal ripple control and load limiting devices in certain areas. We were discussing mainly the Bantu townships and the general feeling at that time, about 15 years ago, was that if a person could afford to pay the charges then the electricity supply should be unlimited. With the recent increases in consumption charges however, this attitude has changed somewhat. Today the attitude seems to be that whether a person can pay or not is no excuse for not conserving energy. Referring to tariffs generally, I often wonder if we are doing the right thing in applying a block tariff to the domestic consumer, and this point Mr. McCullough has already answered. He gave an explanation that he didn't want to go to the other extreme and apply a cheap tariff for poorer people and a more expensive tariff to the richer people. My comment is that it means the poorer class of consumer always pays a higher overall unit rate than the wealthy consumer, who invariably gets down to the "follow" on unit at approximately a third of the block rate. I accept your point, but I wonder why they can't both have the same overall rate without having to discriminate at all. Whilst I agree with the principal of discouraging consumption at times of high system demand, the two part demand charge does not always achieve its object. It may do so in Johannesburg — it depends where your system peak is. It may benefit the consumer by encouraging him to lower his maximum demand, but it does not always benefit the municipality if the consumer's peak does not coincide with the municipal system peak. The three part tariff on the other hand covers this point and provides the added incentive to the consumer to reduce load during system peak periods. This benefits the municipality as well as the consumer. This load shedding can be done during restricted hours by reducing air conditioning after 4.30 pm, altering working hours to start earlier — we actually did that to a large factory in Durban which was starting at 7.30 and finishing at 5 pm. We advanced starting time for the whole factory to 7.00 a.m. and closing time to 4.30 p.m. so they avoided the rush hours between 4.30 and 6.30, but I accept that that is the period where the peak is essentially a domestic one and doesn't necessarily apply in Johannesburg. Also there is the non-use of furnaces, water pumping for agricultural purposes during restricted hours. We do have a separate tariff for this type of load in Durban but only where bulk supply tariff would apply and it would be foolish for people to pump during the restricted hours. It may be that demand metering costs are high, but when one compares them to the costs of the cables, transformers, switchgear, etc, for these consumers, the metering costs are relatively low.

Thus, if one can provide a meter which is going to encourage good housekeeping then I think it is better to pay the additional price of the meter and get a tariff which is going to benefit both parties. With regard to Mr McCullough's reference to load power factor, I feel sure that the only alternative choice he expressed — viz: "accept the situation and pay the cost" — was written in lighter vein. I can not imagine anyone adopting that attitude today with the present charge of the light brigade — our Escom friends. I should prefer to see this choice substituted with the statement "Educate the consumer in the advantages of a high power factor". I feel that this can be done very simply by including with the light acount of a brief description in laymen's language of what power factor is, how it can be improved and an example of actual savings in some installation. The reason some large consumers do not improve their power factor is because of sheer ignorance of the significance or relying on the sound advice of old Bert, the handyman, who heard from his friend at the pub that they tried it once and it didn't work. This is the sort of reply we do get. It is because of incidences such as these that I disagree with the code of ethics of various engineering institutions, which preclude a professional consulting engineer from approaching a firm with a view to checking on and, if possible, reducing electricity consumption charges. I think this is a bit of a parallel to a doctor not being allowed to attend to a sick or injured patient unless the patient first asks him to do so. I note that the writer feels that perhaps industry should pay for more electricity and I quote "because it is in business to make money". I think it fortunate, Mr McCulough, that you read that out at an AMEU Convention and not a Chamber of Industries Convention. It is usually a matter of Council policy as to whether industry should be encouraged or discouraged. In any case, why only refer to industry? I doubt whether many commercial firms are in business for charitable reasons. Whilst most towns encourage industry, I am sure that there are some such as Stellenbosch and Grahamstown — centres of education — which could utilise electricity tariffs to discourage industry. I can imagine Dr Danie Craven's reaction if he were advised that the third Iscor was to be sited next to his beloved Matie's rugby field.

Referring to the tariffs of Johannesburg specifically, I am surprised that the coal escalation clause was only introduced as recently as 1973. I shall be interested to learn whether that statement applies to your gazetted tariffs only and whether there are any special supply agreements which include and have included coal escalation clauses for many, many years. I agree with the departure from the basic room charge for domestic consumers because this is not an easy matter to administer.

However whilst I can appreciate the reasons for eliminating the small service charge for these consumers. I can't see the point in not doing so for the non-domestic consumer with a load of less than 60 kV.A. After all, most small busineses do not close down for lengthy periods, whereas domestic consumers do go away on holiday, sometimes for periods of two or three months, during which no supply is taken, but their service connections must be retained. Perhaps, however, I am not interpreting the purpose of the standing charge correctly.

A comparison of the two part demand tariffs of Johannesburg and Durban is as follows: kVA charge R2,19 for Johannesburg and R4,15 for Durban. Unit charge 1,37 cents for Johannesburg and down to 1,24 cents over 15 000 units for Durban. These tariffs indicate that Durban pays higher fixed charges for the long transmission lines, but the fuel and other running costs for the two cities are about the same. I think the arrangement of granting a rebate to consumers who have improved their power factor is one of the overpromotional incentives that you have referred to. As I see it the demand tariff by itself provides constant incentives for consumers to review operating procedures. It would appear from the incentives offered that the Johannesburg tariffs are framed around a system peak which corresponds to the commercial and industrial maximum demand, but I canot see the benefit of these incentives to an electricity undertaking which has a peak derived mainly fro mthe domestic loads. I am merely mentioning this in case there are other people present who are going to adopt your tariffs for their own towns. You must take into account the type of operation in each town and what gives rise to the peak.

I shall be interested to know the reason for the very large discount of 10% which is applied to accounts over R2 000,00, and wondered whether this also applies to consumers with monthly accounts of about R13 000,00. You must have several such consumers and they would have discounts of about R1 300 per month, which is equivalent to something in the region of 95 000 units. Somebody must be paying for these somewhere along the line and I am wondering what is the point of applying such a high discount. I should also be interested to know whether the application of this discount for charges over R2 000 will in fact mean that a consumer with an amount of R2 000 will pay less than a consumer with an account of R1 850. The proposed provision for automatic adjustment for Escom price variations will solve the problem from the financial point of view, but I wonder if consideration has been given to the psychological effect which may arise when, in the present climate, consumers are subjected to increases in tariff every three months. Would it not be preferable to overcharge initially and create a reserve fund to reduce the number of increases which you are likely to apply. Such an arrangement would at least reduce also the number of times the poor city councillors would have to deal with an unsympathetic press, irate chambers of industry and commerce and angry ratepayers' associations. I like this statement and I quote "All that is necesary is to establish what percentage margin must be added to the amount to be recovered in respect of Escom price increases in order to meet departmental needs and to recover losses". Oh

what joy it is to work for a municipality. I am sure that a lot of our large manufacturing concerns and construction companies envy the facilities at our disposal to meet the needs and to recover losses.

Mr. President, I am indeed honoured that I, as a Councillor, was invited to open the discussion on this paper, and it is as a councillor that I would like to address the following remarks to councillors present.

We invited the City Engineer of Durban, Mr Don McLeod, to speak at the Consulting Engineer's convention in Durban and the subject he was going to speak on was his associations and dealings with consulting engineers. During the course of the discussion, he was asked whether he had any difficulties in dealing with consulting engineers. He said he had no difficulty in dealing with consulting engineers but did with stupid councillors. I hope that isn't why I was asked to speak!

I would like to address my next remarks to the councillors. An electricity tariff is simply a unit rate of selling price. The selling price of any article is made up of cost production plus profit. For a given profit one can therefore control the selling price by controlling the cost of production. The paper has listed various production costs, e.g. capital costs of plant, running costs, maintenance costs, administrative costs, etc., and one of the main controlling factors behind all these costs is the ability of the engineer. Obtaining competent senior electrical engineers is not much of a problem in the larger towns and cities as in most cases such engineers have been with the department for many years and are therefore able to assume the top position.

On the other hand the smaller towns are not usually able to fill the positions from their own staff and have to engage engineers previously unknown to them. Some councillors may be of the opinion that, because the applicant is a qualified electrical engineer, he knows everything there is to know about electrical engineering including distribution design. The result is that engineers are taken on who may be experienced in other fields of engineering but rely on the technical representatives of commercial firms to assist them with their distribution designs. These engineers are often the cause of unnecessarily large expenditures, which result in unnecessary increases in tariffs. The equipment which these people have to deal with is extremely expensive. It may be of interest to councillors to know that if a competent and experienced engineer is employed at say R5 000 per annum more than the intended salary, this engineer in one year has only to save the council from purchasing one 800 kVA transformer or about 200 metres of high voltage cable or one mini-substation in order to cover the increase in salary.

Mr. Chairman, on behalf of the Association I should like to thank Mr. McCullough for the very topical subject he has chosen and to compliment him on the explicit manner in which he has presented his paper. I have much pleasure in formally proposing a vote of thanks to Mr. McCullough. Thank you.

MR. K. G. ROBSON, President:

Thank ycu Councillor for your contribution, which has been all the more interesting because it combines the views of councillor, engineer and businessman. May I now call on Mr. Palser of Cape Town for his contribution.

MR. C. PALSER, Cape Town:

Mr President, I am in full agreement with many of the views expressed by Mr. McCullough. I am also, however, done just the opposite to Johannesburg, albeit for exactly Firstly, I fully agree that tarifs should be as simple as possible, both in number, structure and application. I was therefore most surprised to note that Johannesburg has dropped its Tariff Stabilisation Fund in favour of complicated tariff clauses in order to compensate automatically for fuel cost and Escom tariff variations.

As Mr. McCullough readily admits, the problem is indeed a complex one. We in Cape Town realised this several years ago when we also tried to evolve a clause to cover Escom tariff variations, but we abandoned this approach. Admittedly, it can be done and the solution proposed by Johannesburg appears to be a reasonable one. But is the complication really necesary? We felt it was not and introduced a Tariff Stabilisation Fund instead. In other words, we have done just the oposite to Johanesburg, albeit for exactly the same reason!

It is considered that a tariff stabilisation fund possesses certain distinct advantages over tariff adjustment clauses. Perhaps I could mention a few of them.

Firstly, all inflationary increases, and not only those due to fuel cost or Escom tariff variations, can be met fully without complications. This is particularly important in today's economic climate of rapidly escalating costs.

Secondly, the consumer does not lose financially through the Council's collecting additional revenue from him ahead of its actualy being required. This additional revenue is invested and earns interest effectively on behalf of the consumer.

Thirdly, major increases, such as increases in the price of fuel and Escom's tariff, are generally not so frequent that they canot adequately be met by appropriate annual tariff revisions. An annual increase, although relatively substantial these days, is still probably more acceptable to consumers than quarterly, although smaller, increases of unknown and possibly varying magnitude. This factor is particularly important to large consumers, such as industrialists, as a single fixed annual increase enables them to budget ahead with perhaps more acuracy.

I can conclude my comments on this matter of tariff adjustment clauses versus Tarif Stabilisation Funds by stating that we have operated on the basis of such a fund for the past two years without any trouble.

Another matter of dispute concerns the so-called "promotional" demand tariff with its progressively increasing rebate for load factors in excess of 25%. I consider this concept to be quite wrong in principle.

It would apear that the underlying philosophy behind the load factor rebate is to reduce Johannesburg's purchases from Escom and thereby reduce expenditure and defer tariff increases. But surely, if the demands of indicidual consumers decrease by virtue of the load factor rebate, then the overall revenue that will accrue to the City will also decrease and thereby largely negate any associated savings. It is assumed here that the demand is reduced by shifting to off-peak periods and that there is no appresiable change in energy consumed.

It would be interesting to know whether, in fact, Johannesburg has experienced any increase in system load factor on this acount and, if so, the order of magnitude of the overall net financial savings attributable thereto.

I would submit that, in general, the only correct method when considering two-part maximum demand tariffs is to frame them on the basis of actual costs, with each consumer contributing more equitably to his peak responsibility.

But supose the load factor rebate concept were conceded as being the correct approach, which I do not, then virtually the same, if not better, overall effect could be achieved through the simple expediency of tilting the tariff, that is increasing the demand charge and lowering the unit charge. Not only would this result in a lower cost per unit for high load factors, as achieved by the load factor rebate, but it would also result in a higher mean cost per unit for low load factors, an advantage which is not achieved with the rebate method.

In conclusion, I would refer to the block rate. This rate, as almost universally applied to date, has been the so-called "declining" block rate that is, succeeding blocks are offered at progressively lower rates. Today, however, there is a move in the opposite direction and attention is now being given to "inverted" block rates, largely in the interestes of energy conservation. Under this rate, succeeding blocks are offered at generally progressively higher rather than lower rates to discourage heavy consumption and wastage.

We in South Africa have not quite reached this stage yet but I do think, nevertheless, that we canot afford to be complacent either. The time is possibly not so far off when we also may have to consider such a tariff, particularly in the light of the Minister's remarks yesterday in his opening address on the need to conserve and not waste our energy resources.

Thank you, Mr President.

MR. K. G. ROBSON, President:

Thank You, Mr Palser, for that very interesting contribution. Mr. A. J. Levy, of Escom, will you please give us your contribution.

MR. A. J. LEVY, Escom:

Mr President, Gentlemen, in presenting his paper on electricity tariffs, Mr McCullough is to be congratulated on two counts, firstly on venturing into a most controversial field of discussion where there are almost as many opinions as there are tariff designers and secondly, on performing his difficult task so well.

Mr. McCullough mentions three elements of cost to be considered in tariff design; demand related costs, fixed costs and energy costs and I agree with his views. There is also

a fourth cost element recognised by many designers of electricity tariffs, namely consumer related costs. These have been defined as costs which are caused by the presence of consumers on a system, irrespective as to their demand on energy requirements. This cost element covers considerably more than the cost of service connections, meters, meter reading, billing, etc., and might be considered, as a first approximation, to be the cost of the lightest network that could be constructed, complying with engineering standards, to connect consumers to a system. This is particularly true in rural areas fed over high voltage lines, where consumer related costs tend to represent an appreciable part of total costs. In a block rate tariff designed to ensure as far as possible that each individual consumer meets the cost of his supply, the consumer related cost can only be recovered through a fixed monthly charge in addition to the various block rates for kWh. If it is desired to spread costs over the class of consumers considered, then the consumer related cost can be recovered in the first block of units.

The Electricity Act requires Escom to supply at cost as far as practicable and Escom has therefore introduced what may apear to be relatively high service charges in its tariffs for domestic and small power use, the latter tariff being applicable to demands less than 100 kVA. Typical monthly charges in the standard tariffs are R3 and R4 for domestic use and R6 and R8 for small power use. Municipal tariffs, not being subject to the requirements of the Electricity Act, can be tailored to meet the desires of the municipal authorities.

Table 3 of the paper which compares the cost of generation in January 1977 in the Council's power stations with the Escom tariff for bulk supply, illustrates dramatically the effects of inflation on the electricity supply industry. In 1971 the cost of a 3 000MW power station with six 500MW sets was about R105 per kW sent out. Today the cost of a 3 600MW station with six 600 MW sets expressed in 1977 money value is about R300 per kW sent out. During this period, interest rates have approximately doubled so that the payment for interest on new generating plant as seen in the electricity tariff has increased approximately sixfold.

The proposal to adjust municipal tariffs each quarter to take account of changes in the cost of Escom power due to the effect of the Escom coal adjustment clause and/or increase to tarif surcharges is interesting. Escom has adjusted its energy rates through the application of a coal adjustment clause almost since its inception but, although it is a useful means of compensating for large changes in cost, it cannot provide exact compensation. Where it is based on coal cost in Rands per ton it does not take account of the efficiency of use which varies considerably from power station to power station nor for the calorific value of the coal. When tariffs are subject to discount or surcharge, it will either under-compensate or over-compensate.

If Mr. McCullough's proposal is applied, the Johannesburg tariffs would be subject to surcharge to cover increases in Escom's charges and this would immediately distort the adjustment for increases in the cost of coal burnt by the municipal stations, which in any event should vary, not only with changes in coal price, but also with the ratio of self-generated kWh to purchased kWh.

In the introduction to his paper, Mr. McCullough draws attention to the flaws in the suggestion that a tariff can be determined simply by dividing income by the anticipated number of units to be sold and sets down the criteria for successful tariffs. Modern thinking is, however, making the problem much more difficult in that the basic definition of "cost" is no longer a simple matter. We have been accustomed to thinking of one of the major cost components, namely loan servicing charges, as consisting of interest and redemption charges based on the historical costs of the plant in use. But today's economists point out that this undervalues the resources to be used to supply developing loads and may encourage expansion that may not really be desirable. They suggest that cost should be based on present-day values, that is by revaluing all plants to present-day costs, or in accordance with the principles of inflation accounting or in terms of long term incremental costs. One of the recommendations made by President Carter in his energy policy for the U.S.A. is that energy should be sold at replacement cost.

The message is that our tariffs have been far too low in the past, have encouraged waste of limited resources and have perhaps led to premature costly extensions to generation, transmission and distribution systems. Although the Electricity Act requires Escom to include historical loan servicing costs in its tariffs, it has since 1971 permitted it to create a Capital Development Fund through contributions from revenue to increase internal financing. This can be regarded as a different mechanism for meeting the objective now advocated by the economists.

May I again thank Mr. McCullough for a timely and thought-provoking paper.

MR. E. TRAUTMANN, Ladysmith:

Mr. President

Mr. McCullough has delivered his paper at the right time and we are grateful for the enlightening facts and considerations he has given us.

With the short notice of increases by Escom in the past and the difficulties in correlating the increases with the then prevailing rate of inflation, it is of great importance for every undertaking to know the difference between Escom's and their own tariff patterns at present.

While at present it might not be so important for Johannesburg due perhaps, to small pattern differences and the fact that Escom is only partially supplying power to their area, it is very necessary for the Natal Undertakings to fall in with the new pattern of Escom tariffs as soon as possible.

The better the two tariff structures are correlated, the easier it is to find a formula for automatic tariff adjustment, and the need for a review will not occur quarterly but may only be required yearly. This will also be more acceptable to smaller municipalities, where the Treasurers are not so well geared for more frequent changes.

Any automatic adjustment formula will work satisfactorily only when Escom's tariff increases are based on a normal growth rate at the prevailing inflation rate, since the individual undertakings' own growth rate and the effect of inflation can be proportionally considered in the formula. It is hoped that Escom's increases in future will not be taken in uncomprehensively high steps as in the past.

Another advantage of a similar tariff structure to that of Escom is the possible adjustment by consumers of their load factors. With the Natal tariff structure, Escom's demand costs are in a ratio of roughly 2 to 1 against unit costs at a load factor of 55 to 60%.

In view of this, one should deviate from the old term of "overall cost per unit (kWh)" and rather start to use a term "overall cost per kVA".

Only if the individual undertaking's own tariffs emphasise demand in the same way, will the effort to curb demand and encourage means of improving load factor be successful.

May I mention here that the circuit breaker related tariff for non-bulk consumers has proved its effectiveness and simplicity and should be applied where incentives for high load factors are wanted.

May I ask the author a few questions:

Firstly, should not the words "Escom demand charge and Escom energy charges" be added to Sections 1.2 and 1.3 of his paper?

Secondly, under section 2.2, the block tariff is taken up to 1 300 units before the lowest unit price is charged. What is the average consumption of a domestic consumer in Johannesburg? If it is about 700 units, is the lowest unit price intended to encourage off-peak consumption?

Thirdly, under Section 2.2, Scale 3: Demand tariff: I take it that both LT and HT bulp supplies are included. My question is whether Johannesburg provides any switchgear or transformers or whether the consumer has to provide these. If either case can apply, are different tariffs available?

Thank you.

MR. J. T. GRUNDY, Affiliate:

One notes that Mr. McCullough claims the price of follow on units and also the off-peak Supplies Tariffs give encouragement for the use of electricity at night for applications such as shop window lighting and security lighting. Nevertheless, when one studies all the tariffs available, the percentage increases in costs from 1972 to 1977 all appear to be higher than any other product in the R.S.A. and even the standard C.O.L. Indices. Would Mr. McCullough care to coment? Furthermore, these unit costs have risen so much over the past five years that they obviously lead to encouragement to use the highest efficacy discharge lamps for lighting, regardless of the colour amenity. Would Mr. McCullough agree, and if so, why does not Johannesburg use low pressure sodium lamps for suburban lighting?

MR. C. E. ADAMS, Port Elizabeth:

Mr President, Gentlemen:

Previous contributors have dealt with some of my questions so I'll be very brief.

I would like to congratulate Mr. McCullough on a very interesting and topical paper. The subject was of particular interest to me, as we are presently engaged in revising the Port Elizabeth tariffs, and I was therefore pleased to read this paper and gain an insight into the philosophy behind the Johannesburg tariffs.

I have two questions which I would like to pose.

Firstly, what problems have Johannesburg experienced with their block tariff structure? In Port Elizabeth the meters are only read at two monthly intervals and the City Treasurer's Department is strongly against block tariffs. It claims that many administrative problems occur when accounts have to be adjusted on account of reading errors or other problems, because consumers always dispute the proportioning of units between the blocks. How do they overcome this problem in Johannesburg?

My second question deals with the off-peak tariff. Why does Johannesburg make an off-peak tariff available to demand consumers, surely the nature of a demand tariff encourages the consumer to improve his load factor by spreading his consumption as much as possible. Has Johannesburg considered off-peak tariffs for domestic and commercial consumers on their block tariffs?

Thank you.

MNR. E. de C. PRETORIUS, Potchefstroom:

Mr. President I would also like to add my thanks and congratulations to Mr. McCullough for an excellent paper. Many years ago we had the pleasure to listen to Mr. Pulik, of Johannesburg Electricity Department and he also read a paper on tariffs which to me has been a reference all these years. In Mr Pulik's paper, he stipulated certain basic requirements for a sound tariff structure which are so often disregarded for municipal political reasons. These requirements were that "the tariff should not be determined by considerations extraneous to the business of the electricity supply" and Mr. President I advocate the circuit breaker tariff for small consumers.

MR. W. BARNARD, Johannesburg:

In his overall evaluation of Johannesburg's electricity tariffs the author has stated that the tariffs could be criticised as being over-promotional and encouraging the sale of electricity at night.

This is of course true and has arisen because of the relatively cheap cost of production at night at the Johannesburg City Council's power stations, the cost of these units comprising virtually only the cost of the coal burnt.

Today, however, the picture is changing and a new philosophy is emerging. There is talk of a world-wide energy crisis and energy conservation. I consider that the Electricity Supply Industry must more particularly look to better utilisation of electrical energy and, in this regard, consider incentive tariffs which rather relate to load factor and power factor than off peak usage. In addition to off peak incentives, the Johannesburg tariff has also achieved the objective of better utilisation by the provision of a load factor rebate in the demand tariff.

A good example of how a commercial complex can optimise its energy resources is the Carlton Centre. The following are datils of the electricity supply to this complex is:

Maximum Demand	18 MW
Load Factor	64%
Total Number of Units for Year	100 000 000
Total Annual Account	R800 000
Average Cost per Unit	0,7808c
(Average Cost per Unit for all consumers	1,226c)

Solar heaters have not been used extensively in most countries in the past, but I am sure the considerable escalation in electricity costs will influence consumers, especially in a country like South Africa, to evaluate solar heaters very carefully. This will require a thorough study of the effect on cost and load patterns by the electricity supply authority and may require a new philosophy in regard to the formulation of electricity supply tariffs.

Electricity tariffs of the future must therefore be designed to meet the objective of better rather than great utilisation of energy.

The average domestic consumer has a good power factor load but is unable to do much himself to improve his load factor. He should, therefore, be encouraged by means of publicity campaigns and incentive tariffs to accept load control on his water heating installation. Domestic consumers may also, in the future, have to accept some limitations to their supply even if these result in their being required to select between using a stove or water heater or space heater at any one time.

Thank You.

MR. K. G. ROBSON, President:

May I now call on the author, Mr. McCullough, to answer as many questions as he can in the unfortunately short time we have left for the consideration of his paper.

MR. S. G. McCULLOUGH, Johannesburg:

Mr. President, with the limited time at my disposal I will reply to as many of the numerous points raised by the various contributors as I can.

I will first come to Mr. Adams' question about application of the block tariff when meters are only read at two-monthly intervals. In Johannesburg domestic consumers' meters are read at three-monthly intervals and we have met the problem of monthly allocation of units within each block by defining, in our tariff, that for meter reading purposes a month shall comprise 30,4 days. Previously the calendar month was used but, with the adoption of the block tariff, difficulties were encountered because of thirty and thirty-one day months and also because of unavoidable variations in the numbers of days between meter reading dates. The problem was overcome by the adoption of the 30,4 day month. As an example, if meter reading is on a two-monthly basis and time elapse between two given meter readings is 65 days then, for that two-month period, the first $65 \div 30{,}4 \times 300$ or 641 units would be charged for at the high rate. If the period between meter readings were less than 30,4 days, then proportionately less than 300 units would be charged out at the high rate. The net effect is that for every period of 30,4 days the first 300 units consumed are charged out at the high rate.

In our previous tariff, the "off-peak" scale was available to all non-domestic consumers, but this led to unintended advantage to certain small consumers — e.g. petrol service stations — whose demand was small but who, nevertheless, could get units used almost solely for lighting at the very low off-peak rate. In addition, these consumers had to be provided with time-switches to control the two-rate metering. These time-switches are not only expensive to purchase, but are also costly to maintain. To be effective, they have got to be synchronous, they must have spring reserve, which must be exercised periodically, and so they cannot be justified for small consumers. This problem has been overcome in the present tariff by including in the "off-peak" scale a minimum demand charge of R46 per kVA, which effectively discourages the small consumer for whom the "off-peak" scale is not intended.

I would like to thank Councillor Shepstone for his contribution. Because of the limited time available to me, I have decided to deal with only two of his queries.

Firstly, Johannesburg enjoyed a very favourable 10-year coal contract, which terminated at the end of 1975, coupled with which coal prices had, until about 1973, been fairly stable. Thus there had been no call for an earlier application of a coal escalation clause in our tariff.

Secondly, the 10% discount available to large consumers is only applicable to that amount of the monthly account which exceeds R2 000. Thus, if a consumer's account is R2 010, he will get a rebate of 10% of R10 or R1.

Mr. Palser, one of your main points was that of a tariff stabilisation fund versus provision for automatic tariff escalation. Johannesburg established a tariff stabilisation fund very many years ago and it served its purpose admirably. However, in the present rapidly inflationary period its retention is debatable and in Johannesburg it was decided to discontinue it.

In the long term a tariff stabilisation fund might be to the consumer's benefit, but it does involve the possibility that the present generation may be paying for the well-being of the next, whereas with the concept of tariff escalation, you are trying to ensure that consumers are paying for the electricity they are in fact using.

Mr. Levy, I think the points you raised were rather of an explanatory nature and I thank you for these.

To M. Trautmann, I think Johannesburg has greater problems in formulating tariffs than do municipalities which do not operate generating stations. How easy would it be for us in Johannesburg to adopt the Escom tariff and its periodic escalations. Certainly the problems of our Management Services Engineer would be materially simplified. Mr. President, thank you very much for your remarks and for the time you have made available to me for replying to some of the points raised by the various contributors.

MR. K. G. ROBSON, President:

Gentlemen, I have no doubt that if Provincial Administrators were asked to provide a chairman at a Convention of the AMEU, their question as to whether the duration of the Convention should be of three or four days would quickly be answered. I'm being quite serious when I say that with a convention of this importance it is absolutely essential that we maintain a four-day period. There is no doubt whatsoever in my mind about this. It is imposible even in the four days to get our teeth into the discussions that we really should be putting our minds to, and it is for this reason that we find, with papers such as we have had today, that there is just not enongh time to give people the opportunity to ask the questions they would like to — not merely to criticise but to get the benefit of the experience of people like Mr. McCullough, who is obviously completely on top of his subject as far as the electricity tariffs of Johannesburg is concerned. We congratulate you Mr. McCullough on your confident presentation and your courage in coming here to East London to talk about what is always a controversial subject. You have expressed very convincingly, very forcefully and very engagingly, your own views on tariff structure and design and for this we especially thank you.

MR. K. G. ROBSON, President:

It has been my particular privilege to have been associated with Ben Leach on the Board and Management Committee of NOSA for some years. I have no doubt in my own mind that he is recognised as a foremost authority on Management Techniques in South Africa and as an outstanding example of a top executive effectively applying the Louis Allen Management Concepts in his own sphere of operations, and for me it is a special personal pleasure to have him on the platform at an AMEU Convention.

Die Bestuur van oorsake-Tot-Verlies

Deur

MNR. B. H. L. LEACH
M.Sc.(Ing.)(Wits.)

INLEIDING

Die doel van hierdie referaat is om sommige van die huidige denkrigtings oor die beheer van oorsake-tot-verlies te verhaal en te kombineer. In die verband is ek dankbaar vir die werk wat reeds deur verskeie persone gedoen is. Die bronne wat ek geraadpleeg het verskyn in 'n aparte lys aan die einde van die referaat. Hierdie persone se bydrae het my gehelp om hierdie referaat saam te stel waarin ons oorweging sal skenk aan wat nodig is vir die beheer van faktore wat verband hou met oorsake-tot-verlies of afwykende effekte.

In verband met die referaat, die volgende:-

— 'n Afwykende effek is die verskil tussen wat beplan is en wat werklik bereik is. Dit kan meer of minder wees as wat beplan is;

— 'n Verlies is 'n besondere afwykende effek wat insluit skade aan toerusting; verlies aan geld, produksie, eiendom, goeie trou en persoonsbenadeling (beserings of dood) of 'n kombinasie van hierdie faktore.

Aangesien verlies 'n element is van afwykende effek is dit moeilik om slegs op verlies te konsentreer sonder om die bespreking onnodiglik te strem. Hierteenoor dek die begrip afwykende effek so 'n wye veld dat dit onmoontlik is om dit in 'n referaat soos hierdie te behandel. Vir die doel van hierdie lesing plaas ons dus die klem op verlies gedagtig daaraan dat in sommige gevalle die onderwerp van bespreking ook van toepassing is op afwykende effek.

Aandag sal aan die volgende aspekte gegee word:-

(1) Die sakestelsel;
(2) Sake- en bedryfsverlies;
(3) Die identifisering, taksering en regulering van oorsake-tot-verlies of afwykende effek;
(4) Die struktuur van oorsake-tot-verlies of afwykende effek;
(5) Standaarde vir bestuursmetodes; persoonlike-, fasiliteits-, produk-, omgewings- en sake-oogmerkfaktore; bedryfsgebruike en — toestande;

MR. B. H. L. LEACH

The Management of Loss Causation

By

MR. B. H. L. LEACH
M.Sc.(Eng.)(Wits.)

INTRODUCTION

The intent of this presentation is to relate and combine some of the current thoughts on the management of loss causation. I am indebted to the writings and thoughts of a number of persons who are active in this field. These sources are listed in the reference section at the end of this paper. Their contributions have helped me to develop this presentation in which we will consider what is necessary for the management of factors related to loss causation or deviation effect.

In the context of this presentation —

— a deviation effect is the difference between what was planned for and the actual achievement, which may be more or less than planned;

— A loss is a specific deviation effect meant to include such items as damage to facilities; loss of money, production, property, goodwill and personal harm (injury or health) or a combination of these factors.

Since loss is an element of deviation effect, it is difficult to focus on loss alone without putting an unnecessary constraint on to the discussion. Further that to use deviation effect, which is so wide in scope, it is impossible to deal with the subject in a presentation of this nature. So the course followed here is one of emphasis on loss with an occasional reminder that in some respects, the subject matter is also applicable to deviation effect.

Loss causation is an ever present activity in the business system and like all other activities in this system must be managed to obtain optimal results. Loss must be optimised, i.e.: the best trade-off of expected loss value and cost of control on the one hand and business benefit on the other.

We will be considering —

(1) The elements of the business system;
(2) Business and operating loss;
(3) The identification, assessment and regulation of cause of loss or deviation effect;
(4) The structure of causation of loss or deviation effect;
(5) Standards for management practice; personal, facility, environment, product and corporate objective factors; practices and conditions;

MR. B. H. L. LEACH was born in Ermelo on the 2nd April, 1926, matriculated at the Witwatersrand Technical College, Vereeniging and graduated in 1950 from the University of the Witwatersrand with a Bachelor of Science in Mining Engineering (Coal option). After graduating he joined Springfield Collieries near Heidelberg. In 1968 he obtained his M.Sc. in Engineering from the same university. In 1964 he joined Sasol as Manager of the Corporation's Sigma Colliery. In 1971 he was appointed to his present position of Assistant General Manager. In this position he is mainly concerned with the Sasol works and mine production.

At present he is National Vice-Chairman of the National Occupational Safety Association.

(6) Die identifiseringswyse en bestuursbeheer van die oorsake- tot:-
  6(1) Potensiële verlies of afwykende effek;
  6(2) Werklike verlies of afwykende effek;
  6(3) Afgraderingsvoorvalle;
  6(4) Substandaard bedryfsgebruike en -toestande; persoonlike-, omgewingsfaktore, ens. en bestuursmetodes;
(7) Die ingewikkeldheid van die oorsake-tot-verliesstelsel;
(8) Ten slotte, wat die optrede kan wees met betrekking tot die inhoud van die referaat.

Die behoefte aan 'n beter begrip om ons sodoende hopelik beter in staat te stel om die oorsake-tot-verlies te hanteer, word miskien die beste geïllustreer deur te verwys na een maatstaf van verlies waarmee meeste van ons te doen kry en bekend mee is. Dit is naamlik persoonsbenadeling gemeet in terme van die beseringstrekwensie.

Soos aangedui in die tabel in afbeelding 1 het die beseringstrekwensiekoers in die V.S.A. (dit is slegs vir die maatskappye wat aan die Nasionale Veiligheidsraad verslag doen) tussen die jare 1925 en 1940 vinnig afgeneem. Gedurende die oorlogsjare het dit weer ietwat gestyg wat miskien toegeskryf kan word aan die groot inname daardie tyd van relatief onopgeleide werkers. Daarna het dit weer afgeneem en tussen 1955 en 1967 het die koers op omtrent 7 afgeplat. Teen 1975 het dit tot 13 gestyg.

Die beskikbare inligting in die verband met betrekking tot Suid-Afrika wat van die Ongevallekommissaris verkry is vir die tydperk 1952 tot 1972 is ook in afbeelding 1 getabuleer. (Vir sommige jare is daar geen betroubare inligting beskikbaar nie). Van hierdie inligting kan afgelei word dat vordering in sowel die V.S.A. en Suid-Afrika gemaak is met die vermindering of uitskakeling van sommige faktore wat beserings tot gevolg het. Dit blyk egter dat met betrekking tot die beseringstrekwensie die V.S.A. besig is om veld te verloor terwyl dit wil voorkom of die koers in Suid-Afrika op nagenoeg 13 afgeplat het.

Persoonsbenadeling is slegs die boonste punt van die ysberg van al die moontlike sakeverliese. Daar is geen rede om te glo dat ons vermoë om ander verliese, soos skade, nie ook afgeplat het nie. Hoewel dit erken word dat daar 'n ekonomiese beperking is ten opsigte van verliesbeheer, dit is waar die koste van die beheer hiervan die resultaat wat verkry word oorskry, dit onwaarskynlik is dat dié posisie reeds bereik is. Ons is heeltemal geregverdig om die afleiding te maak dat bestuur nog nie verder gevorder het as om simptome van oorsake-tot-besering te identifiseer, naamlik substandaard bedryfsgebruike en -toestande.

Daar is geen rede om te glo dat dit nie ook waar is ten opsigte van ander afwykende effekte in die vorm van verlies van, of skade aan toerusting, omgewing, produkte en sakeoogmerke, nie.

In hierdie referaat word sekere vlakke van oorsake-tot-verlies en die inhoud van elke vlak aangebied. As gevolg van die groot verskeidenheid van moontlike elemente op elke vlak, word daar nie probeer om verder te gaan as slegs om voorbeelde aan te bied nie.

Die gewone simptome van oorsake-tot-verlies, substandaard bedryfsgebruike en -toestande, vorm een van die vlakke van hierdie struktuur van oorsake-tot-verlies.

1. DIE SAKESTELSEL

Enige besigheid of onderneming hetsy privaat of openbaar, wat of goedere of dienste verskaf, moet voldoen aan die vereistes van wins en sosiale verantwoordelikheid. Die sakeonderneming is ook onderhewig aan omgewingsbeperkings (politieke, sosiale, wetlike, natuurlike, finansiële en kommersiële beperkings om net 'n paar te noem). Dit is ook gevoelig vir verhoudings tussen mense (hulle kennis, vaardigheid en gesindheid), die omgewing en fasiliteite (hulle bruikbaarheid en beskikbaarheid). Hierdie vereistes, beperkings en verhoudings is komponente van 'n produksiestelsel en oefen 'n wisselwerking op mekaar uit.

Die wisselwerking van al die komponente moet bestuur word (beplanning, organisering, beheer en leiding) om die oogmerk van die onderneming te bereik. Die stelsel van bestuur, omgewing en die mens, fasiliteite (masjinerie, geboue, gereedskap, materiaal, eiendomme, ens) as 'n produsent van die produk of diens om die oogmerk van die onderneming te bereik, word in afbeelding 2 aangetoon.

In bogenoemde stelsel is daar aansienlike moontlikhede vir verandering en ingewikkelde interaksies tot voor- of nadeel van 'n onderneming. Om dit te bereik wat beplan is, dit is om enige verlies uit te skakel, moet die stelsel deur bestuur beheer word. Faktore met die potensiaal van oorsake-tot-verlies is altyd aanwesig en daaroor moet beheer uitgeoefen word om te verseker dat die oogmerk van die onderneming bereik word binne die vasgestelde aanvaarbare perke. Die gehalte van dit wat deur die onderneming daargestel word, staan direk in verhouding tot die gehalte van bestuur.

(6) The process of identification and management control of the causation of —
  6(1) Potential loss or deviation effect;
  6(2) Actual loss or deviation effect;
  6(3) Downgrading incidents;
  6(4) Substandard practices and conditions; personal, environmental, etc., factors and management practice;
(7) The complexity of the loss causation system;
(8) In conclusion, what the action in respect of the content of the presentation could be.

The need for a better understanding and thus hopefully improving our ability to cope with loss causation, is perhaps the best demonstrated by reference to one measure of loss that most of us are familiar and concerned with, namely personal harm as measured in terms of the injury frequency. As illustrated in tabular form in figure 1, in the U.S.A. (only for those companies reporting to the National Safety Council) the injury frequency rate declined quite rapidly between 1925 and 1940, rose somewhat during the war years (most probably due to the intake of a large and relatively untrained workforce) but declined thereafter. Between 1955 and 1967 the rate levelled out at about 7 and has risen to 13 in 1975.

In South Africa the available data from the Workmen's Compensation Commissioner is also tabled in figure 1 for the period 1956 to 1972. (For some years no reliable data is available). From this information it can be deduced that progress has been made in the U.S.A. and in South Africa, in reducing or eliminating some factors which result in injury. However, it does appear that in respect of the injury frequency the U.S.A. is losing ground and in South Africa it does seem that the rate has levelled off at about 13.

Personal harm is only the tip of the iceberg of all the loss business experiences. There is no reason to believe that our ability to control other losses such as damage, has not also levelled out. While it is recognised that there is an economic level of loss control, i.e.: where the cost of controlling exceeds the return on the effort, it is quite unlikely that this position has been reached. We can quite justifiably conclude that management has not yet got beyond the treatment of the symptoms of injury causation, i.e.: substandard practice and conditions. There is no reason to believe that this is not also true for other deviation effects in the form of loss or damage to facilities, environment, products and business objectives.

In this presentation distinct levels and elements on each level of loss causation structure will be presented. Because of the great variety of possibilities of elements on each level no effort beyond the presentation of examples has been made. The usual symptoms of loss causation, namely substandard practice and conditions form a level of this structure.

1. THE ELEMENTS OF THE BUSINESS SYSTEM

Any business or undertaking, private or public, either providing goods or services, is required to meet the demands of profit and frequently social responsibility. The business is also subject to constraints in the environment (political, social, legal, natural, financial and commercial to mention some), in which it operates. It is also sensitive to relationships between man (his knowledge, skill and attitude), the environment and facilities (their operability and availability). These demands, constraints and relationships are components of a producing system which interact with each other.

The interaction of the components must be managed (planning, organising, controlling and leading) to achieve the objective of the undertaking. The system of management, environment, man and facilities (machines, buildings, tools, materials, property, appliances and so on) as a producer of the product or service to achieve the object of the business is illustrated in figure 2.

In the aforesaid system there is considerable potential for change and complex interaction to the advantage or disadvantage of the business. To achieve which was planned, that is loss avoidance, the action of the system must be controlled by management. The factors which have the potential for loss causation are forever present which must be managed to ensure that the business objective is achieved within the established acceptable limits. The quality of the business result rests squarely on the quality of its management.

Die bestuur en in besonder die taksering en regulering van oorsaaklike elemente van verlies in die stelsel, is futuristies van aard, aangesien dit slegs moontlik is om huidige en toekomstige gebeurtenisse te beheer. Tog kan baie geleer word uit vroeëre gebeure met betrekking tot doeltreffende optrede in die toekoms. Dit is tog slegs die oorsaaklike elemente wat werklik beheer kan word en nie die verlies op sigself nie. Ten opsigte van verlies is die toepaslike optrede op sy beste slegs bedwingend of rehabiliterend van aard.

Omgewings-, fasiliteits- en persoonlike faktore hou in sigself groot moontlikhede in vir verandering of afwyking van die beplande, d.w.s. as aangeneem word dat die gehalte van die beplanning in die eerste plek voldoende was. Die bestuursproses self hou ook aansienlike moontlikhede in vir afwyking en dit maak die hele stelsel baie meer kompleks van aard.

2. SAKE EN BEDRYFSVERLIESE

Die oogmerke van 'n onderneming is wins in terme van profyt of diens. Besigheid is 'n riskante onderneming aangesien die uitslag wins of verlies is. Daar is egter 'n aantal funksies in 'n onderneming wat van nature slegs operasioneel is en waarin slegs nie-spekulatiewe risiko's gevind word. Die gevolg van hierdie nie-spekulatiewe risiko's kan op hulle beste slegs wees om dit te bereik waarvoor beplan is. Andersins kan die afwyking slegs 'n verlies wees met die gevolg dat die beplande nie bereik kon word nie. Dit is veral waar ten opsigte van afwykings in bedryfsfaktore wat verwant is aan sekere omgewingselemente, fasiliteite en die produk van 'n onderneming. In hierdie referaat word daar in besonder gelet op die beheer van die oorsaak-tot-verlies of afwykende effek op die nie-spekulatiewe gebied van die sake-onderneming.

Uit die oogpunt van die besigheids- of spekulatiewe risiko's is oorsake-tot-verlies in die algemeen, maar nie uitsluitlik nie, in die gebiede van:-

- — Sosiale verandering in die vorm van arbeidsonrus of 'n verandering in die smaak van die verbruiker;
- — Ekonomiese verandering soos inflasie of 'n afname in die vlak van ekonomiese aktiwiteite;
- — Politieke verandering wat onrus en oorlog of handelsbeperkinge insluit.

Op die gebied van die nie-spekulatiewe of bedryfsrisiko's kan die oorsake-tot-verlies in die volgende gevind word hoewel dit nie eksklusief daaraan gekoppel kan word nie:-

- — Fisiese natuurgevolge soos aardbewings en oorstromings;
- — Produkafwyking ten opsigte van hoeveelheid en kwaliteit;
- — Tegniese insidente soos prosesafwyking of mislukkings;
- — Persoonlike insidente soos onvoldoende kennis en vaardigheid of die verkeerde houding;
- — Beperkings of oponthoude in produksie as gevolg van 'n ontoereikende voorraad grondstowwe of gebruiksgoedere;
- — Bemarking ten opsigte van 'n fout in die geraamde vraag;
- — Finansieël in die vorm van slegte skuld;
- — Omgewingsinsidente soos onder meer die volgende:-
  - (a) Fisies soos besoedeling of die blootstelling aan skadelike stowwe, dampe ens.;
  - (b) Sosiaal — gedragsafwykings soos diefstal, nalatigheid, oproer ens.

Hierdie verlies veroorsakende insidente dra elkeen by tot die finale gevolg van 'n afname in die gehalte van die eindresultaat van die onderneming in verhouding tot sy oogmerk.

As daar meer as beplan is in die nie-spekulatiewe risiko situasie bereik word, is dit 'n bewys van ontoereikende beplanning veral ten opsigte van taakstelling en die toekenning van hulpmiddels.

'n Strak indeling in kompartemente van die oorsaaklike en gevolglike elemente wat verlies tot gevolg het soos in bogenoemde kategorieë aangetoon, mag wenslik wees vanuit 'n ontledingsoogpunt. Dit is egter nie altyd moontlik om te doen nie. Byvoorbeeld, die verlies veroorsaak deur slegte skuld kan herlei word na spekulatiewe sowel as nie-spekulatiewe faktore. So 'n klassifikasie is ook nie werklik nodig nie behalwe in die sin dat dit help om die begrip van spekulatiewe of nie-spekulatiewe verlies beter te verstaan. Dit kan weer van waarde wees waar bepaal moes word watter tipe verlies of afwykende effek daarmee te doen gekry word.

3. DIE IDENTIFIKASIE, TAKSERING EN REGULERING VAN OORSAKE-TOT-VERLIES OF AFWYKENDE EFFEK

Daar word aangeneem dat elke vlak in die bestuurstruktuur van 'n organisasie die nodige stappe sal neem om voorvalle wat verliese kan veroorsaak of aanleiding kan gee tot 'n afwyking van dit wat beplan is, te identifiseer en te beheer. Dit is die plig van die bestuur om alle doelbewuste en moontlike korrektiewe of rehabiliterende maatreëls ten

The management, particularly the assessment and regulation of the casual factors of loss in the system is futuristic by nature since it is only possible to control current and future events. However, much can be learned from past events to facilitate future action. Furthermore, it is only the casual factors which really can be controlled and not the loss. In respect of loss the appropriate action at best is containment or rehabilitative.

The process of change and potential for deviation from the planned (assuming that the quality of the planning was adequate in the first place) in the environment, facilities and man factors alone is great. The management process itself also has considerable potential for deviation and this makes the system as a whole more complex.

2. BUSINESS AND OPERATIONAL LOSS

The purpose of an enterprise is gain in terms of the necessary profit or service. Business is at speculative risk since the outcome may be gain or loss. There are, however, a number of functions within a business which mainly are operational by nature and in which only non-speculative risks exist. In the non-speculative type of risk the outcome at best can only be achieving what was planned, otherwise the deviation can only be a loss and the result less than what was planned. This is particularly true for deviations in the operational factors related to certain environmental elements, facilities and the product of an enterprise. The particular concern of this presentation is the management of deviation effect or loss causation in the non-speculative area of an enterprise.

From the business or speculative risk point of view loss causes are generally but not exclusively due to —

- — Social change in the form of labour unrest or change in consumer taste;
- — Economic change, such as inflation or decline in the level of economic activity;
- — Political change, which would include unrest and war or trade restrictions.

Non-speculative or operational risk loss causes may, although not exclusively, be found in —

- — Physical effects of nature such as earthquake and flood;
- — Product deviation in respect of quantity and quality;
- — Technical factors such as process deviation or failure;
- — Personal factors such as inadequacies in knowledge and skill, or improper attitude;
- — Production interruptions or restrictions because of the inadequate supply of raw materials or utilities;
- — Marketing in the form of error in forecasting demand;
- — Financial, such as bad debts;
- — Environmental factors, to mention a few —
- (a) Physical — such as pollution and exposure to harmful dusts, vapours, etc.;
- (b) Social — such as behavioural deviations as theft, negligence, riot and so on.

These loss causation factors each contribute towards a final consequence which downgrades the quality of the business result in relation to its objective.

Should there be a gain in a non-speculative risk situation, it is a sign of inadequate planning, particularly objective setting and resource allocation.

A rigid compartmentalisation of the cause and effect factors which give rise to loss as illustrated in the above-mentioned categories, may be desirable from an analytical point of view, but it is not always possible to do so, e.g.: the loss cause of a bad debt may be related to speculative or non-speculative factors. Such a classification is not really necessary except to create an understanding of speculative and non-speculative loss, which could be useful to identify which type of loss or deviation effect is under consideration. In the operational area of the business system it is mainly the non-speculative loss which is encountered.

3. THE IDENTIFICATION, ASSESSMENT AND REGULATION OF CAUSE OF LOSS OR DEVIATION EFFECT

It is expected that each level in the management structure of an organisation takes the appropriate action to identify and control those events which will cause loss or give rise to a deviation from what is planned. It is management's job to take the necessary cognitive, contingent, remedial or rehabilitative action since nobody else in the organisation is

opsigte van verlies of afwyking te tref aangesien niemand anders in die organisasie in 'n beter posisie as juis hulle is om dit te doen nie.

Om hierdie faktore van oorsaak-tot-verlies te erken en die nodige maatreëls daarteen te tref:-

(a) Moet 'n bestuurder weet wat sy oogmerke is en wat beplan is om dit te bereik. So 'n plan sal nie net die stappe insluit wat geneem moet word om optrede te inisieer om die doelwit te bereik nie, maar ook die fasiliteite, omgewing en die mense wat benodig word, die tyd wat dit behoort te neem sowel as die koste daaraan verbonde, aandui.

Die oogmerk is 'n wenslike en meetbare eindresultaat. Met die onvolmaaktheid van die werklikheid in gedagte, sal die oogmerk en die beplanning daarvoor normaalweg opgestel word met hoër en laer perke sodat indien 'n resultaat binne die perke behaal word dit as bevredigend beskou word. Dit word in afbeelding 3 uitgebeeld. Binne hierdie perke word rigtings tot veranderings aangestip en gewoonlik is die enigste optrede wat nodig is kognitief, rakend of aanpaslik van aard. Indien die afwykings die onderste (of boonste) perke sou oorskry bereik dit die gebied van onbevredigende werkverrigting waar die regstellende optrede herstellend, behoudend, beveiligend of voorkomend van aard dien te wees. Indien toegelaat word dat die afwyking die onbevredigende perk oorskry, word die ondraaglike situasie bereik waar die gevolge nie meer werklik beheer kan word nie. Die enigste optrede is so 'n geval is behoudend en/of rehabiliterend van aard om die omvang van die afwyking of verlies in bedwang te hou of teen hoë koste herstel moet word.

In die onderste gebied van onaanvaarbare prestasie is die gevolge oormatige skade, verlies, persoonsbenadeling of 'n kombinasie van hierdie faktore. In die boonste gebied van onaanvaarbare prestasie is die gevolge oormatige winsgewendheid, profyt, rykdom, persoonlike gerief of 'n kombinasie hiervan.

Uit bogenoemde paragraaf moet daar nie afgelei word dat skade, verlies, persoonsbenadeling of 'n kombinasie daarvan die gevolge is van afwykings wat slegs beperk is tot ontoelaatbare of onbevredigende werkverrigting nie. Op die gebied van aanvaarde werkverrigting word daar in die beplanning toegelaat vir hierdie moontlikhede omdat dit eenvoudig nie winsgewend is om al die afwykende effekte uit te skakel nie. Afwykende effekte kom ook voor op die gebied van onbevredigende werkverrigting maar deur toepaslike optrede en onkoste kan dit gewoonlik reggestel word. Indien daar egter nie vir die toepassing van hierdie regstellende stappe begroot of andersins voorsiening (versekering) gemaak word nie sal daar 'n nadelige uitwerking op die eindresultaat wees.

Met afbeelding 3 as 'n voorbeeld van bogenoemde, word die optrede om die doel te bereik by t1 geïnisieer en volgens plan ontwikkel tot by t2 waar 'n verandering 'n afwyking veroorsaak wat effektief voortduur tot by t5 wat 'n laer waarde het as die oogmerk met betrekking tot die omvang van afwykende effek. Met betrekking tot die oogmerk, was die eindresultaat minder as 'n gevolg van 'n afgraderingseffek van verlies, skade en persoonbenadeling of 'n kombinasie van almal aangesien die afwyking nie beheer kon word nie deur enige aksie wat toegepas is.

Daar moet ook op gewys word dat die resultaat wat bereik word nie altyd die gevolg van 'n enkele oorsaak is nie. Veelvoudige en gewoonlik interafhanklike oorsake en effekte is dikwels aanwesig veral in die vorm van 'n kettingreaksie wat ontstaan uit 'n primêre afwyking. Primêre afwykings bring gewoonlik bykomende elemente tot verandering mee wat op hulle beurt lei tot verdere reekse van oorsaak-en-gevolg wat voorkom in sekondêre, tersiêre, kwartere ens. stadiums. Hierdie begrip sal later in die aanbieding uitgebrei word.

(b) 'n Bestuurder moet in staat wees om vroegtydig die veranderingsfaktore of oorsaaklike werksaamhede wat krities is vir die bereiking van die oogmerk binne die neergelegde perke, te onderskei. Die ernstigheid van elke element van oorsaak-tot-verlies is afhanklik van sy potensiaal om 'n afwyking te veroorsaak wat die perke van aanvaarbare werkverrigting sal oorskry. Verlies, wat die gevolg is van een of ander afgraderingsvoorval en wat in sy aard en omvang toevallig is, kan slegs in sommige gevalle deur behoudende optrede beheer word, maar in die algemeen is slegs rehabiliterende optrede moontlik.

Die oorsaaklike of veranderings kan egter beheer word tot die mate waartoe pogings en fondse daartoe beskikbaar gestel word. Daar is egter 'n ekonomiese perk op kostes in die vorm van kognitiewe, rakende, aanpassende, korrektiewe, behoudende, beveiligende, voorkomende en rehabiliterende optrede.

'n Kenmerk van baie goeie bestuur is die vermoë om gebeure en situasies te voorsien. Dit is veral waar vir die uitbetter placed to do so.

To identify these loss casual factors and take the necessary action effectively —

(a) A manager should know what his objectives are and what the plans for their achievement are. A plan will include the steps to be taken to initiate action and to advance to the objective; the facilities, environment and people involved; the time to be taken and the cost of operation.

The objective is a desirable and measurable end result. With the imperfections of the real world in mind the objective and plan for the achievement will normally be established with upper and lower limits within which performance will be considered to be satisfactory. This is illustrated in figure 3. Within these limits change trends are monitored and usually the only action necessary is cognitive, contingent or adaptive. Should the deviation exceed the lower (or the upper) limit of acceptable performance, then the area of unsatisfactory performance is entered and the corrective action is likely to be restorative, containment, safeguarding or preventive. Should the deviation be allowed to proceed beyond the unsatisfactory limit, an area of intolerable performance is reached from which there is no return from the consequence and the only action is containment and/or rehabilitative to limit the scope of the specific deviation effect or loss.

In the lower area of intolerable performance the consequences are excessive damage, loss, personal harm or a combination of these. In the upper area of intolerable performance the consequences are excessive gain, profitability, affluence, personal comfort or a combination of these.

From the last paragraph it must not be concluded that damage, loss, personal harm or a combination of these or that gain, profitability, etc., are deviation consequences limited to the areas of intolerable performance. In the area of acceptable performance these are allowed for in the planning process simply because it is not profitable to eliminate all deviation effects. Deviation effects also occur in the area of unsatisfactory performance but through the appropriate control action and expense can usually be restored to the area of satisfactory performance. However, the application of these corrective resources, if not budgeted for, downgrade the business result.

Taking figure 3 as an illustration of the above-mentioned process, the action to achieve the objective was initiated at t1 and progressed according to plan to t2 when a change agent caused a deviation which remained effective beyond t3 resulting in the actual result at t5 which is of a lower value than the objective to the extent of the deviation effect. In respect of the objective, the actual result achieved was less as a consequence of the downgrading effect of loss, damage and personal harm or a combination of these because the deviation could not be contained by whatever control action that may have been applied.

It should also be noted that the results achieved are not always the consequence of a simple cause. Multiple and usually inter-related causes and effects are often present particularly in the form of a chain reaction eminating from a primary deviation. Primary deviations usually introduce supplementary change agents which lead to further sequences of cause and effect cascading through secondary, tertiary, quaternary and so on, stages. This concept will be illustrated later in the presentation.

(b) A manager must be able to identify timeously those change agents or causation factors, which are critical to the achievement of the objectives within the stated limits. The criticality of each loss causation factor is dependant on its potential to cause deviation beyond the established limits of acceptable performance. Loss, which is a consequence of some downgrading incident and much of its nature and scope is fortuitous, can only be controlled to the extent of containment in some cases, but generally only rehabilitation is possible. However, the casual factors or agents of change can be controlled to the extent to which effort and funds are made available to do so. The cost of control in the form of cognitive, contingent, adaptive, corrective, containment, safeguarding, preventive and rehabilitative action has an economic limit.

A characteristic of management excellence is the ability to predict events and situations. This is particularly

kenning van potensiële oorsake van afwyking en om dus in 'n posisie te wees om die nodige bronne tot beskikking te hê om die nodige beheermaatreëls te kan tref. As 'n afwyking besig is om voor te kom is dit belangrik met betrekking tot die behoud van bronne en die bereiking van die doelwit, om in staat te wees om te bepaal watter stadium die afwyking reeds bereik het in terme van bevredigende, onbevredigende en onaanvaarde prestasie. Die gepaste beheer aksie binne die spektrum van aanvaarbare werkverrigting is gewoonlik kognitief, rakend of aanpassend van aard. Sover dit die onbevredigende situasie betref, is dit gewoonlik korrektief van aard deurdat herstel-, beveiligings, behoudende, of voorkomende maatreëls geneem sal word. Sodra dit die onbevredigende perk oorskry, d.w.s.: op die gebied van die onaanvaarbare prestasie is die enigste moontlike optrede gewoonlik behouding en/of rehabilitasie.

4. DIE STRUKTUUR VAN OORSAKE-TOT-VERLIES OF AFWYKENDE EFFEK

Die direkte oorsaak van 'n verlies is 'n gebeurlikheid wat veroorsaak is deur of 'n substandaard bedryfsgebruik of -toestand. Alle afgraderende voorvalle lei egter nie noodwendig tot 'n verlies nie. As voorbeeld hiervan kan 'n voorval geneem word waar 'n persoon op twee maniere deur 'n voertuig raakgery kan word. In die eerste instansie is die relatiewe posisie van die persoon en die voertuig so dat wanneer die persoon raakgery word, die moontlikheid (niespekulatiewe risiko) van ernstige besering (verlies) besonder hoog is. In die tweede instansie is die relatiewe posisie van die persoon en die voertuig so dat die moontlikheid van ernstige besering besonder laag is. Die korrektiewe optrede in die eerste geval, waar ernstige beserings voorgekom het, is ten minste rehabilatief van aard soos mediese versorging, vergoeding, ens. In die tweede geval, waar niks meer gebeur het as 'n onderbreking in die gang van die voertuig en die persoon en die verlies vir alle praktiese doeleindes nul is, sal die optrede afhang van die verlies potensiaal wat die situasie inhou indien dit weer sou kon voorkom op 'n vlak waar die risiko's hoër is.

Bogenoemde voorbeeld kan soos volg toegelig word:-

Afgraderingsvoorval — raakgery deur voertuig;
Risiko (nie-spekulatief) — hoog of laag;
Gevolge (verlies of afwykende effek) — ernstige beserings of nie.

Die volgende stap sal wees om die struktuur van oorsaaklike werksaamhede wat aanleiding gegee het tot die afgraderingsvoorval van nader te bekyk sonder om bogenoemde voorbeeld verder te ontleed.

Dit kan soos volg geillustreer word:-

Substandaard bestuursmetodes wat lei tot substandaard faktore met betrekking tot persoonlike, omgewings-, fasiliteit-, produk- en sake-oogmerkfaktore wat op hulle beurt lei tot substandaard bedryfsgebruikte en -toestande (dit is spesifieke metodes wat aanvaar is) wat in werklikheid 'n gevaar is en die direkte oorsaak is van afgraderingsvoorvalle.

Met die invoering van die begrip van substandaard in verband met bestuursmetodes; persoonlike, omgewings-, fasiliteitsfaktore ens. asook in bedryfsgebruike en -toestande dui aan dat daar ook perke is met betrekking tot aanvaarbare werkverrigting (hoër en laer) vir elk van hierdie aktiwiteite. Hierdie aktiwiteite mag voortgaan binne die perke sonder dat dit enige besondere uitwerking het op die volgende vlak in die hele struktuur van elemente van oorsaak-tot-verlies.

Daar is nie net 'n opeenvolgende interaksie tussen die vertikale komponente van die struktuur nie, maar ook sywaarts. Dit word aangetoon in afbeelding 4 en dit kan duidelik gesien word dat die oorsaak-gevolgreeks opmekaar volg van substandaard bestuursmetodes of deur al die substandaard bedryfsgebruike en/of toestande tot by die afgraderingsvoorvalle. Verder kan dit ook gevolg word deur die risikosituasie en kulmineer in 'n resultaat van verlies of afwykende effek.

Die plek wat ingeneem word deur ondersoeke, voorval- of verliesophaling, inspeksies en waarnemings in verhouding tot die verskillende vlakke in die oorsaak-en-gevolg struktuur, word ook in afbeelding 4 aangetoon.

Dit is belangrik dat elke substandaard aktiwiteite of faktore op elke vlak van die hele struktuur van oorsaak-tot-verlies, bepaal word. Dit is nie net waar ten opsigte van **ondersoeke** na verlies nie, maar ook wanneer **inspeksies** en **waarnemings** gedoen word. Laasgenoemde twee aktiwiteite het nie net ten doel om werksverrigtingafwykings in gebruike en toestande respektiewelik uit te wys nie, maar ook afwykings ten opsigte van die persoonlike, omgewings-, fasiliteits-, produk- en maatskappy-oogmerkfaktore asook op die vlak van bestuursmetodes. Hoewel inspeksies en waarnemings op enige vlak van die oorsaaklike struktuur mag begin, moet die nodige aandag aan al die relevante vlakke gegee word.

true for the identification of potential causes of deviation and thus being in a position to have the necessary resources available to take the required control action. If a deviation is in progress it is important in respect of the conservation of resources and the achievement of objectives to be able to identify what stage, in terms of satisfactory, unsatisfactory and intolerable, the deviation has reached.

The appropriate control action within the area of acceptable performance usually is cognitive, contingent or adaptive; in the unsatisfactory performance area the action is usually corrective in that restorative, safeguarding, containing or preventive steps will be called for and beyond the unsatisfactory limit, that is in the intolerable area the only action usually possible is containment and/or rehabilitation.

4. THE STRUCTURE OF CAUSATION OF LOSS OR DEVIATION EFFECT

The direct cause of loss is an event which resulted from either a substandard practice or condition. Such an event may be called a downgrading incident. However, all downgrading incidents do not necessary result in loss. This is illustrated by considering a case where a person may be bumped by a vehicle in two possible ways. In the first case the relative position of the person and the vehicle is such that upon being struck the probability (non-speculative risk) of serious injury (loss) is extremely high. In the second case the relative position of the person and the vehicle is such that upon being struck the probability of serious injury was extremely low. The control action in the first case, with serious injury, would at least be rehabilitation such as medical care, compensation, etc.; while in the second case where nothing more than a mere interruption of the progress of the vehicle and the person took place and the loss being nil for practical purposes, the control action will depend on the potential for loss that the situation holds should it be repeated at a higher level of risk.

The above example can be illustrated in the following manner:-

Downgrading incident — struck by vehicle;
Risk (non-speculative) — high or low;
Consequence, i.e.: loss or deviation effect — serious injury or none.

The next step would be to consider the structure of casual factors leading up to a downgrading incident without taking the above example for further analysis. This is illustrated as follows:-

Substandard management practice which causes substandard personal, environmental, facility, product and business objective factors, which in turn cause substandard practices and conditions (i.e.: the specific methods adopted) and in effect are hazards which in turn are the direct cause of downgrading incidents.

With the introduction of the notion of substandard to the above management practice; personal, environmental, facility, etc., factors; and practices and conditions indicates that there are limits of acceptable performance (upper and lower) for each of these activities. The activities may proceed within these limits without having any meaningful effect on the next level in the structure of elements of loss causation.

There is not only a cascading interaction between the vertical components of the structure but also an interaction laterally between the elements of each level. This is illustrated in figure 4, and it can be seen that the cause-effect sequency cascades from substandard management practice through the substandard factors and then the substandard practices and/or conditions and onwards to the downgrading incidents, through the risk situation and culminating in a consequence of loss or deviation effect.

The business system, i.e.: the management; man, the environment, facilities, product and business objectives, together with the methods adopted, i.e.: practices and conditions can for analytical purposes be divided into two major components. One part in which the practices and conditions are proceeding according to plan, i.e.: within the upper and lower limits of acceptable performance and tending to produce the desired results, i.e.: the business objective within its limits of acceptance. The other part in which practices and conditions have exceeded the upper and lower limits of acceptable performance and are downgrading the business result.

In the former part of the system the management practice and the personal, environmental, facility, product and business objective factors are according to standard, while in the latter part these are sub- or above standard (as a rule

Die korrektiewe aksie wat uit inspeksies en waarnemings sal spruit, hang af van die graad van afwyking van die aanvaarde perke van bevredigende werkverrigting. Dit sluit in 'n bepaling van die aard van die verwagte afgraderingsvoorval (wat ook die gevaarmeganisme genoem kan word), die moontlikheid (risiko) en die aard en omvang van die gevolg (die verlies) tesame met die koste verbonde aan die beheermaatreëls en die waarde van die voordeel van beheer. Ondersoeke, wat die tegniek van voorval- of verliesophaling insluit, begin gewoonlik met 'n verslag oor 'n verlies of afgraderingsvoorval en word gevolg deur 'n opwaartse stap vir stap ondersoek van elke vlak van die betrokke oorsaaklike struktuur om te bepaal watter aktiwiteite op elke vlak afgewyk het buite die perke van bevredigende werkverrigting. Met die hulp van dié bevindings kan die nodige beheermaatreëls bepaal word vir huidige en toekomstige werksaamhede.

Die sakestelsel, dit is die bestuur, die mens, omgewing, fasiliteite, produk en sake-oogmerke, tesame met die aanvaarde bedryfsgebruike en -toestande kan vir ontledingsdoeleindes in twee hoof stelsels ingedeel word. Die een is waar die bedryfsgebruike en -toestande volgens plan verloop, d.w.s. binne die boonste en laagste perke van aanvaarde werkverrigting, en neig om die verwagte resultaat te lewer, d.w.s. die bereiking van die sakeoogmerk binne die perke van aanvaarbaarheid. Die ander is waar bedryfsgebruike en -toestande die boonste en laagste perke van aanvaarde werkverrigting oorskry en afgradering van die onderneming se resultate tot gevolg het.

In die eerste geval is die bestuursmetodes asook die faktore met betrekking tot persone, omgewing, fasiliteite, produk en sakeoogmerke volgens standaard terwyl dit in die laasgenoemde geval minderwaardig of hoër as standaard is. (Oor die algemeen is hulle minderwaardig en dit is dan ook die uitgangspunt in die referaat). Die minderwaardige prestasies is in werklikheid die gevolge in die oorsaak-tot-verliesstelsel. Die uiteindelike sakeresultaat is die somtotaal van die bydraes van die genoemde twee prestasiestelsels.

Ons keer nou terug na die oorsake-tot-verliesstelsel vir verdere oorweging daarvan. Sou 'n afgraderingsvoorval gebeur, dan kan dit aanvaar word dat die perke van aanvaarde werkverrigting oorskry is in een van die voorafgaande vlakke in die struktuur van oorsake-tot-verlies. As dit nie besef word nie, sal 'n ondersoek na die oorsaak van die verlies of afgraderingsvoorval heel moontlik 'n substandaard bedryfsgebruik of -toestand aandui as die oorsaak en die onderliggende oorsaaklike faktore op elke vlak van oorsaak reg deur tot die minderwaardige bestuursmetodes nie uitgewys word nie.

Dit is waarskynlik die belangrikste rede vir die onvermoë van bestuurders om die nodige deurbraak in verliesbeheer te maak. Terwyl ons voortdurend in gebreke bly om te besef dat substandaard bestuursmetodes die hoofoorsaak is van verlies en nie die te opvallende substandaard bedryfsgebruike (byvoorbeeld versuim om gehoor te gee aan waarskuwings) of bedryfstoestande (byvoorbeeld remversaking) nie.

Wanneer daar slegs teen substandaard bedryfsgebruike en -toestande opgetree word, bestaan die aanvanklike probleem dat die aandag wat daaraan gegee word slegs 'n tydelike uitwerking het en dat 'n herhaling daarvan met gereelde tussenposes voorkom. Dit is waarskynlik die mees onekonomiese en algemeen gebruikte vorm van verliesbeheer.

Dit is nou nodig om die oorsaak- en gevolgstruktuur van nader te bekyk sodat sommige besonderhede wat nodig is om 'n voldoende ondersoek, ophaling van 'n voorval of verlies, inspeksie of waarneming te doen met die oog op verliesbeheer, beter verstaan kan word.

5. NORME VIR BESTUURSMETODES; PERSOONLIKE-, FASILITEITS-, OMGEWINGS-, PRODUK- EN MAATSKAPPY-OOGMERKFAKTORE; BEDRYFSGEBRUIKE EN -TOESTANDE

Norme of standaarde is nodig sodat onderskei kan word tussen bevredigende en onbevredigende werkverrigting. Hierdie benadering is reeds in afbeelding 3 aangetoon.

Standaarde word benodig vir elkeen van die elemente van die sakestelsel, d.w.s.: vir die bestuur; die mens, fasiliteite, omgewing, produk (of diens) en die doelstellings van die onderneming; bedryfsgebruike en -toestande. Hoogste en laagste perke vir bevredigende en onbevredigende werkverrigting of prestasie moet met die oog op beheerdoeleindes vir elke element in die stelsel bepaal word. Baie van die norme kan slegs kwalitatief uitgedruk word soos byvoorbeeld die graad van personeel-motivering, maar dit is geen verskoning om nie die nodige norme van werkverrigting daar te stel nie.

Die manier om standaarde daar te stel asook die rol wat dit speel, kan die beste met 'n voorbeeld toegelig word.

Beginnende by bestuursmetodes waar alle oorsake-tot-verlies ontstaan, sal die opleidingsaktiwiteite in die leierskapfunksie van bestuur in die voorbeeld gebruik word.

they are substandard and this is the general approach followed in this presentation). The substandard is in effect the loss causation system. The final business result is the sum of the contributions of these two components.

Returning to the loss causation system for further consideration. Should a downgrading incident occur then it can be accepted that the limits of acceptable performance have been exceeded in each of the preceding levels in the structure of loss causation. If this is not realised then an investigation into the cause of a loss or a downgrading incident will probably end at the identification of a substandard practice or condition and the underlying causative elements will not be identified in each level of causation right through to the substandard management practice.

This is probably the most important reason for the failure of managers to obtain the necessary breakthrough in loss control. We persistently failed to recognise that managing at a substandard level is the root cause of loss and not substandard practices (e.g.: failure to heed a warning) or conditions (e.g.: brakes failed). Failure to recognise this hampers management action. In treating substandard practices and conditions the apparent problem is receiving attention with only temporary effect and repetition occurs at frequent intervals. This is possibly the most uneconomical and widely practised form of loss control.

It is important that each substandard practice be determined in each level of the structure of loss causation. This is not only true for **investigations** of loss, but also when **inspections** and **observations** are undertaken. The latter two activities have the objective of not only identifying performance deviations in conditions and practices respectively, but also at the level of personal, environmental, facility, product and corporate objective factors and the management practice level. While inspections and observations may commence at any one of the levels of the causation structure, attention must be given to all of the levels.

The corrective action arising from inspections or observation depends on the degree of deviation outside the accepted limits of satisfactory performance. This would include an assessment of the nature of the anticipated downgrading incident (which may be called the hazard mechanism), the probability (risk) of and the nature and extent of consequence, i.e.: loss, together with the cost of the control measures and the value of the benefit of control.

Investigations, which include **incident or loss recall** techniques commence with the report of a loss or downgrading incident and is followed step by step upwards examining each level the relevant causal structure to determine which activities in each, deviated beyond the limits of satisfactory performance. From these findings the necessary control action can be determined for current and future operations.

The place of investigations, incident or loss recall, inspections and observations in relation to the various levels in the cause and effect structure is also illustrated in figure 4.

It is now necessary to examine the cause effect structure in some greater detail so that a better understanding of some details which are necessary to do an adequate investigation, incident, recall, inspection or observation for the purpose of loss management.

5. STANDARDS FOR MANAGEMENT PRACTICE; PERSONAL, FACILITY, ENVIRONMENTAL, PRODUCT AND CORPORATE OBJECTIVE FACTORS; PRACTICES AND CONDITIONS

Standards are necessary to be able to differentiate between satisfactory and unsatisfactory performance. This approach has already been illustrated in figure 3.

Standards are required for each of the elements of the business system, i.e.: management; man, facilities, environment, product (or service) and the objects of the business; practices and conditions. Upper and lower limits of acceptable and unsatisfactory performance will have to be determined for each element in the system for the purpose of control. Many of these standards can only be expressed qualitatively, such as the degree of motivation of personnel, but this should not be an excuse for not establishing the required levels of performance.

The process of establishing and the role of the standards can best be illustrated by using an example.

Commencing with management practice where all loss causation has its origin, the activity of training in the leadership function of management will be used.

Vir die opgelegde taak is 'n sekere hoeveelheid kennis nodig. Gedurende opleiding word kennis aan 'n persoon oorgedra (vir die doel van hierdie voorbeeld word die vermoë van die persoon in opleiding om kennis in te neem en dit te onthou nie in aanmerking geneem nie, maar slegs die hoeveelheid kennis wat deur opleiding aangebied word). Die hoeveelheid kennis wat voorberei word vir opleidingsdoeleindes kan van so 'n aard wees dat die persoon die taak waarvoor hy opgelei word binne die perke van aanvaarbare werkverrigting kan volvoer. 'n Aanbieding van kennis wat die leerling in staat sal stel om die werk op so 'n manier te doen dat dit die boonste perk van aanvaarbare werkverrigting oorskry, sal die opleiding duurder maak terwyl die rendement van die belegging in die bykomende opleiding nie regverdig kan word nie. Hierdie oorbesteding sal die finansiële faktor van die onderneming afgradeer of dit kan selfs onaanvaarbare gevolge inhou. Kennis wat nie gebruik kan word nie, kan lei tot frustrasie en die demotivering van die betrokke persoon.

Hierteenoor kan 'n minderwaardige toevoer van kennis die volgende tot gevolg hê:-

(a) Onderbesteding aan opleiding. Sodoende word te doen gekry met 'n kunsmatige finansiële faktor met 'n moontlike bykomende korttermyn winsgewendheid. Dit beteken dat die onderneming heelwaarskynlik op die vlak van oormatige wins bedryf word ten koste van voldoende kennistoevoering om bevredigende bedryfsgebruike en -toestande te handhaaf, of

(b) Dat die persoonfaktor, kennis, wat minderwaardig is aanleiding sal gee tot minderwaardige gebruike, byvoorbeeld dat 'n vurkhyser verkeerd gebruik sal word. Dit sal op sy beurt weer lei tot 'n afgraderingsvoorval soos die laat val van die vrag of as die omstandighede sodanig is dat die moontlikheid van voorvalle (risiko) hoog is, sal 'n verlies voorkom. Die koste van die gevolge van die verlies mag, en in alle waarskynlikheid sál dit altyd die besparing aan opleiding wat aan die finansiële faktor gekrediteer moet word, oorskry.

In die sakestelsel is daar aktiwiteite wat binne die norme funksioneer en dus as bevredigend beskou word. Sommige aktiwiteite mag egter in die spektrum van onbevredigende werkverrigting funksioneer en korrektiewe aksie kan hulle tot die bevredigende spektrum herstel. Ander kan egter in die spektrum van onaanvaarbare werkverrigting val en slegs verliesbedwinging en/of rehabilitasie mag moontlik wees. Die stand van aktiwiteit in verhouding tot die norme kan vasgestel word deur inspeksies, waarnemings, ondersoeke en voorval- of verliesophalingsprosedures sodat die nodige bestuursaksie toegepas kan word met betrekking tot die oorsaak-tot-verlies en waar van toepassing, ook tot die verlies of afwykende effek.

6. DIE IDENTIFISERINGSWYSE EN BESTUURSBEHEER VAN DIE OORSAKE VAN:-

6.1 Potensiële verlies of afwykende effek

Die normale bronne van inligting oor produktiwiteit in 'n sakeonderneming is die kwartaallikse, maandelikse, weeklikse, daaglikse verslae met betrekking tot die hoeveelheid en kwaliteit van die verskillende toevoere en produksie. Hierdie verslae stel die bestuur in staat om aktiwiteite te beheer. Dié wat binne die spektrum van bevredigende werkverrigting val het slegs die nodige kognitiewe, rakende of aanpassingsaksies nodig. Hierdie verslae dui ook afwykings aan wat die aanvaarde perke van bevredigende werkverrigting oorskry en terwyl hierdie afwykings nog binne die perke is van onbevredigende werkverrigting, kan die nodige korrektiewe stappe geneem word. Indien die spektrum van onaanvaarde werkverrigting bereik word, kan die nodige behouding en/of rehabilitasie gedoen word.

Daar is egter dikwels 'n aantal aktiwiteite in bedryf waarvan die werkverrigting nie op die genoemde manier aangegee word nie maar wel deur inspeksies of waarnemings. Soos vroeër aangedui, hou inspeksies redelik verband met die funksionering van dinge en fisiese toestande terwyl waarnemings neig om aangewese te wees op menslike prestasies. Die doel van 'n inspeksie of waarneming is om afwykende effekte en hulle oorsake te identifiseer sodat die bestuur in staat gestel kan word om die nodige beheeraksies te neem.

Inspeksies en waarnemings kan informeel of formeel wees. Die informele mag deel uitmaak van deurlopende toesighouding terwyl die formele, volgens 'n voorgeskrewe skedule, deel mag uitmaak van

— Die normale prosedure van die bedryf;
— Die verantwoordelikheid van gespesialiseerde inspekteurs.

Die metode van verslagdoening met betrekking tot die formele en informele inspeksies en waarne-

For a given task a necessary amount of knowledge is required. In training knowledge is imparted to a person (for the purposes of this example the ability of the trainee to absorb and retain knowledge is not considered, only the amount of knowledge presented as a training unit input). The amount of knowledge prepared as an input could be such that the person can perform the task for which he is being trained between the upper and lower limit of acceptable performance. A knowledge input to the trainee to enable him to operate well above the upper limit will only make the training more expensive and the return on the additional training investment will not be jus'ified. This over-expenditure will downgrade or even worse have intolerable consequences on the financial factor of the business. Knowledge not put to use may cause frustration and demotivation of the person concerned.

On the other hand a substandard knowledge input could have two consequences, namely:-

(a) Underexpenditure on training, thus the financial factor is inflated and short-term additional profitability may result. This means that the business is probably operating in the area of excessive gain at the expense of inadequate knowledge input to maintain satisfactory practices or conditions, or

(b) The personal factor of substandard knowledge is below the lower limit of satisfactory performance which will lead to substandard practice, for example using a forklift improperly. This in turn will lead to a downgrading incident such as dropping the load and should the circumstances be right, that is the probability of occurrence (the risk) be high, a loss will occur. The cost of the loss consequence may and in all probabiilty always does, exceed the saving in training credited to the financial factor.

Within the business system we have activities which are performing within the limits of the standard and thus are considered to be performing satisfactorily. Some activities may be operating within the limits of unsatisfactory performance and corrective action may restore them to the satisfactory area. Others may be in the intolerable performance area and only loss containment and/or rehabilitation may be possible. These positions of activity in respect of the standard can be identified through inspections, observations, investigations and incident or loss recall procedures so that the necessary management action can be applied to the loss causation and where relevant, the loss or deviation effect.

6. THE PROCESS OF IDENTIFICATION AND MANAGEMENT CONTROL OF THE CAUSATION OF:-

6.1 Potential Loss or Deviation Effect

The normal sources of productivity information in a business are the quarterly, monthly, weekly, daily, hourly reports in respect of the quantity and quality of various inputs and outputs. These reports enable management to control activities within the satisfactory area of performance through the necessary cognitive, contingent or adaptive control action. These reports also indicate deviations in excess of the accepted limits of satisfactory performance and while these deviations are within the upper and lower limits of unsatisfactory performance the necessary corrective action can be taken. If the area of intolerable performance has been reached, the necesary containment and or rehabilitative action can be initiated.

However, a number of activities are often in progress whose performance is not reported in the aforesaid manner but is monitored by means of inspections or observations. As indicated earlier, inspections are rather related to the functioning of things and physical conditions, while observations tend to be directed towards human performance. The objective of an inspection or observation is to identify deviation effects and their causation to enable management to implement the necessary control action.

Inspections and observations may be informal or formal. The informal may be part of the cognitive control action while the formal may be according to a prescribed schedule as part of:-

— The normal procedure of the operating process;
— The responsibility of specialist inspectors.

The reporting procedure in respect of informal and formal inspections and observations will usually in-

mings sal gewoonlik die volgende items insluit:

Eerstens, 'n opgawe van elke aktiwiteit met 'n aanduiding van die prestasie daarvan met betrekking tot die bevredigende, onbevredigende of onaanvaarde en die toepaslike beheeraksie met betrekking tot elke vlak in die oorsaak-tot-verliesstruktuur te wete:-

(a) Bestuursmetode;
(b) Faktore met betrekking tot die mens, fasiliteite, omgewing, produk en sake-oogmerke;
(c) Bedryfsgebruike en -toestande (ook bekend as die gevare).

Tweedens, 'n bepaling van die gevaarsituasie wat uit die volgende elemente bestaan:-

(a) Die gevaar, d.w.s.: die substandaard bedryfsgebruik of -toestand;
(b) Die gevaarmeganismes, d.w.s.: die afgraderingsvoorval;
(c) Die risiko, d.w.s.: die moontlikheid dat die gevaar 'n gevolg kan hê;
(d) Die gevolg soos vergestalt in

— Persoonsbenadeling;
— Skade aan eiendom en fasiliteite;
— Verlies van markte, kundigheid, eiendom, fondse, wins, produk, goeie trou, mannekrag, beeld, ens.;

(e) 'n Bepaling van die beheeraksie en die koste daaraan verbonde op elke vlak van die oorsaak-tot-verliesstruktuur en die waarde van die voordele daardeur bereik.

Toegerus met hierdie inligting, is die bestuur in 'n posisie om die nodige besluite te neem, te beplan en beheer uit te oefen. Dit kan ook die nodige versekeringsaktiwiteite as 'n beveiligings- of rehabiliterende beheer insluit.

Vroegtydige opsporing van minderwaardige bestuursmetodes besit die hoogste potensiaal vir doeltreffende en ekonomiese verliesbeheer.

6.2 Werklike verlies of afwykende effek

Soos vroeër genoem sluit verlies ook in skade en persoonsbenadeling of 'n kombinasie van die twee. Namate die bestuur van 'n sakestelsel algaande na die voortreflike beweeg, word verslaggewing oor verlies intensiewer en 'n vinniger ondersoekaksie volg. Waar die metode van verslaggewing oor verliesvoorvalle nie voldoende is nie, behoort 'n stelsel van verlies- of voorvalophaling gebruik te word om inligting te bekom oor vergete of verborge verliessituasies. Die metode van ondersoeke en voorval en verliesophaling is in beginsel dieselfde behalwe dat die gewillige samewerking van mense baie meer krities is vir die sukses wat behaal word met verliesophaling.

Die doel van 'n ondersoek is om vas te stel watter en hoekom aktiwiteite in die verskillende vlakke van die oorsaak-tot-verliesstruktuur die perke van bevredigende werkverrigting oorskry sodat die nodige beheeraksie bepaal en toegepas kan word. Hierdie aksie kan die volgende insluit:-

(a) Rehabilitering en bedwinging van die gevolge sover as wat dit moontlik geregverdig is (bedwinging is nie moontlik wanneer die verlies reeds 'n voldonge feit is nie);
(b) Metodes om die nodige bestuursbeplanning en beheeraksies van huidige en verwante toekomstige aktiwiteite, d.w.s. korrektiewe aksie, te verbeter.

Die eienskappe van 'n voldoende ondersoek is:-

Eerstens, 'n verslag oor die gevolge, dit is die skade, verlies of persoonsbenadeling, tesame met die koste van die verlies en, waar van toepassing, die koste van die rehabiliterende aksie. Laasgenoemde sal dinge insluit soos herstel-, mediese-, vervangingskostes, ens.

Tweedens, die identifikasie van die afgraderingsvoorval (die gevaarmeganisme) en 'n bepaling van die risiko- en die gevolgesituasie van moontlike soortgelyke voorvalle wat onder ietwat verskillende omstandighede 'n nadelige uitwerking kan hê op huidige en toekomstige bedryfsaspekte.

Derdens, die identifikasie van minderwaardigheid op elke vlak van die oorsaak-tot-verliesstruktuur ten opsigte van

— Bedryfsgebruike en -toestande (gevare);
— Faktore met betrekking tot personeel, fasiliteite, omgewing, produk en sake-oogmerke;
— Bestuursmetodes wat deur die opeenvolging van oorsake en gevolge lei tot 'n gebeurlikheid en gevolglike verlies.

Vierdens, die noodsaaklike beheeraksie wat ingestel of heringestel moet word behoort 'n oorsig van verwante standaarde in te sluit. Die koste van die beheeraksie behoort verdiskonteer te word deur die verwagte voordeel wat daarclude the following items:-

Firstly a statement in respect of each activity indicating its performance in terms of satisfactory, unsatisfactory or intolerable and the appropriate control action in respect of each level in the loss causation structure viz.:-

(a) Management practice;
(b) Factors relating to man, facilities, environment, product and business objectives;
(c) Practices and conditions (also known as the hazards).

Secondly, a measurement of the hazard which consists of the following elements:-

(a) The hazard, i.e.: the substandard practice or condition;
(b) The hazard mechanism, i.e.: the downgrading incident;
(c) The risk, i.e.: the probability that the hazard will have a consequence;
(d) The consequence expressed in some measure such as:-
— Personal harm;
— Damage to property and facilities;
— Loss of market, know-how, property, funds, profit, product, image, goodwill, manpower, etc.;
(e) An assessment of the control action and the cost thereof required at each level of the loss causation structure and the value of the benefit.

Armed with this information management is in the position to do the necesary decision making, planning and control. This action could include the appropriate insurance activity as safeguarding or rehabilitative control.

Early detection of substandard management practice holds the highest potential for effective and economical loss control.

6.2 Actual Loss or Deviation Effect

As stated earlier loss is taken to include damage, personal harm or a combination of these. As the management of a business system tends towards excellence, the reporting of loss becomes fuller and prompter investigating action follows. Where the process of reporting of loss incidents is not complete, a system of loss or incident recall should be used to retrieve information concerning forgotten or concealed loss situations. The procedures for investigations and incident or loss recall are the same in principle except that the willing co-operation of people is more critical to the success of loss recall.

The object of an investigation is to determine which and why activities in the various levels of the loss causation structure exceeded the limits of satisfactory performance so that the necessary control action can be implemented. This control action will include-:

(a) Rehabilitation and containment of the consequences as far as justifiably possible (containment is not possible when the loss event is concluded);
(b) Means to improve the necessary management planning and control action of current and related future activities, i.e.: corrective action.

The charecteristics of an adequate investigation are:-

Firstly, a statement of consequence, i.e.: the damage, loss or personal harm, together with the value of the loss and, where applicable, the cost of rehabilitative action. The latter item would include repair, medication, replacement, etc., costs.

Secondly, the identification of the downgrading incident (the hazard mechanism) and an assessment of the risk and consequence situation of similar potential incidents which under somewhat different circumstances could adversely affect current or future operations.

Thirdly, the identification in each level of the loss causation structure the substandard:-

— Practices and conditions (hazards);
— Factors relating to personal, facilities, environment, product and the business objectives;
— Management practices, which through the cascade of cause and effect lead to the incident and subsequent loss.

Fourthly, the necessary control action to be established or reestablished and this should include a review of related standards. The cost of the control activities should be traded off against the expected benefit to be obtained. Because of the

4-way circular junction box.

Durolektric on current affairs.

In current affairs Duropenta is switched on to the most technically progressive electrical conduit system in the world.

Made of high impact-resistant uPVC, Durolektric is a complete system of conduits and a range of fittings currently the most advanced in the Republic. Durolektric exceeds the tough requirements of the SABS. It provides quicker and easier installation, saving costs on material and labour.

Of course it's also corrosion-resistant. One reason why uPVC conduit and fittings are so highly accepted world-wide. In some countries their use is mandatory!

Durolektric is designed to meet the ever-growing demand here for a technically sound and economical electrical conduit system.

Use the Durolektric system. The results are power-full.

Duropenta makes life plumb easy.

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deur verkry sal word. As gevolg van die aard van die situasie, d.w.s. 'n verlies wat ondervind is, sal die beheeraksie na die rehabilatiewe of korrektiewe neig, maar daar kan ook net kennis van geneem word indien dit voordelig sou wees om dit te doen.

Afbeelding 5 dui sommige van die moontlike substandaard aktiwiteite op elke vlak van die oorsaak-tot-verliesstruktuur aan tesame met tipiese afgraderingsvoorvalle en verskillende soorte gevolge.

6.3 Afgraderingsvoorvalle

Namate die motiverings- en kommunikasiestelsels van 'n organisasie algaande na die voortreflike neig, sal die voorkoms van afgraderingsvoorvalle meer doeltreffend aangemeld word. Hierdie voorvalle is gevaarmeganismes wat op so 'n manier gefunksioneer het dat daar geen of weinig verliesgevolge was. 'n Nadere ondersoek van hierdie voorvalle is egter ook nodig as gevolg van hulle potensiaal vir groter verliese onder ietwat verskillende omstandighede. Hierdie ondersoeke is soortgelyk aan dit wat benodig word vir 'n inspeksie of waarneming en behoort onbevredigende werkverrigting op elke vlak van die oorsaak-tot-verliesstruktuur uit te wys.

6.4 Substandaard bedryfsgebruike en -toestande: persoonlike-, fasiliteitsfaktore, ens. en bestuursmetodes

Weereens, namate die motivering en kommunikasie na selfs hoër voortreflikheid neig, sal die minderwaardige funksionering van hierdie aktiwiteite na vore kom vir ondersoek en die daarstelling van toepaslike korrektiewe optrede. Die metode van ondersoek is soortgelyk aan dié vir waarnemings- en inspeksieprosedures.

Hier, soos in die geval van waarnemings en inspeksies hou die vroeë identifikasie van minderwaardige bestuursmetodes die hoogste potensiaal in vir effektiewe en die mees ekonomiese verliesbeheer.

7. DIE GEKOMPLISEERDHEID VAN DIE OORSAKE-TOT-VERLIESSTELSEL

Dit is nogal buitengewoon dat die oorsaak-tot-verlies wat begin met 'n enkele minderwaardige bestuursmetode, in 'n enkele gevolg of verlies sal kulmineer. As gevolg van die noue wisselwerking tussen menslike, fasiliteit-, produksie- en omgewingsfaktore, het 'n enkele oorsaak in die praktyk gewoonlik veelvuldige gevolge.

Die identifikasie van oorsaak en gevolg is geen eenvoudige saak nie en dit kan 'n rede wees hoekom inspeksies, waarnemings en ondersoeke asook voorgestelde beheeraksies dikwels ontoereikend is.

Dit behoort moontlik te wees om die primêre oorsaak-en-gevolgreeks wat gevolg word deur sekondêre, tersiêre, kwartêre ens. oorsaak-en-gevolgreekse, te identifiseer. Alles moontlik moet gedoen word om elk van hierdie fasette te bepaal aangesien 'n versuim op dié gebied, bestuur die geleentheid ontneem om doeltreffende beheeraksies te neem.

Bogenoemde stelling word in afbeelding 6 aangetoon. Die resultate wat aangedui word, is verwant aan 'n hipotetiese geval waar 'n stoomketel gebars het (beginnende by die gevolg en dan oorsake tot by die minderwaardige bestuursmetode).

Hierdie benadering is nie net gebonde aan ondersoeke na verliese of ander afwykende effekte nie, maar maak ook deel uit van evaluasie van waarnemings en inspeksies waar oorweging geskenk moet word aan die hele reeks potensiële gevolge wat voortspruit uit die onbevredigende werkverrigtingspektrums wat op elke vlak van die oorsaak-tot-verliesstruktuur geïdentifiseer is. Dit sal elke gevaar, gevaarmeganisme, risikosituasie en gevolge in die opeenvolging van primêre, sekondêre en kwartêre oorsake-tot-verlies, insluit.

SLOT

Bestuur skep vermydelik of onvermydelik die toestande waarin gevare bestaan of in kan ontwikkel. Dit is daarom heel gepas dat bestuurders ook die gedrag van hulle skeppinge moet beheer. Die gevolg van afwykende effekte buite die spektrum van aanvaarde werkverrigting is 'n afname in produktiwiteit en 'n ontoereikende bydrae tot maatskappydoelmerke waarvoor ons as bestuurders, verantwoordelik gehou word.

Die doeltreffendheid van die bestuurspoging om oorsake-tot-verlies te beheer, hang grootliks af van die kwaliteit van bestuur veral ten opsigte van beplanningsfunksies (vooraf-bepaling van optrede) en beheer (die taksering en regulering van die werk wat op daardie tydstip nog aan die gang en voltooi is met betrekking tot dit wat beplan is).

Wat moet dan gedoen word in die lig van die onderwerp ter sprake in die referaat? Die volgende word voorgestel:-

> Eerstens, dat inspeksie, waarnemings, verlies- en voorvalophaling en ondersoekprosedures wat 'n sleutelrol speel in bestuursbeheeraktiwiteite, hersien moet word

nature of the situation, i.e.: an experienced loss, the control action will tend to be rehabilitative and corrective, but could be cognitive if profitable to do so.

Figure 5 is an illustration of some of the possible substandard activities on each level of the loss causation structure, together with typical downgrading incidents and types of consequence.

6.3 Downgrading Incidence

As the motivation and communication systems of an organisation tend towards excellence then the occurrence of downgrading incidents will also be reported more adequately. These incidents are hazard mechanisms which have operated in a manner which had no or negligible loss consequence. However, these incidents also need close examination, because of their potential for greater loss under slightly different circumstances. This examination is similar to the requirements of an inspection or observation and should reveal unsatisfactory performance in each of the levels of loss causation structure.

6.4 Substandard Practices and Conditions; Personal Facility, etc., Factors and Management Practice

Again as motivation and communication tend towards even greater excellence then substandard performance of these activities will come up for examination and the establishment of appropriate correction action. The process of examination is similar to that followed in the observation or inspection procedure.

Here, too, like in observations and inspections, the early identification of substandard management practice holds the highest potential for effective and most economic loss management.

7. THE COMPLEXITY OF THE LOSS CAUSATION SYSTEM

It is rather exceptional that loss causation commencing with a single substandard management practice culminates in a single consequence or loss. In practice, because of the close interaction of people, facilities, production and environmental factors, a single cause usually has multiple consequences.

The identification of cause and effect is no simple matter and this could be a reason for inspections, observations and investigations and the proposed control action frequently being inadequate.

It should be possible to identify the primary cause and effect sequence, followed by secondary, tertiary, quarternary, etc., cause and effect sequences. Every effort should be made to define each of these facets since failure to do so will deny management the opportunity to take effective control action. Such an indepth investigation assists management in identifying weaknesses in the system.

The above statement is illustrated in figure 6. The results given are related to a hypothetical case of a burst boiler (commencing at the causation and consequence working through to the substandard management practice).

This approach is not confined to investigations of loss or other deviation effects, but also forms part of the evaluation done in observations and inspections, where consideration must be given to the full range of potential consequences arising from the unsatisfactory performance areas identified at each level of the loss causation structure. This would include each hazard, hazard mechanism, risk situation and consequence in the primary, secondary, tertiary, etc., cause and effect succession.

CONCLUSION

Management avoidably and unavoidably creates the conditions in which hazards exist or can develop. It is therefore only appropriate that managers control the behaviour of their creation. The consequence of deviation effects outside the area of acceptable performance is decreased productivity and an inadequate contribution to corporate objectives for which we, as managers, are held accountable.

The effectiveness of management effort to control loss causation depends on the quality of management particularly in the functions of planning (pre-determining the course of action) and control (assessing and regulating the work in progress and completed in respect of what was planned).

What then should be done in the light of the subject matter of this presentation? It is suggested:-

> Firstly, that inspection, observation, loss and incident recall and investigation procedures, which are key management control activities, be reviewed in the light of

in die lig van die struktuur van die oorsaak-tot-verliesstelsel soos hier aangedui. Hierdie prosedures behoort te verseker dat elke vlak van die struktuur behoorlik gedek word, beginnende of eindigende met oorsake tot minderwaardige bestuur soos die geval ook al mag wees.

Tweedens, dat ons as bestuurders moet besef en dit as sodanig herken dat substandaard bestuursmetodes die grondoorsaak is van die struktuur van oorsaak-tot-verlies. Dat ons geensins sal kan verbeter op die huidige vlak van verlies of skade ten opsigte van eiendom, produksieverlies, persoonsbenadeling of ander afwykende effekte nie as ons dit nie erken nie en nie die verantwoordelikheid wil aanvaar om oorsake-tot-verlies op alle vlakke van sy struktuur te beheer nie.

Die doeltreffende beheer van oorsake-tot-verlies is 'n manier om 'n bydrae te lewer tot hoër produktiwiteit en in die laaste instansie winsgewendheid.

BRONNE

(1) Bird, Frank E. Jnr., Management Guide to Loss Control. Institute Press, Atlanta, Georgia.

(2) Allen, Louis A., The Management Profession. New York, McGraw-Hill Book Company.

(3) Grose, Vernon L., Vice-President, Tuston Institute of Technology, Santa Barbara, California.

(4) M. Joan Crowe, Imperial Oil Limited in Industrial Relations Research.

Hugh M. Douglas, Imperial Oil Limited as Senior Loss Control Co-ordinator and First Vice-President of the Industrial Accident Prevention Association of Ontario. Authors of "Effective Loss Prevention". To be made available through Industrial Accident Prevention Association, Toronto, Canada.

(5) Arnold Glass, Head Loss Prevention, Monsanto.

(6) Bob Browning, Engineering Specialist, Loss Prevention, Monsanto.

(7) Robert Wright, Advisor, Loss Management, Gulf Oil Canada Limited.

AFBEELDING 1

(a) "National Safety Council of America" beseringsfrekwensie koerse 1926 tot 1975:-

1926	31,87	1950	9,30
7	25,95	1	9,06
8	24,52	2	8,40
9	25,39	3	7,44
1930	18,47	4	7.22
1	15,12	5	6,96
2	13,20	6	6,38
3	14,56	7	6,27
4	15,29	8	6,17
5	14,02	9	6,47
6	13,57	1960	6,04
7	14,05	1	5,99
8	12,18	2	6,19
9	11,83	3	6,12
1940	12,52	4	6,45
1	15,39	5	6,53
2	14,68	6	6,91
3	14,52	7	7,22
4	14,46	8	7,35
5	13,63	9	8,08
6	14,16	1970	8,87
7	13,26	1	9,37
8	11,49	2	10,17
9	10,14	3	10,85
		4	10,20
		5	13,10

(b) Suid-Afrikaanse beseringsfrekwensie koerse soos voorsien deur die Ongevallekommissaris

1952	20,2	6	13,4
1956	18,9	7	13,4
1959	14,3	8	13,3
1962	13,9	9	13,2
3	14,7	1970	12,4
4	13,1	1	12,8
5	13,7	2	13,3

L.W.: Inligting ten opsigte van ontbrekende jare is nie beskikbaar nie.

the structure of the loss causation system put forward. These procedures should ensure that each level of the structure is appropriately dealt with, commencing or concluding with, the substandard management causation, as the case may be.

Secondly, that we as managers must recognise that it is substandard management practice which lies at the very root of the structure of loss causation. That we will not improve upon the present level of loss or damage to property, production loss, the infliction of personal harm or other deviation effects if we fail to recognise this and accept the responsibility to manage loss causation at all levels of its structure.

Effective management of loss causation is a way of contributing towards higher productivity and in the final count profitability.

REFERENCES:

(1) Bird, Frank E. Jnr., Management Guide to Loss Control. Institute Press, Atlanta, Georgia.

(2) Allen, Louis A., The Management Profession. New York, McGraw-Hill Book Company.

(3) Grose, Vernon L., Vice-President, Tuston Institute of Technolgoy, Santa Barbara, California.

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FIGURE 1

(a) National Safety Council of America Injury Frequency Rates — 1926 to 1975

1926	31,87	1950	9,30
7	25,95	1	9,06
8	24,52	2	8,40
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5	14,02	9	6,47
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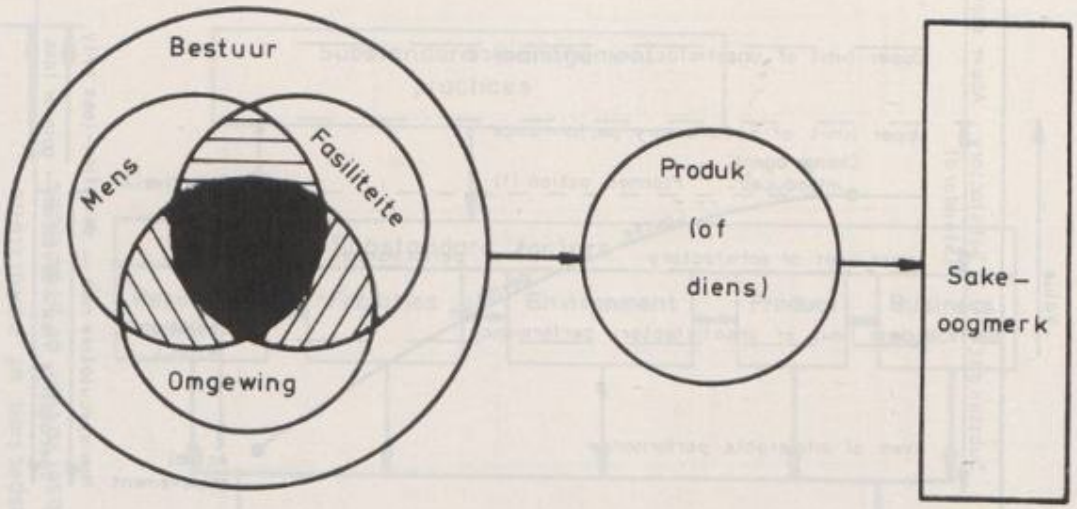
7	13,26	1	9,37
8	11,49	2	10,17
9	10,14	3	10,85
		4	10,20
		5	13,10

(b) South African Injury Frequency Rates Available from the Workmen's Compensation Commissioner

1952	20,2	6	13,4
1956	18,9	7	13,4
1959	14,3	8	13,3
1962	13,9	9	13,2
1963	14,7	1970	12,4
4	13,1	1	12,8
5	13,7	2	13,3

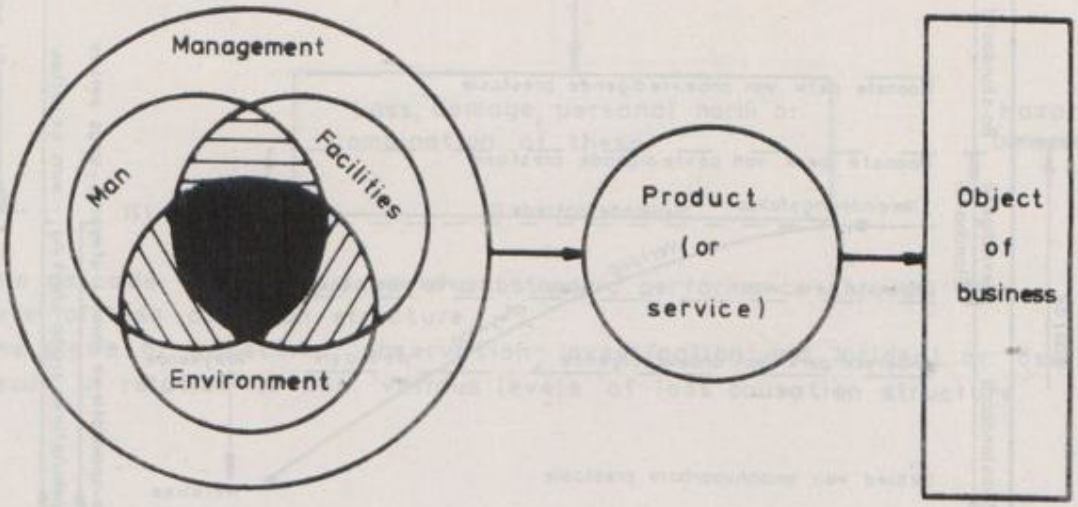
NOTE: Missing years not available.

AFBEELDING 2



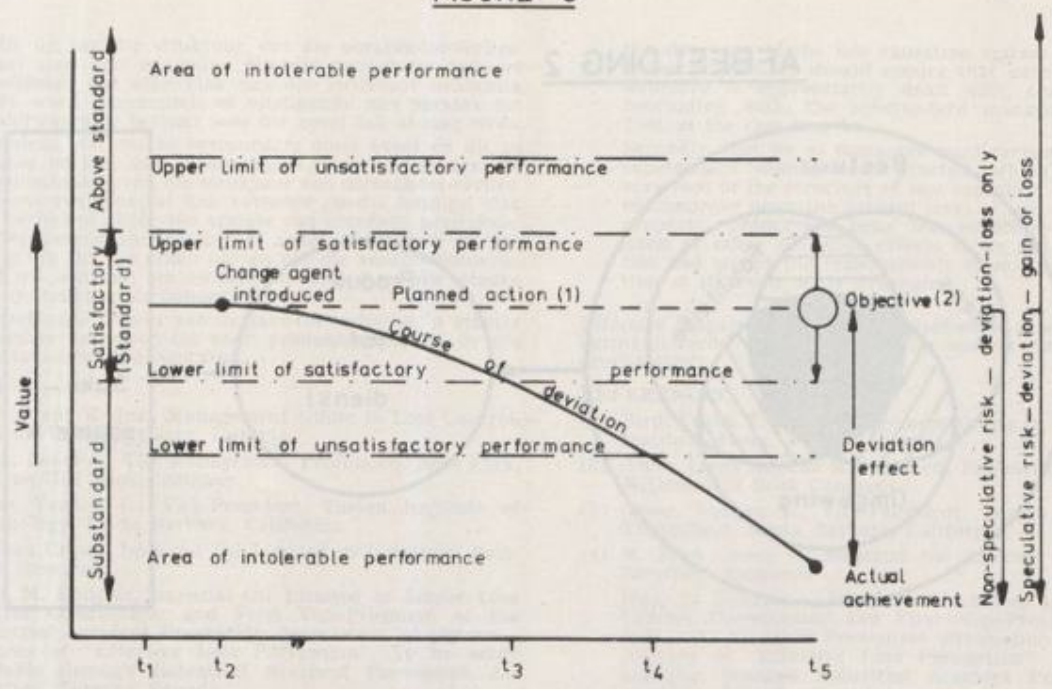
Die bestuurs-, mens-, omgewings- en fasiliteite sisteem wat ingeskakel is om 'n produk (of diens) te lewer en sodoende die sake-oogmerk te bereik

FIGURE 2



The management, man, environment and facilities system engaged to deliver a product (or service) in order to achieve the object of the business.

FIGURE 3

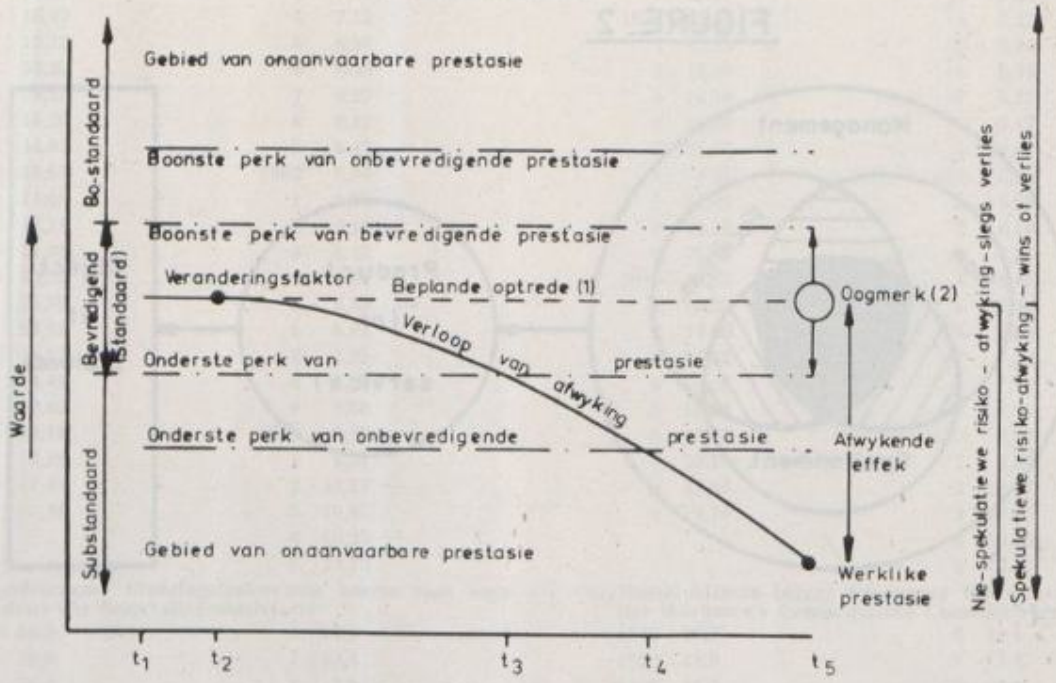


Control action in relation to course of deviation

Cognitive, contingent or adaptive	Corrective	Rehabilitative
	Containment Safeguarding Preventive	Containment

1) In respect of management practice, man, environment, facility, product and business objective factors; practices and conditions.
2) Taking into account that amount of loss, damage and personal harm which is accommodated in realistic objective setting

AFBEELDING 3

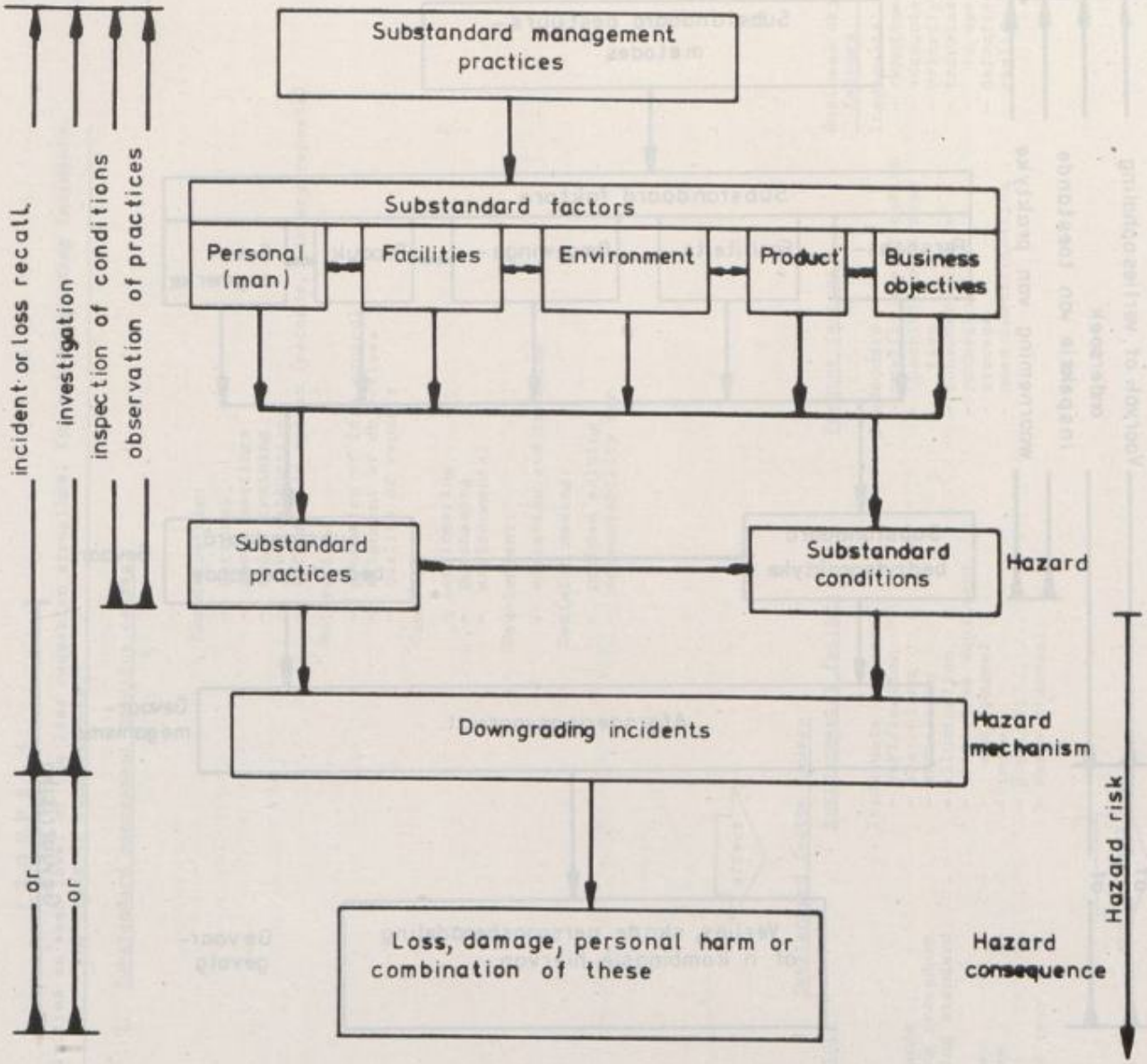


Beheer t.o.v. verloop van afwyking

Kognitief rakend of aanpassend	Regstellend	Rehabiliterend
	Bedwinging Beveiliging Voorkoming	Bedwingend

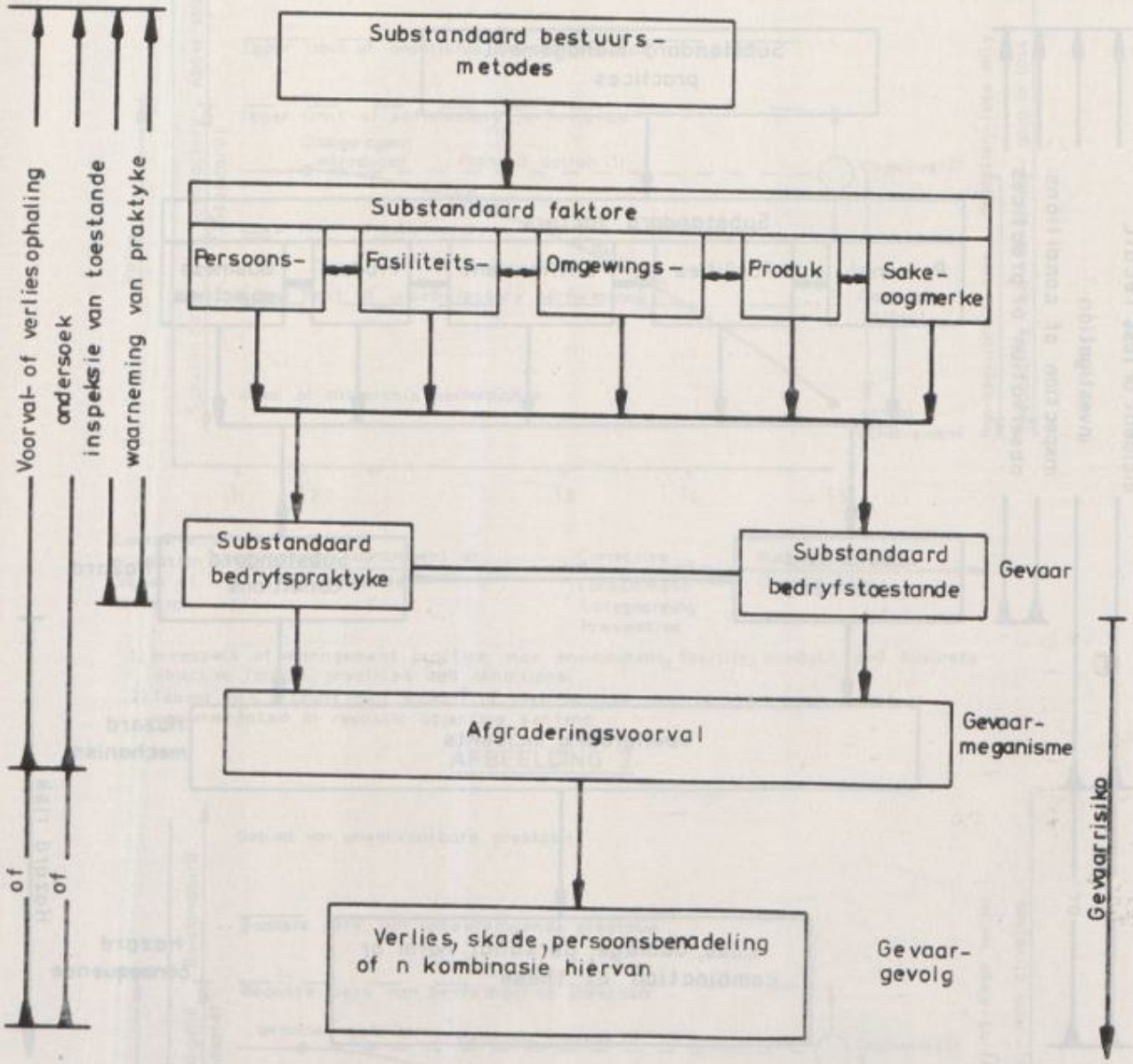
1) T.o.v. bestuursmetode; persoons-, omgewings-, fasiliteits-, produk en sake-oogmerk-faktore; bedryfspraktyke en-toestande.
2) Met die veronderstelling dat met die stelling van realistiese oogmerke voorsiening gemaak is vir onvermydelike verlies, skade of persoonsbenadeling.

FIGURE 4



1) The cascade of consequence of substandard performance through each level of loss causation structure.
2) The place of inspection, observation, investigation and incident or loss recall in relation to the various levels of loss causation structure.

AFBEELDING 4



1) Die kaskadering van gevolg van substandaard werkverrigting deur elke vlak van die oorsaak-tot-verlies struktuur

2) Die plek van inspeksies, ondersoeke en voorval-of verliesophaling in verhouding tot die verskeie vlakke van die oorsaak-tot-verlies struktuur

FIGURE 5

Some examples of substandard activities on each level of the loss causation structure, typical downgrading incidents and types of consequences

1. Substandard management practice causes

Failure to establish and/or maintain:

Procedures:

- hiring, selection and placement
- job analysis
- job methods
- family protection
- design and provision of protective equipment and apparel
- inspections
- investigations
- observations
- emergency preparedness
- wasted disposal
- security

Policy, rules and regulations:

- behavioural practice
- care of injured and ill
- pension plan
- use of equipment
- stock levels

Forecasting:

- production and market
- political
- social

Organising:

- structure
- delegation
- relationships

Communication:

- personal
- group meetings
- skill training
- job instruction
- information system (records, library reports)

Motivation:

- promotion of loss control
- alignment of objectives
- quality of reports

Control:

- engineering
- purchasing
- environmental

Development:

- education and training

Decision making:

- problem solving
- accountability for

effect

2. Substandard factor causes

Personal factors

Inadequacy of knowledge or skill
Improper motivation or attitude
Physical or mental unsuitability
Improper social environment

Facility factors

Inadequate
- design
- maintenance
- operating procedure
- purchasing standard
- funds
- know-how
- utilities

Abnormal
- wear and tear
- usage

Environmental factors

Inadequate
- purification
- absorbtion
- supression
- illumination
- protective equipment and apparel
- image
- goodwill
- waste disposal

Product factors

Inadequate
- quality specification
- quantity specification
- consumer service
- packaging
- storage
- need identification

Business objective factors

Inadequate
- commitment
- accountability
- priority
- translation into specifics
- definition
- realism

effect

3. Substandard practice and condition causes (hazard)

Practices

Operating without authority
Failure to warn or secure
Operating at improper speed
Making safety devices inoperable
Using defective equipment
Using equipment improperly
Failure to use personal protective apparel and equipment
Improper leading or placement
Improper lifting
Taking improper position
Servicing equipment in motion
Horseplay
Drinking or drugs
Failure to follow operating procedures

Conditions

Defective, missing guards or protection
Defective tools, equipment, materials or utilities
Congestion
Ineffective or missing warning system
Pyrophoric or explosive materials
Inadequate housekeeping
Exposure to dangerous atmospheric conditions gases, fumes, dusts, vapours
Excessive noise
Radiation exposure
Ineffective illumination or ventilation
No alternative to
- excess of
- lack of
- deficiency of
- inadequacy of

effect

4. Types of downgrading incidents (hazard mechanism)

Struck against
Struck by
Fall to below
Fall on same level
Caught in
Caught on
Maltreated by
Misplaced by
Stopped by
Discontinued by
Removed by, to
Stolen by
Damaged by

Caught between
Contact with electricity, heat, cold radiation, caustics, noise, toxic or noxious substances
Overexertion (overload) or exceeding design specification
Lost to, by, in, on
Overcome by
Asphyxiated by
Destroyed by

result

5. Nature of loss, damage or personal harm (hazard consequence)

1. Types

Loss of market, know-how, property, product, funds, profit, image, goodwill, manpower, time
Damage to property, facilities, product
Personal harm

2. Scope of personal harm (injury or illness) classification

- seriousness by frequency and severity
- reportable
- compensable
- disabling, lost time or major
- death
- catastrophic (multiple deaths)

3. Scope of loss or damage classification

- minor
- serious
- major
- catastrophic

no standard but adjusted to local values

AFBEELDING 5

Voorbeelde van substandaard aktiwiteite op elke vlak van die oorsake-tot-verlies struktuur, kenmerkende afgraderingsvoorvalle en gevolgsoorte.

1. Substandaard bestuursmetode

Versuim om die daarstelling of instandhouding van:

Prosedures:

- huring, seleksie en plasing
- taakontleding
- taakmetodes
- gesinsbeskerming
- ontwerp en voorsiening van beskermende toerusting en bekleedsel
- inspeksies
- ondersoeke
- waarneming
- noodparaatheid
- uitskot wegdoening
- sekuriteit

Beleid, reëls en regulasies:

- gedragspraktyke
- versorging van beseerdes
- pensioenskema
- gebruik van toerusting
- voorraadvlakke

Vooruitskatting

- produksie en mark
- politieke
- sosiale

Organisering:

- struktuur
- delegering
- verwantskappe

Kommunikasie:

- persoonlike
- groepvergaderings
- vaardigheidsopleiding
- taakopleiding
- inligtingstelsel (rekords, biblioteek, verslae)

Motivering:

- bevordering van verliesbeheer
- gerigtheid van oogmerke
- kwalitiet van verslae

Kontrole:

- ingenieurs
- aankope
- omgewing

Ontwikkeling:

- opvoeding en opleiding

Besluitneming:

- probleemoplossing
- aanspreeklikheid

effek

2. Substandaard faktore

Persoonsfaktore

Ontoereikende kennis of vaardigheid
Onbehoorlike motivering of gesindheid
Fisiese of geestelike ongeskiktheid
Onbehoorlike sosiale omgewing

Fasiliteitsfaktore

Ontoereikende
- ontwerp
- instandhouding
- bedieningsprosedure
- aankoop standaard
- fondse
- kundigheid
- utiliteite

Abnormale
- slytasie
- gebruik

Omgewingsfaktore

Ontoereikende
- suiwering
- absorbsie
- smoring
- verligting
- beskermende toerusting en bekleedsel
- beeld
- uitskotwegdoening

Produkfaktore

Ontoereikende
- gehalte spesifikasie
- hoeveelheid spesifikasie
- verbruikersdiens
- verpakking
- berging
- behoeftebepaling

Sake-oogmerk-faktore

Ontoereikende
- verpligting
- aanspreeklikheid
- prioriteit
- oorsetting na besonderhede
- definisie
- realisme

effek

3. Substandaard bedryfspraktyk en -toestande (gevare)

Praktyke	Toestande
Bediening sonder gesag	Defektiewe, verlore skerms of beveiliging
Versuim om te waarsku of beveilig	Defektiewe gereedskap, toerusting, materiaal of utiliteite
Bediening teen onbehoorlike spoed	Ophoping
Buitewerkstelling van beveiligingstoerusting	Ondoeltreffende of ontbrekende waarskuwingstelsel
Gebruik van defektiewe toerusting	Piroforiese of ontplofbare stof
Onbehoorlike gebruik van toerusting	Ontoereikende huishouding
Versuim om beskermende beklædsel en toerusting te gebruik	Blootstelling aan gevaarlike atmosferiese toestande, gasse, dampe, stof, rook
Onbehoorlike aktivering of plasing	Oormatige geraas
Onbehoorlike optel	Blootstelling aan straling
Onbehoorlike posisie inneem	Ondoeltreffende verligting of ventilasie
Bediening van bewegende toerusting	Geen alternatief vir
Ruwe spel	Oormaat van
Drank of dwelmmiddel misbruik	Tekort aan
Versuim om bedieningsvoorskrifte te volg	Gebrek aan
	Ontoereikendheid van

effek

4. Voorbeelde van afgraderingsvoorvalle (gevaarmeganismes)

Botsing met	Gevang tussen
Getref deur	Kontak met elektrisiteit, hitte, koue, straling, geraas, byt-, toksiese of skadelike middele
Val na (benede)	Verloor aan, by, in, op
Val op (dieselfde vlak)	Oorstelp deur
Vasgevang in	Versmoor deur
Vasgevang deur	Vernietig deur
Mishandel deur	
Misplaas deur	
Verhinder deur	
Beëindig deur	
Verwyder deur, na	
Gesteel deur	
Beskadig deur	

resultaat

5. Aard van verlies, skade of persoonsbenadeling (gevaar gevolg)

1. Tipes

Verlies van mark, kundigheid, eiendom, produk, fondse, wins, beeld, mannekrag, tyd
Skade aan eiendom, fasiliteite, produk
Persoonsbenadeling

2. Indeling van omvang van persoonsbenadeling (besering of siekte)

- erns m b t frekwensie en hewigheid
- aanmeldbaarheid
- vergoeding
- dood
- katastrofies (veelvoudige sterfgevalle)

3. Indeling van verlies of skade

- gering
- ernstig
- groot
- katastrofies

} plaaslike waardes bepaal } standaard

FIGURE 6

MULTIPLE CAUSATION AND CONSEQUENCE

CAUSATION	CONSEQUENCE – Loss, damage or personal harm	PRIMARY	SECONDARY			TERTIARY	QUARTERNARY	QUINARY
		damaged boiler	lost steam	personal injury	damaged surrounding plant	lost production	lost income	loss of profit
	Downgrading incident	exceeded design pressure	exposed to atmosphere	struck by steam	struck by missiles	production stopped by lack of steam	sales discontinued by lack of product	funds lost by lack of sales
	Substandard practice (p) and or condition (c)	(p) operating at improper pressure (c) defective relief valve	(p) - (c) standby boiler defective	(p) - (c) no protective clothing	(p) - (c) inadequate plant spacing	(p) - (c) lack of reserve product stock	(p) - (c) no alternative source of product	(p) - (c) - inadequate insurance
	Substandard factor	(p) inadequate operating knowledge (c) inadequate maintenance	(p) - (c) inadequate maintenance	(p) - (c) inadequate protective measures	(p) - (c) inadequate design	(p) - (c) no storage for reserve product	(p) - (c) no agreement for purchasing emergy stock	(p) - inadequate risk management knowledge (c) -
	Substandard Management practice	(p) training inadequate (c) schedules maintenance program not instituted	(p) - (c) scheduled maintenance program not instituted	(p) - (c) no inspection to identify needs	(p) - (c) accountability for design approval not established	(p) - (c) inadequate policy in respect of storage	(p) - (c) inadequate purchasing procedures	(p) - inadequate risk management development program (c) -

AFBEELDING 6

VEELVULDIGE VEROORSAKING EN GEVOLG

	GEVOLG	PRIMØR		SEKONDØR		TERSIØR	KWARTØR	KWINØR
	Verlies, skade of persoonsbenadeling	beskadigde ketel	verlore stoom	persoonsbesering	skade aan omliggende aanleg	verlore produksie	verlore inkomste	verlies van wins
V E R O O R S A K I N G	Afgraderingsvoorval	oorskryding van ontwerpdruk	blootstelling aan atmosfeer	getref deur stoom	getref deur projektiel	produksie gestaak as gevolg van gebrek aan stoom	verkope gestaak deur gebrek aan produk	fondse verloor as gevolg van gebrek aan verkope
	Substandaard praktyk (p) en/of toestand (c)	(p) bedien teen onbehoorlike druk (c) defektiewe ontlasklep	(p) - (c) reserwe ketel defektief	(p) - (c) geen skutklerasie	(p) - (c) onvoldoende spasiëring van aanlegte	(p) - (c) gebrek aan reserwe produk	(p) - (c) geen alternatiewe bron van produk	(p) - (c) onvoldoende versekering
	Substandaard faktore	(p) onvoldoende kennis van bediening (c) onvoldoende instandhouding	(p) - (c) onvoldoende instandhouding	(p) - (c) onvoldoende beskermingsmaatreëls	(p) - (c) onvoldoende ontwerp	(p) - (c) geen bergplek vir reserwe produk	(p) - (c) geen ooreenkoms om noodvoorraad aan te koop nie	(p) onvoldoende kennis van risikobestuur (c) -
	Substandaard bestuursmetode	(p) onvoldoende opleiding (c) geskeduleerde instandhouding nie ingestel nie	(p) - (c) geskeduleerde instandhouding nie ingestel nie	(p) - (c) geen inspeksie om behoefte te bepaal nie	(p) - (c) aanspreeklikheid vir goedkeuring van ontwerp nie bepaal nie	(p) - (c) onvoldoende beleid ten opsigte van berging	(p) - (c) onvoldoende aankoopsprosedures	(p) onvoldoende risikobestuur ontwikkelingsprogram (c) -

MR. D. H. FRASER, Durban:

Mr. President, Gentlemen,

Mr. Leach has obviously approached the subject of his paper in a very thorough manner and I am sure that I speak for all present in expressing appreciation to him for the time and effort devoted to its preparation and presentation. He has provided us with a list of useful references on this important aspect of our responsibilities as managers and, speaking for myself at least, introduced us to a host of new words such as "deviation effect", "speculative" and "non-speculative" risks, "cognitive" and "rehabilitative" action and so on, which may be useful.

The term "loss control" has only recently been imported to South Africa and one of the leading authorities on the subject, Mr. Frank Bird of the U.S.A. has done much to popularise it in this country through lectures and seminars arranged by the National Occupational Safety Association.

The Engineer, of course, is steeped in the tradition of controlling losses and one of the first expressions he learns is that

$$\text{Efficiency} = \frac{\text{Input} - \text{losses}}{\text{Input}}$$

In the case of machines, losses are reasonably predictable. It is generally possible to control these to fairly close limits and strike an optimum economic balance. We are able to choose the machine with the lowest cost of ownership and operation under given conditions. However, when it comes to controlling the performance of people, it is a very different matter and one of the most important factors is the efficiency formula in this situation called MOTIVATION.

The training of the engineer is often deficient in regard to the study of human behaviour due to the extent of the technical knowledge to be acquired. This may be why we frequently concentrate more on the machines in our lives than the people. They are usually not temperamental and require no psychological motivation. There is, I am afraid, no escaping involvement with people and responsibility for their performance when the Engineer takes on the mantle of a Manager. Mr. Leach puts the onus squarely on us when he says that "it is substandard management practice which lies at the very root of the structure of loss causation". He also suggests the need for us to review key management activities to control the numerous factors which are involved in downgrading incidents and losses viz., "inspection, observation, loss and incident recall and investigation procedures".

It would be helpful to your audience today, Mr. Leach, if you could focus a little more specifically on the environment in which we as Municipal Electrical Engineers operate and pinpoint what you see to be priorities in our efforts to improve our efficiency as managers.

For example, your Figure 3 shows some value declining with time in a manner which could no doubt be expressed mathematically. It also shows limits of satisfactory performance and presumably if the graph represented the performance of say an electric motor, any engineer worth his salt could design a feedback system to keep it operating between the upper and lower limits. In the context of your paper, Mr. Leach, what values should be monitored in this manner in an electricity supply undertaking and how are the limiting values set?

In figures 5 and 6 you indicate the various stages 1 to 5 of downgrading incidents from root cause (resting with management) to final consequence of loss, damage or injury. Mr. Leach has pointed out that the number of actual injuries sustained by people, represents the mere tip of an iceberg of incidents or conditions which are potentially injurious or "downgrading". It is presumably the same with damage to plant or losses in other forms. The depth of the investigation into these incidents, judging by these two figures must involve a considerable amount of time and manpower. Can Mr. Leach indicate to us where one draws the line in deciding what warrants investigation and to what degree; again, if possible, related to our sort of activity?

Apart from the problem of finding the personnel to undertake the investigations, observations and reporting of downgrading incidents the resultant generation of additional paperwork could cause difficulties. We are continually faced with complaints from artisans and supervisors concerning the number of forms and records to be completed, which contribute little to their practical work output. Then, of course, all these reports have to be read, evaluated and hopefully, condensed to essentials, for examination and action by management. Could Mr. Leach comment on this aspect and perhaps suggest ways in which managers can stem the flood of paper that threatens to overcome us and keep us desk-bound.

There is no doubt that a very significant impact can be made on the tip of the loss "iceberg", represented by personal lost time injury, by an active accident prevention programme, coupled with an effective first aid and medical screening organisation. I would suggest that this is the first step in the management of loss causation and one which produces measurable results in terms reduced injury frequency rate. This can be evaluated in financial savings to justify administrative costs incurred and displayed on safety boards as so many man hours worked without a lost time accident as a challenge and stimulus to staff.

The difficulty arises when a high level of safety performance has been reached in an organisation and the humans involved start to display that unfortunate human tendency of becoming de-motivated, when the challenge has been eliminated.

Dare I suggest that "loss control" is that gimmick which has been thought up to provide a new pinnacle to be conquered — a new motivating force? Perhaps the following extract from a recent article in NOSA's "Safety Management" magazine by Bill England, Managing Director of Mobil Refinery, Durban, which has an enviable safety record, sums it up!

"I am convinced that no matter how effective a programme man can devise to protect employees from injury and plant from damage and resources from loss, the biggest obstacle to success is and always will be lack of sufficient motivation on the part of human beings to implement the programme to the full. Since people will always be people, this fact will ever be so. No manager can ever be finished with the subject of safety. The moment he stops, the lack of it will take him by surprise and it will be an unpleasant surprise, and too often he will have to rebuild again. The battle against unnecessary loss will and can never be won."

Mr. President may I on behalf of all delegates propose a very hearty vote of thanks to the author for his most interesting address.

MR. B. H. L. LEACH, Sasol:

Mr. President, Mr. Fraser thank you very much for those kind words. I can say that as a questioner, you certainly know which questions to ask. You are certainly touching on the important things and these are the difficult areas.

You asked me what should the Electrical Engineer be looking at. Well, as an Electrical Engineer, what is your product, what would be those dimensions of your product in which you would measure its quantity and its quality? I am treading on very thin ice here Mr. President, the quality of your product — how do you measure it? When is your product standard and when is it unsatisfactory, and I guess at times if inadequately used it could have intolerable consequences. Your quality is continuity I would think, now is it continuity at all costs? I think this is what you have to take a decision on, that is, what is considered to be satisfactory performance? I would say one or two blackouts a year. You can't carry on spending money to eliminate those blackouts because then I think the cost would become prohibitive. Many blackouts a year would certainly be in the unsatisfactory performance area. I think that you also have a quantity limit in your product and that you can supply so much from your resources and if you exceed that then your facility is going to be overtaxed, which I am sure will lead to some sad consequences. Perhaps sometimes you have to buy electric power from Escom to augment your own facilities. Then there is a cost factor — what can be considered to be standard cost and what is an unsatisfactory or even an improbable cost? I don't think this really answers your question, but this is the sort of notion that it conjures up in my mind. Your next question is what warrants investigations, where do you draw the line, this is a very good question. I know it generates paperwork, but you should be sensitive to those incidents, damage, loss, harm, or those downgraded incidents that could lead to serious consequences those incidents that in your planning are still within the satisfactory limits. We would expect that you would have small cuts and bruises and operations and one thing and another, but those cuts and scratches are really fortuitious. So you look at your downgrading incidents and your conditions and practices that are substandard and say — well what would be the consequences of allowing this to continue? As far as paperwork is concerned, I think that if you use the structure that I have suggested here, management practices, substandard factors and conditions and so on, it may simplify the forms that you are using and it may even help to cut down on the paperwork, although at first sight you may be asking for too much. I have seen forms that have been developed along these lines, where questions are answered by putting crosses in "boxes" alongside them. This is one way of

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reducing paperwork, although it is not necessarily the best. If you really make the breakthrough in getting to the sub-standard factors and management factors and management practices, you are going to find that these incidents are going to decrease and that you are going to have less work to do. Motivation as one of the other questions that you raised, first aid, safety and so on, I think this is all very good. First Aid is a useful stimulator motivator, it makes people sensitive to injury and it has the spin-off that it makes them sensitive to damage and other losses as well.

On the question of motivation, Mr. Fraser, I think the important thing is that this motivation starts at the top and works downwards. Organisaions rot from the top downwards and not from the bottom upwards and the motivation of people starts at the top and works downwards. We can't expect our artisans, our operators, our foremen to be adequately motivated, if you and I who are at the top are not enthused and don't believe in what we are doing. I can assure you that this is noticed very clearly. The message goes down the line very quickly that you are not practicing what you are preaching, and some of us don't even preach. So adequate motivation starts at the top.

MNR. A. J. VAN DEN BERG, Krugersdorp:

Mnr. die President, mnr. Leach verdien lof vir sy referaat aangesien dit aangebied is in 'n tyd waar almal van ons ernstig moet besin oor wat ons te doen staan in 'n tyd van ongunstige gebeurlikhede in die wêreld, hier in ons land, en wat ons betref mnr. die President, die bestuur van ons Elektrisiteitsondernemings.

Die professionele bestuurder sou mnr. Leach se referaat waarskynlik in diepte kan begryp en as leidraad gebruik om praktiese en doelganglike doelwitte te verwesenlik.

Die gemiddelde ingenieur bestuurder verstaan die term totale verlies beter en sou graag meer wou doen om sy bydrae te lewer.

Met die instelling van die departement Bestuursdienste by meeste Plaaslike Owerhede is ek van mening dat dit 'n veld is wat in samewerking met voorgenoemde departement ook baie kan bydrae om die beheer van die elektrisiteitsdepartement in baie opsigte te vergemaklik, en verliese van allerlei aard te bekamp.

Maar mnr. die President, wat doen die ingenieur om die alledaagse en etlike probleme wat die tyd waarin ons leef met hom saamgebring het enigsins te probeer oplos? Ek stel die vraag omdat ek aan u die volgende wil noem:

1) Die petrolpomp sluit deesdae om 12 uur op Vrydae. My ondervinding is dat persone van alle sektore nou hul werk verlaat en gou hul motors gaan volmaak. Manure gaan verlore want ons moet nou eers gewoond word aan die nuwe reeling. As jy die uitwerking van hierdie; „ek het vergeet en moet petrol hê", bestudeer staan jy verstom watter verlies dit vir 'n instansie beteken.
2) Die onverwagte probleme wat talle dorps ontwikkelaars ondervind, het baie plaaslike owerhede ewe onverwags onkant gevang en groot uitbreidingsprojekte teen enorme bedrae is of gevries of gedeeltelik voltooi, of mnr. die President, wel voltooi teen kostes wat nie bekostig kan word nie. Omgereken in terme van verliese wonder ek wat hierdie enkele gebeurlikheid ons land kos?
3) Die stygende pryse in die algemeen en die mens se wyering om sy lewensstandaard in te krimp het allerlei wanpraktyke laat ontstaan — strenger veiligheidsmaatreëls en sekuriteitsmaatreels is onvermeidelik om eiendom en goedere te beskerm.
4) Met die koms van televisie het 'n onverstaanbare persoonlikheidspatroon by die mens ontstaan wat die oplettende bestuurder seker nie net kan afmaak as tekens van die tye nie aangesien hierdie enkele faktor die mens se lewe, sy opvatting en benadering tot sy werk beinvloed.

Mnr. Leach se referaat laat baie stof tot nadenke. Dankie.

MNR. B. H. L. LEACH, Sasol:

Mnr. President, mnr. van den Berg, U verwys na totale verliesbeheer. Ek glo dit is nie 'n baie goeie begrip nie, dit is iets wat ingevoer is. Ek wil aan die hand doen dat ons moet praat van verliesbestuur, dit is vir my beter omdat dit dan al die faktore van bestuur kan laat inwerk op die situasie van verlies. Total loss control — let us look at it. Total loss — what does that really say — does it say that, initially we should be looking at all our losses? I think we should be looking at all our losses and if we do our management work adequately, we would be looking at all our losses in any case, so I think that total in the concept of loss control, is not necessary. Then loss control — we do not want to control our losses, we have got to manage those factors as I have indicated in my presentation. One cannot only control the casual factors of loss, you have got to do some planning and organising around it and a number of other things. Therefore I think that control is too narrow a base and we should rather be talking about Loss Management — Verliesbestuur.

MR. L. FUTCHER, Kempton Park:

Mr. President, I want to open my remarks by congratulating Mr. Leach on a very informative and excellent Paper and for the manner in which he presented it.

I have been listening with interest to the various speeches, Papers and discussions which have been presented at this Convention and it has struck me forcibly that there has been a strong underlying theme in everything and that has been "conservation" and, in spite of all the speeches of the Minister, in which he advocated conservation of electrical energy, coal etc., we just went on in the same old way. I think Mr. Leach has covered the whole matter of conservation very logically in his handling of the subject "Loss Control".

When talking about Conservation or saving, we, as Engineers, automatically think in terms of electrical energy, coal, fuel, water etc. — we must however think further and include accident prevention and total Loss Control.

Top management has always been rather complacent in this respect. They have always had the idea, that the assets and equipment are covered by insurance anyway and the employees, well anything that happens to them is taken care of by the Workmen's Compensation, so why worry. Now this attitude, Mr. President, must be changed and top management must become fully involved in Total Loss Control. The subject of this Paper is something which could be discussed at length, but I only wish to touch on a few aspects.

I am sure that all the members are aware of the importance of the Management of Loss Control, especially in these times of high labour costs and price escalation. Is it a management function to ensure that Total Loss Control be strictly adhered to? Mr. Leach has stated in his Paper that the disabling injury frequency rate in South Africa has levelled out at about 13, however, statistics show that in 1975 the figure rose to 14,72. Of interest to the members present, Mr. President, in 1972 some 348 000 cases of injury were reported and the cost of compensation amounted to R30,2-million. What may be of further interest to our colleagues is that this cost did not include medical expenses, which alone amounted to some R3,2-million, so it is rather a frightening sum of money when you think that it covers only the injuries to persons and does not include damage to equipment. Perhaps our members can take consolation from the fact that of the 348 000 injuries, only 760 or 0,2% were caused by electrical apparatus. In 1972 the incidence for Local Authorities was 5 052, giving a disabling injury frequency rate of 14.

The 1975 statistics however, showed an improvement in this figure and Local Authorities had an incidence of 3 821 giving a disabling injury frequency rate of 11,18. It should be the goal, Mr. President, of all Local Authorities to achieve a disabling injury frequency rate of less than 10, and I think if everybody really goes into this question of Loss Causation Management, we can achieve that. It has been proved by quite a few Local Authorities that it can be done, but it needs an all out effort by everyone of us here and all top management. Thank you Mr. President.

MR. B. H. L. LEACH, Sasol:

Mr. President, I am not sure whether I must reply immediately to each of the speakers, but each one who speaks reminds me of something I would like to share with the audience. Mr. Futcher, I like your approach. I think that, as Engineers, many of you, if not at all, have heard of such techniques as operability studies, fault re-analysis, hazard analysis. In our organisation, we are taking a good look at the use of these inspection techniques — I would call them inspection of software techniques in the operability studies whereby you study your project, its viability in the whole environment in which it is going to work, not only its physical environment but also the economic and the social environment — social environment being that of man related to the machine. I would recommend to Engineers that they have a close look at these techniques which have been developed. The stimulus has come from the era of space projects and you will hear such terms as management oversight, risk, free analysis — it is all to do with these operability studies. Mr. Futcher, I would like to say that the only thing that we can manage is the causation of loss, we cannot manage loss. Loss is something that has happened and passed. You can do very little about it, the best you can do is to take a little rehabilitative action, that is to say rehabilitate broken down plant or the broken down man — the injured man. The only thing that we can manage is the causation. When referred to "loss management", the words I should have used are "Loss Causation Management". Thank you.

MR. A. A. WEICH, Chief Inspector of Factories:

Mr. President, I found the Paper most interesting. I would like to make a few observations — in the first place I agree with the speaker that the term "Total Loss Control" is a shibboleth that has been imported just recently and on which we have hung just about our whole accident prevention effort. I believe that safety is a by-product of good management, but I would like to pose one problem. Mr. Leach has said that the effort has bottomed out — I agree with him that it has bottomed out, but it can be reduced further without much effort in this respect that in the accident prevention field you have the saints and the sinners. At the moment you are preaching to the saints and they can do very little about it. The sinners never hear the message and the problem is how do we get to the sinners. In our department we deal with them every day. It is very difficult to bring home the necessity of good management to them, because they are usually people who do not understand anything about management. There is another point I would like to make and that is that we find a tremendous amount of effort is put in to accident prevention, a lot of literature is passed around, but there is one book that is very seldom studied and that is the Factories Act. Everybody seems to know about Loss Control, everybody reads about it, but when it comes to the Factories Act, they are blissfully ignorant. Thank you.

MR. K. G. ROBSON, President:

Mr. Weich, it would appear to me that your Department needs a Public Relations Officer, or a salesman.

MR. L. H. HARE, Central Organisation for Trade Testing:

Mr. President, I was privileged earlier this year to undergo one of NOSA's Samtrack Courses where Henry Haynes and his crew put the screws on us. One of the things I would like to thank Mr. Leach for is for refreshing my memory and bringing back to me rather vividly some of the things he told us at that course. Training may start at various levels, but I would make an appeal here. The apprentice is the artisan, the supervisor and possible middle level manager of the future, and he should be trained from the word go. From the moment he is indentured, when he steps into the organisation, this training must be undertaken. Mr. Fraser mentioned motivation and I refer to the motivation of apprentices by their employers to do their best. Mr. Leach has pointed out that motivation starts at the top and that is why we at COTT want to see the top level management visit us so that they can then support middle management supervisors, instructors, right down to the apprentice. I feel the lowest level of intolerability is reached by many an apprentice, when he speaks of himself as being "only an appy". They feel they are the lowest form of animal life and the average artisan encourages them in this attitude. Mr. President, I feel that NOSA's seed has fallen upon fertile ground and we at COTT are doing everything we can to ensure that the apprentices and instructors who came to COTT can go back to their employers and say that COTT is aware of the need for control, accident prevention and so on. Thank you.

MR. B. H. L. LEACH, Sasol:

Mr. President, gentlemen, perhaps we can start with Mr. Hare's comments first. I think it is unfortunate that our apprentices think they are the lowest form of life. I think that is just part of the culture in which apprentices find themselves and, as you said, the artisans encourage this.

Mr. Hare you said that apprentices can move through the ranks of artisans, foremen, and supervisors to mid-level managers. Generally I think that the artisans who are studying for their Government Tickets and so on are inadequately prepared for management functions — even supervisory functions. There are a number of courses people can follow at Colleges and so on but, if it is not done with the active support of their employers then they will not get anywhere and I would like to say that to me there is an important difference between training and education.

Training is programming people whereas education is broadening the mind. Somebody said to me one day that if you are trained you are functioning according to a programme — and you are a puppet, but if you are educated you can be a puppeteer. I think it is important that we should train our apprentices to do those programme jobs which they have to do as artisans. We have to give them some education so that they can understand what they are doing, but as far as management training is concerned, we have to select those people who show promise. Mr. Weich, I appreciate the comment on saints and sinners. I will make a prediction here today that the sinners are going to cause us the same kind of trouble as that which has been and is being experienced in the United States. I think that most of us have heard of Occupational Safety and Health Administration. From what I hear, I believe that this is really bureaucratic and tough and the people who are suffering today are the sinners. I think that the Factories Act and the Mines and Works Act are really chicken feed compared to what Americans have done, are doing or attempting to do. They are prescribing just about everything as far as personnel and equipment safeguarding is concerned because people have refused to think for themselves and to become saints. The sinners have brought to America a terrible burden — the ladders are specified, the guards are exactly specified, they have to be just so. Perhaps some of you have already seen some of this literature and, if we don t do something about it, gentlemen, we are going to get something similar in due course in this country. That is going to be an extremely sorry day, so I would recommend that in the meantime we should at least read the Factories Act and the Mines and Works Act. It has been said — Frank Bird mentioned this to me that, if you stick to the Factories Act or the Mines and Works Act, you should have an injury frequency of say round about 50, but if you are really doing your best you should have an injury frequency rate of a lot less. So we can say that the Factories Act really only calls for the minimum and if we could get everybody to do that minimum then I think our record in this country would be exceptionally good, but it is not the record that I am concerned about. What I am concerned about is that we may get something like the American Occupational Safety and Health Act which I think would be a terrible burden.

MR. K. G. ROBSON, President:

There are times when the most incongruous things happen and some years ago I of all people was in a team that was appointed to judge Mr. Leach of SASOL and certainly when I went there I found it was something of a presumption to send people like me to judge SASOL. May I say that what Mr. Leach is preaching is certainly not theory and, to those of you who have the time and the inclination, may I say you should visit SASOL. I have never been impressed so much as I was at the magnificent standard of performance of SASOL. It opened my mind to achievement that I would never have been persuaded to accept as possible until I saw it. The check procedures and the obvious commitment of Mr. Leach's staff to many of these management practices and techniques that he has talked about today I saw in actual practice and for this reason Mr. Leach we have been particularly privileged to have you talk to us about the things that really do matter in the management of our Electricity Undertakings and the electrical manufacturing industry in South Africa. There is no doubt that you have brought a message to us and, on behalf of the delegates and members of the Association, I thank you very much for having come from Sasolburg to talk to us this morning. As a small token to remind you that, for some short time, you were involved with us here in East London at this 45th Convention, I hope you will accept this AMEU tie with our appreciation.

THANKS TO MRS. PHILPOTT:

I have a very pleasant duty to perform and that is to say a very warm thank you to Mrs. Philpott and her helpers.

You may not know but, as well as having prepared all the teas throughout this convention, Mrs. Philpott and her ladies organised the catering for the Civic Reception on Tuesday night and they really did a tremendous job of work.

On your behalf, I would like to thank her and her helpers very much indeed!

MR. K. G. ROBSON, President:

May I start with a special welcome to Mrs. Berna Beck, who is alone in the gallery.

One never knows when one is going to find some new criticism levelled at one and I have just been criticized on the grounds that we have been presenting ties rather lavishly throughout this Convention, but Mrs. Philpott did not get one, so may I leave the thought with members that for the next Convention we provide some suitable adornment to give to the ladies. No doubt most of you will be pleased to get back from an obtruse subject like management to something that you can see, that you enjoy fiddling around with, such as high voltage switchgear. I think it is fitting that, after the discussions about management and the direcetion of our thoughts along those paths, we should get back to some of the things that we are in business for and for which we are responsible. I am particularly pleased this morning that we are going to have a contribution from the East London Municipal Electricity Undertaking as the concluding paper of this Convention. One of the advantages of being the President is that you don't have to present a Paper. You can ask other people to do so and I was able to ask Mr. Harden Beck, who is the Deputy City Electrical Engineer here in East London, to read a paper on High Voltage Switchgear. I would like to say thank you very very much, Harden, for having accepted that assignment. It is now my pleasure to introduce Mr. Beck to you.

Hoogspanningskakeltuig

Deur

H. D. BECK

Pr.Ing., B.Sc.(Ing.)(Natal)

1.0 **OPSOMMING**

Die metode om 'n grootmaat toevoer van elektrisiteit na Oos-Londen te voorsien word in hierdie referaat beskryf. Onlangse lasaanwas in die Westelike gebied word in oorweging geneem, met die gevolglike behoefte om 132 kV skakeltuig te installeer. Die verskillende tipes hoogspanningskakeltuig wat beskikbaar is, word ondersoek, met besondere verwysing na swawelhexafluoriede (SF5) skakeltuig.

1.1 **INLEIDING**

Tot vroeg in 1974 het die munisipaliteit van Oos-Londen krag van die Elektrisiteitsvoorsieningskommissie teen 11 kV aangekoop. Die Kragvoorsiening was van Evkom se Wesbank kragsentrale verkry. Met gebruik van die voorsieningsreëling was die geborgde vermoë by die 11 kV munisipale substasies 72 MVA. Dit sal van Figuur 1 bemerk word dat dit nodig was om die grootmaatvoorsiening op sy laaste teen die winter van 1974 te verhoog.

Omrede die verwagte groeitempo van belasting in Oos-Londen in daardie tyd, en as gevolg van die bykomstige laste waartoe Evkom gebonde was om aan sy Grensonderneming te verskaf, was 'n grootmaat voorsiening van munisipale laste wat 72 MVA te bowe gaan, teen 11 kV, nie doenlik nie. In 1971 is die besluit geneem om 'n 132 kV grootmaat — inname stasie daar te stel. Krag moes vanaf hierdie grootmaat — inname stasie, genaamd Stafford, geneem word, deur middel van twee oorhoofse oorbrengingsleidings, na die Stoneydrift substasie. Aanvanklik sou hierdie substasie toegerus word met twee 90 MVA 132/33 kV transformators. Die beoogde datum vir voltooing van die werk was Maart 1973. Die skematiese voorsieningsinrigting word aangedui in Figuur 2.

Die oorskakeling van 11 kV na die nuwe 132 kV voorsiening is finaal voltooi in Maart 1974.

Voorsiening is by Stoneydrift substasie gemaak vir die uiteindelike installasie van 'n derde 90 MVA transformator met sy meegaande 132 kV oorbrengingsleiding. 'n Stel dubbelbaan maste was voorsien maar die derde baan is nie gespan nie.

High Voltage Switchgear

By

H. D. BECK

Pr.Eng., B.Sc.(Eng.)(Natal)

1.0 **SUMMARY**

In the paper, the method of providing a bulk supply of electricity to East London is described. Recent load growth in the Western area is considered, with the resulting need for installation of 132 kV switchgear. The various types of high voltage switchgear available are examined, with particular reference to Sulphur Hexafluoride (SF6) switchgear.

1.1 **INTRODUCTION**

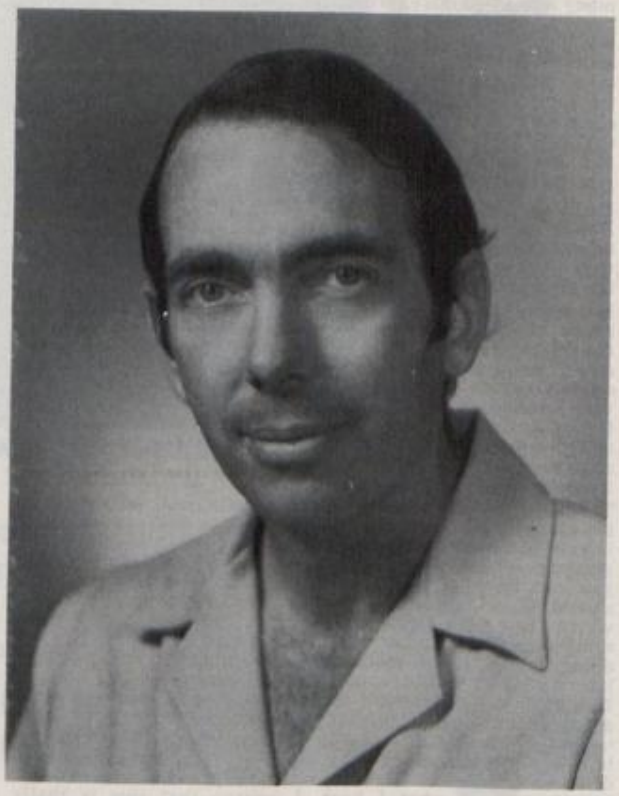
Until early 1974, East London Municipal Electricity Undertaking purchased power from the Electricity Supply Commission at 11 kV. The supply was obtained from Escom's West Bank Power Station. Using this supply arrangement, the secured capacity available at the Municipal 11 kV substations was 72 MV.A. It will be seen from Figure 1 that it was necessary to increase the capacity of the bulk supply at the latest by the winter of 1974.

Due to the anticipated rate of growth of load in East London at that time, and due to the additional loads which Escom was committed to supply in their Border Undertaking, a bulk supply at 11 kV for Municipal loads in excess of 72 MV.A was not practical.

In 1971 the decision was taken to establish a 132 kV bulk-intake station. Power was to be taken from this bulk-intake station, named Stafford, by means of two overhead transmission lines to the Stoneydrift substation. Initially this substation was to be equipped with two 90 MV.A 132/33 kV transformers. Target date for completion of this work was March, 1973. The schematic supply arrangement is shown in Figure 2.

The change-over from 11 kV to the new 132 kV supply system was completed finally in March, 1974.

Provision was made at Stoneydrift Substation for the ultimate installation of a third 90 MV.A transformer together with its associated 132 kV overhead transmission line. A set of double-circuit towers was provided but the third circuit was not strung.



MR. H. D. BECK

MR. HARDEN BECK graduated from the University of Natal with a Bachelor of Science Degree in Electrical Engineering (light current) in 1962.

After completing a period of post-graduate training with Associated Industries Ltd. in Manchester, he joined South African Pulp and Paper Industries Ltd. With the exception of a six-month period with the Durban City Electricity Department in 1969 as an Assistant Engineer, he remained with South African Pulp and Paper Industries Ltd., as Plant Engineer from 1965 to the beginning of 1974.

He was appointed Deputy City Electrical Engineer in the East London Municipal Electricity Undertaking in February, 1974. Since that date he has been responsible for assisting with the management of the Undertaking.

Die las in die Westelike gebied van die Stad het vinnig aangewas. Om die voorsiening aan die oorwegende industriële laste in die gebied te versterk, is die derde 132 kV oorhoofse oorbrengingsleiding vroeg in 1976 gespan. Die leiding is teen 11 kV later in daardie jaar in gebruik gestel, om in beperkte aanvullende voorsieningsvermoë vir die gebied te voorsien.

Gegrond op in jaarlikse lasaanwas van 7 persent, sal die las in die Westelike gebied teen die winter van 1977 die beveiligde voorsieningsvermoë aan die gebied, naamlik 14,5 MVA, effens te bowe gaan.

In 1975 is die besluit geneem om voort te gaan met die ontwerp en installasie van 'n 132/11 kV substasie om die gebied te voorsien. Hierdie substasie, genoem Progress na die grond waarop dit geleë is, sal aanvanklik toegerus word met twee 20 MVA transformators. Die beoogde datum vir inwerkstelling van die substasie is die einde van Mei 1977.

Progress substasie is geleë in die 132 kV oorbrengingsleiding servituut. Die voorsiening aan die transformators word bereik deur 'n T — verbinding vanaf die oorhoofse leidings tussen Stafford en Stoneydrift. Tydens die ontwerpstadium is skakeltuig van die toevoer aan die transformators deurmiddel van motor — aangedrewe afsonderskakelaars, oorweeg, met die doel van besparing in die ontwerp.

Alhoewel stroombrekers duurder is, is hulle tog verkiesliker vanuit 'n bedryfsoogpunt beskou, aangesien:-

(a) Dit nie nodig is om 'n onderbreking van 'n 132 kV leiding te hê om die transformator af te sonder nie, en

(b) 'n Fout tussen die 132 kV stroombreker en die 11 kV skakelbord behoort nie op 'n leidingsonderbreking uit te loop nie, wat die gevolg sou wees indien 'n motor motoraangedrewe afsonderskakelaar gebruik was.

Die bogenoemde bedryfoorwegings sal al hoe meer belangrik word soos die las op die 90 MVA transformators by Stoneydrift toeneem. Bowendien is die munisipale grootmaat — innamepunt te Stafford nog nie toegerus met 132 kV stroombrekers nie. Die 132 kV oorhoofse leidings word gebruik as transformatorvoerders, terwyl die 132 kV stroombrekers in die Evkom Buffalo substasie gebruik word vir skakeling en beveiliging.

2.0 DIE FUNKSIE VAN 'N STROOMBREKER

Op hierdie stadium mag dit van belang wees om die funksie van 'n stroombreker te oorweeg.

Van 'n stroombreker word daar verwag dat dit vier verskillende teenstrydige take moet uitvoer:-

1. Wanneer dit aangeskakel is moet dit elektriese stroom gelei;
2. Wanneer dit afgeskakel is, moet dit homself soos 'n isoleerder of ope stroombaan gedra;
3. Wanneer aangeskakel moet dit in staat wees om sy aangeslane stroom op enige oomblik te onderbreek sonder om gevaarlike oorspannings te veroorsaak;
4. Wanneer afgeskakel moet die stroombreker in staat wees om aan te skakel onder kortsluitingstoestande sonder dat die kontakpunte aanmekaar sweis.

Verder moet stroombrekers eenvoudig wees om op te rig en maklik om te onderhou.

3.0 Stroombreker Prestasie (2)

Vir 11 kV skakeltuig is die basiese eienskappe of aanslag van belang;-

Aangeslane stelselspanning,
Aangeslane simmetriese breekvermoë,
Impuls toetsspanning,
Aangeslane vollasstroom.

Daar is bykomstige eienskappe wat die diens van 'n stroombreker bepaal. Die volgende is sommige van hierdie bykomstige eienskappe:-

3.1 Eerste fase tot klaring faktor (sien figuur 3)

Onmiddelik na die onderbreking van 'n stroom, sal die grondspanningsfrekwensie wat oor die pole van die breker verskyn, verskil. Die hoogste spanning sal oor die eerste fase verskyn om 'n driefase fout op te klaar. Dit kan bewys word dat die spanning oor die eerste fase tot klaring gelyk is aan 1,5 maal die fasespanning in 'n stelsel met geïsoleerde neutrale. Vir 'n stelsel met 'n effektiewe geaarde neutrale sal die fasefaktor minder as 1,3 wees. 'n Eerste fase tot klaring faktor van 1,5 stel daarom die ergste geval voor.

3.2 Oorgangsherstelspanning

Die oorgangsherstelspanning of herontsteekspanning is die werklike spanning wat oor die stroombreker se kontakpunte verskyn na onderbreking. Die spanning sal uiteindelik die oopbaanspanning van die netwerk benader, maar dit sal dit in die vorm van 'n ossilasie doen.

The load in the Western area of the City has grown rapidly. To re-inforce the supply to the predominantly industrial loads in this area the third 132 kV overhead transmission line was strung early in 1976. This line was commissioned at 11 kV later in that year, to provide limited additional supply capacity for the area.

Based on an annual load growth of 7 per cent, the load in the Western area would marginally exceed the secured supply capacity to the area, namely 14,5 MV.A, by the winter of 1977.

In 1975 the decision was taken to proceed with the design and installation of a 132/11 kV substation to supply this area. The substation, named Progress after the land on which it is situated, will initially be equipped with two 20 MV.A transformers. Target date for commissioning the substation is the end of May, 1977.

Progress substation is sited in the 132 kV transmission line servitude. The supply to the transformers is obtained by tee-ing off from the overhead lines between Stafford and Stoneydrift. During the design stage, switching of the supply to the transformers by means of motor operated isolators was considered, with a view to economy of design.

While circuit breakers are more expensive, they are preferable from an operational point of view since

(a) It is not necessary to have an outage of a 132 kV line to isolate the transformer, and

(b) A fault between the 132 kV circuit breaker and the 11 kV switchboard should not result in a line outage which would result if a motorised isolator had been used.

The above operational aspects will become increasingly important as the load on the 90 MV.A transformers at Stoneydrift increases. In addition, the Municipal bulk intake point at Stafford has not yet been equipped with 132 kV circuit breakers. The 132 kV overhead lines are operated as transformer feeders, the 132 kV circuit breakers in the Escom Buffalo Substation being used for switching and protection.

2.0 THE FUNCTION OF A CIRCUIT BREAKER (1)

At this point it may be of interest to consider the function of a circuit breaker.

A circuit breaker is required to perform four separate and conflicting duties:-

1. When closed it should conduct electric current;
2. When open, it should behave as an insulator or open circuit;
3. When closed it should be capable of interrupting its rated current at any instant without causing dangerous overvoltages;
4. When open the circuit breaker must be capable of closing under conditions of short-circuit without the contacts welding together.

In addition, circuit breakers should be simple to erect and easy to maintain.

3.0 CIRCUIT BREAKER PERFORMANCE (2)

For 11 kV distribution switchgear, the basic characteristics or ratings of interest are:-

Rated System Voltage,
Rated Symmetrical Breaking capacity,
Impulse test voltage,
Rated full-load current.

There are additional features which define the duty of a circuit-breaker. The following are some of these additional features:-

3.1 First Phase to Clear Factor (See Figure 3)

Immediately after interrupting a current, the fundamental frequency voltage appearing across the poles of a breaker will differ. The highest voltage will appear across the first phase to clear a three-phase fault. It can be shown that the voltage across the first phase to clear is equal to 1,5 times the phase voltage in a system with an insulated neutral. For a system with an effectively earthed neutral the phase factor will be less than 1,3. A first phase to clear factor of 1,5 therefore represents the worst case.

3.2 Transient Recovery Voltage (See Figure 4)

The transient recovery voltage or restriking voltage is the actual voltage which appears across the circuit breaker contacts after interruption. The voltage will ultimately approach the network open-circuit voltage, but it will do this in the form of an oscillation. As a

As gevolg van die vorm van die netwerk sal die ossilasie in die algemeen verskeie frekwensie bevat. Een frekwensie is gewoonlik oorheersend, en die herontsteekspanning kan gewoonlik omskryf word in terme van 'n enkele frekwensie en amplitude (sien bylae A). Die ossilasie frekwensie en amplitude of kruinfaktor sal in die algemeen laag wees met hoë kortsluitingskrag by die stroombreker. Met verlaging van die kortsluitingskrag beskikbaar by die stroombreker, sal die ossilasie frekwensie en kruinfaktor toeneem, met gevolglike toename in die tempo van toename van herstelspanning.

3.3 Kort leidingsfout (sien figuur 5)

'n Kort leidingsfout is een wat veraf van die breker se aansluitingsklemme af plaasvind. 'n Leidingslengte van 1 tot 5 kilometers tussen stroombreker en fout veroorsaak gewoonlik die strafste toestande.

Vir 'n fout by die stroombreker sal die spanningsverspreiding die gebroke lyn volg, met die gehele spanningsval aan die toevoerkant van die stroombreker. As die fout op die leiding 'n kort afstand vanaf die stroombreker se klemme plaasvind, sal die spanningsverdeling die vol lyn volg soos in Figuur 5 getrek. As gevolg van spanningsval met die lyn langs na die foutpunt, sal die kortsluitingstroom effens verminder word en 'n bepaalde spanning sal by die posisie van die stroombreker verskyn.

Na die onderbreking van die stroom, sal die spanning op die voorsienings- en leidingskante van die stroombreker onafhanklik van mekaar ossileer.

Die herontsteekspanning oor die stroombreker sal die verskil tussen hierdie spannings wees.

3.4 Uit fase skakeling (sien figuur 6)

Uit fase skakeling kan plaasvind as twee onderling- geskakelde stelsels uit sinkronisasie werk. Indien die stroombrekers aangeslaan is vir die hele kortsluitkrag wat beskikbaar is by die geleistam onder bespreking (bv. in fout by punt A) kan die maksimum kortsluitstroom wat in 'n verbinding tussen die twee stelsels vloei onder volle uit fase toestande, 'n waarde van 50 persent van die aangeslaande kortsluitstroom van die stroombreker bereik. Vir die stroombreker by stasie 1 gebeur dit wanneer X2+XL=X, d.w.s. wanneer die krag wat oorgebring word van netwerk 2 gelyk is aan die kortsluitkrag van netwerk 1.

3.5 Skakeling van onbelaste leidings en kabels (sien figuur 7)

Afsondering van 'n lang onbelaste leiding gaan gepaard met die onderbreking van 'n betreklik groot kapasitiewe stroom. Geen stroomafsnyding vind plaas nie. 'n Onderbreking vind plaas op die natuurlike nulpunt van die stroom wanneer die spanning op sy maksimum is. Na onderbreking bly daar 'n gelykspanning op die leiding. Hierdie spanning neig om stadig te verdwyn terwyl die spanning aan die toevoerkant aanhou wissel met die stelselfrekwensie. Na verloop van 'n halwe siklus het die spanning oor die stroombreker toegeneem tot ongeveer tweemaal die fasespanning. As die stroombreker op hierdie oomblik heraanslaan, sal die leiding of kabel deur die stroombreker in die netwerk induksie ontlaai. 'n Ossilasie sal plaasvind met gevolglike verbyskiet in spanning. Indien die ossilasiestroom by sy eerste nulpunt onderbreek word, sal die leiding teen 'n hoër spanning as tevore gelaai bly. Na 'n verdere halwe siklus is die spanning oor die stroombreker steeds hoër as tevore en 'n nuwe heraansteking kan plaasvind. Op hierdie manier kan baie groot oorspannings opgebou word, afhangende daarvan of daar stuwingsomleiers gebruik is al dan nie. Die oorspannings sal afhang van die eienskappe van die stuwingsomleiers sowel as van die ligging van hierdie stuwingsomleiers in die stelsel met betrekking tot die stroombreker. Om hierdie rede moet stroombrekers vir hoë spannings, wat kapasitiewe strome skakel, herontsteekvry wees.

3.6 Diskonneksie van onbelaste transformators

Hoë oorspannings kan ook voorkom by die onderbreking van lae induktiewe strome. As voorbeeld is die geval waar 'n stroombreker die magnetiseringstroom van 'n onbelaste transformator afsny voor die natuurlike stroom nulpunt.

Die energie sal ossileer tussen die transformator induktansie. en kapasitansie. Aangesien die kapasitansie klein is, kan hoë oorspannings ontstaan. Weereens kan dit verwys word deur stuwingsomleiers te gebruik.

3.7 Parallelwerking van stroombrekers

Parallelbedryf van stroombrekers kan moeilike omstandige as gevolg hê. In geval waar 'n fout voorkom, kan een breker eerste begin opklaar. Die tweede breker

result of network configuration the oscillation will usually contain several frequencies. One frequency is normally dominant, and the restriking voltage can usually be described in terms of a single frequency and amplitude (See Annexure A). The oscillation frequency and amplitude or peak factor will generally be low with high short-circuit power available at the circuit breaker. With a reduction in short circuit power available at the circuit breaker, the oscillation frequency and peak factor will increase, with consequent increase in rate of rise of recovery voltage.

3.3 Short Line Fault (See Figure 5)

A short-line fault is one which occurs remote from the breaker terminals. A line length of from 1 to 5 kilometres between circuit breaker and fault usually leads to the most severe conditions.

For a fault at the circuit breaker the voltage distribution will follow the broken line, with the entire volt drop on the supply side of the circuit breaker. If the fault occurs on the line, a short distance from the circuit breaker terminals, the voltage distribution will follow the full line drawn in Figure 5. Because of volt drop along the line to the point of fault, the short circuit current will be slightly reduced and a certain voltage will appear at the position of the circuit breaker.

After the interruption of the current, the voltage on the supply and line sides of the circuit breaker will oscillate independently of each other. The restriking voltage across the circuit breaker will be the difference between these voltages.

3.4 Out of Phase Switching (See Figure 6)

Out of phase switching may occur if two inter-connected systems operate out of synchronism. If the circuit breakers are rated for the total short circuit power available at the busbar in question (for example, a fault at point "A") the maximum short circuit current flowing in a tie between the two systems under fully out of phase conditions can reach a value of 50 per cent of the rated short circuit currnt of the circuit breaker. For the circuit breaker at Station 1 this occurs if X2+XL=X1, that is, if the short circuit power transmitted from net-2 equals the short-circuit power of network 1.

3.5 Switching of Unloaded Lines and Cables (See Figure 7)

Disconnection of a long unloaded line involves the interruption of a relatively large capacitive current. No current chopping occurs. An interruption occurs at the natural zero of the current, when the voltage is at its maximum. After interruption a direct voltage remains on the line. This voltage tends to disappear slowly while the voltage on the supply side continues to vary with system frequency. After a half cycle the voltage across the circuit breaker has increased to approximately twice the phase voltage. If the circuit breaker restrikes at this instant, the line or cable will discharge through the circuit breaker into the network inductance. An oscillation will occur, with a subsequent overshoot in voltage. If the oscillation current is interrupted at its first zero, the line will be left charged at a higher voltage than before. After a further half cycle the voltage across the circuit breaker is still higher than before and a new restrike can take place. In such a way very high over-voltages can be built up, depending on whether or not surge diverters have been used. The overvoltages would depend on the characteristics of the surge diverters as well as the position of these surge diverters in the system in relation to the circuit breaker. For this reason circuit breakers for high voltages, switching capacitive currents must be restrike free.

3.6 Disconnection of Unloaded Transformers

High over-voltages can also arise on the interruption of low inductive currents. An example is the case where a circuit breaker chops the magnetizing current of an unloaded transformer before the natural current zero.

The energy will oscillate between the transformer inductance and capacitance. As the capacitance is small, high over-voltages can occur. Again, this can be avoided by the use of surge diverters.

3.7 Parallel Operation of Circuit Breakers

Parallel operation of circuit breakers can result in onerous conditions. In the event of a fault occuring, one breaker could start clearing first. The second breaker

begin dan oopmaak, wat kan veroorsaak dat die eerste eenheid herontsteek. Van die breker wat eerste oopgemaak het, word dan verwag om die volle foutstroom op te klaar, met sy kontakte byna ten volle oop.

4.0 BOOGBLUSSINGS- EN ISOLASIEMEDIA VIR SKAKELTUIG

Metaalomhulde stroombrekers met hoë olie-inhoud is al gebruik teen spannings tot op 132 kV (3). In die onlangse verlede is stroombrekers wat lug gebruik, en stroombrekers met minimum olie-inhoud ontwikkel. Lugblusstroombrekers is beskikbaar oor 'n wye reeks spannings. Lugdruk tot aan 6 MPa (900 pond/dm^2 meterdruk) word deur sommige skakeltuigvervaardigers gebruik.

Stroombrekers met minimum olie — inhoud word ook gebruik oor 'n wye reeks spannings en dienste. Om prestasie te verbeter, is 'n ontwerp ontwikkel wat stikstof gebruik, in plaas van lug, bokant die olie by elke stroombrekerpool, teen 'n druk van 600 tot 800 kPa. Die druk in die boogbluskamer beperk die volume van gas wat voortgebring word by onderbreking van geringe foutstrome tot 'n minimum en verseker heraansteekvrye werking.

Twee nuwe middels gebruik, is vakuum en swawelhexafluoriede (SF6).

4.1 Boogblussing: (4)

Om die stelselsteurings wat deur stroomafkapping veroorsaak word, is dit wenslik dat 'n stroombreker die stroom so na aan die natuurlike nulpunt as moontlik onderbreek.

In 'n oliestroombreker brand die boog in 'n atmosfeer wat hoofsaaklik waterstof is, opgelewer deur termiese ontbinding van die olie. Hierdie waterstof het 'n goeie termiese geleidingsvermoë wat die boog vinnig afkoel en deïoniseer.

Die boog in 'n vakuum verskil van 'n boog in 'n gas. Dit is 'n boog in 'n metaaldamp. Die enigste bron van die elektriese ladingsdraers wat benodig word om die boog te laat ontstaan is metaaldamp. Dit word opgelewer by die kontakoppervlak, deur die hitte ontwikkel soos die kontakte oopmaak.

Boogblussing in 'n vakuum maak staat op die langer gemiddelde pad na die elektrone by die druk wat daar in 'n vakuum onderbreker bestaan, wat in die orde van 10^{-6} torr of millimeters kwik is.

Verder maak dit staat op kort termiese tydkonstante van die katodekol waarvanuit die ladingdraers uitgestraal word. Hierdie tydkonstante is ongeveer 1 mikrosekonde in die spreiboog gebied, vir strome minder as 10 kA. Vir strome wat 10 kA te bowe gaan, word die boog 'n saamgetrekte, enkele boog. Aangesien die spreiboog-gebied goeie boogonderbrekingseienskappe het, is die nodig om die bestendige bestaan van 'n saamgetrekte boog te verhoed en 'n aantal gespreide boë te vorm. Dit word bereik deur elektrode ontwerp.

4.2 Swawelhexafluoriede as 'n isoleerder en boogblussingsmedium

Swawelhexafluoriede (SF6) is 'n swaar, nie-giftige, kleurlose, reuklose en nie — ontvlambare gas by normale temperature en drukke. Dit het 'n digtheid vyf maal die van lug, met 'n kookpunt van 60°C by normale atmosferiese druk. In 'n suiwer toestand is dit onaktief, en is nie aan veroudering onderworpe indien korona — ontlading voorkom word nie.

Dit is 'n „elektro-negatiewe" gas daarin dat dit maklik negatiewe ione vorm deur in bykomstige elektron in die molekuul op te neem. Dit beteken dat die gasmolekule 'n aantrekking het vir swerf- elektrone en verklaar sy goeie diëlektriese eienskappe SF6 gas het 'n diëlektriese sterke verskeie maal meer as lug by dieselfde druk. Teen 'n absolute druk van slegs 200 kPa is dit gelykstaande aan dié van die olie. Die American General Electric maatskappy was oorspronklik verantwoordelik vir die ontdekking van die isoleereienskappe van SF6. Westinghouse in die Verenigde State van Amerika het die eerste dubbeldruk stroombreker wat SF6 gebruik, in die vroeë 1960 ontwikkel.

Dit is gevolg deur Mitsubishi van Japan en Siemens van Duitsland en verskeie ander firmas.

Dit is nie lonend om SF6 na die atmosfeer uit te laat met elke skakelwerking, soos die geval is met lugblusskakelaars, nie. Gevolglik word 'n geslotebaan verseëlde stelsel gebruik. 'n Britse vervaardiger het daarop aanspraak gemaak dat vir 'n 145 kV oliestroombreker met lewendige tenk, die koste van 'n lading gas £30,00 sterling is (5).

Die huidige prys van 'n 20 kg houer met SF6 is R342,00 in die Republiek en 15 kg word benodig om 'n stroombreker van die tipe wat aangekoop is vir installasie te

then starts to open, which could cause the first unit to restrike. The breaker which opened first is then called on to clear the full fault current, with the contacts almost fully open.

4.0 SWITCHGEAR ARC EXTINGUISHING AND INSULATING MEDIA

Metal clad bulk oil circuit breakers have been used at voltages up to 132 kV (3). In recent years circuit breakers using air, and minimum oil volume circuit breakers, have been developed. Air blast circuit breakers are available for service over a wide range of voltages. Air pressures of up to 6 MPa (900 lb/ins^2 (g) are used by certain switchgear manufacturers.

Minimum oil volume breakers are also used over a wide range of voltages and for a wide range of duties. In order to improve performance, a design has been developed which uses nitrogen or air above the oil in each circuit breaker pole at a pressure of 600 to 800 kPa. The pressure in the arc extinction chamber minimises the volume of gas produced on interruption of small fault currents, and ensures restrike-free operation.

Two new media are vacuum and Sulphur Hexafluoride (SF6).

4.1 Arc Extinction (4)

To avoid the system disturbances which result from current chopping, it is desirable that a circuit breaker interrupts the current as near to the natural zero as possible.

In an oil circuit breaker the arc burns in an atmosphere which is predominantly hydrogen produced by thermal dissociation of the oil. This hydrogen has good thermal conductivity which rapidly cools and de-ionises the arc.

The arc in a vacuum differs from an arc in a gas. It is an arc in metal vapour. The only source of the electric charge carriers necessary to create the arc is metal vapour. This is produced at the contact surface by the heat generated as the contacts part.

Arc extinction in a vacuum relies on the longer mean free path of the electrons at the pressure found in a vacuum interrupter, which is of the order of 10^{-6} torr or millimetres of mercury.

In addition it relies on the short thermal time constant of the cathode spot from which charge carriers are emitted. This time constant is about 1 microsecond in the diffuse arc region for currents below 10 kA. For currents above 10 kA the arc becomes a constricted, single, arc. Since the diffuse arc region has good arc interruption characteristics it is necessary to prevent the stable existence of a constricted arc and to form a number of diffuse arcs. This is achieved by electrode design.

4.2 Sulphur Hexafluoride as an Insulant and Arc Extinction Medium

Sulphur Hexafluoride (SF6) is a heavy, non-toxic, colourless, odourless and non-flammable gas at normal temperatures and pressures. It has a density five times that of air, with a boiling point of −60°C at normal atmospheric pressure. In the pure state it is inert, and is not subject to ageing if corona discharge is prevented. It is an "electro-negative" gas in that it easily forms negative ions by absorbing an extra electron into the molecule. This means that the gas molecules have an affinity for stray electrons and accounts for its good dielectric properties — SF6 gas has a dielectric strength several times that of air at the same pressure. At an absolute pressure of only 200 kPa it is equal to that of oil. The American General Electric Company was initially responsible for discovering the electrical insulating properties of SF6. Westinghouse in the United States of America developed the first dual pressure circuit breaker using SF6 in the early 1960's.

This was followed by Mitsubishi of Japan and Siemens of Germany and various other firms.

It is not economic to exhaust SF6 to atmosphere with every switching operation, as is the case for air blast circuit breakers. Consequently a closed circuit sealed system is used. A British manufacturer has claimed that for a 145 kV live tank outdoor circuit breaker the cost of a charge of gas is £30.00 Sterling. (5).

The current price of a 20 kg container of SF6 in the Republic is R342,00 and 15 kg is required to charge a circuit breaker of the type purchased for installation at

Progress substasie te vul. Die verskil in koste per lading aangehaal in Brittanje en die plaaslike koste is waarskynlik te wyte aan die feit dat die Britse ontwerp drie SF6 kolomme onder druk het, met onderlinge gasverbindings. Dit sal minder gas per lading vereis as die tipe wat te Progress substasie geïnstalleer is, waarin die drie basiskolomme sowel as die basis- of raamwerktenk met SF6 gevul is. Soos tevore gestel, is kommersiële SF6 kleurloos, reukloos en skadeloos. 'n Interessante biologiese toets om die suiwerheid van die gas mee te bewys word gespesifiseer in I.E.C. publikasie 376 (eerste uitgawe 1971) "Specification and acceptance of new sulphur hexafluoride". Die toets voorsien daarvoor dat vyf muise vir 'n tydperk van 24 uur gelaat word in 'n atmosfeer bestaande uit 79 persent SF6 en 21 persent suurstof. Die vyf muise moet dit oorleef en geen buitengewone gedrag openbaar nie. (6).

By die hoë temperatuur wat samgaan met 'n elektriese boog, ontbind die gas in sy verskillende samestellings, hoofsaaklik SF2 en SF4, met geringe hoeveelhede swawel en fluoriede. Al die chemies — aktiewe elemente verbind meer wanneer die boog eers geblus is en enige oorblywende besoedelers kan uitgeskakel word deur absorberende stowwe, soos geaktiveerde aluinaarde, in die stroombreker te gebruik.

Terwyl skadelike boogprodukte almal behoort te verbind of geabsorbeer te word, meld een skakeltuig vervaardiger dat in soverre dit hantering en onderhoud aangaan „voorkomende maatreëls soos jou gesonde verstand voorskryf, behoort geneem te word, soos die gebruik van beskermende kleredrag en genoegsame ventilering".

In die lig van hierdie opmerkings gesien, skyn dit nodig te wees om onderhoudsmaatreëls meer noukeurig te ondersoek.

5.0 ELEKTRIESE EIENSKAPPE VAN SWAWEL-HEXAFLUORIEDE (sien figuur 8)

Indien onsekerheid bestaan omtrent die aard van die gas kan 'n vinnige toets gedoen word deur 'n klein hoeveelheid van die gas in 'n houer in te laat. Omdat die SF6 swaarder as lug is, sal dit die houer vul. 'n Stuk brandende papier wat in die houer gedruk word, sal uitgedoof word as die gas SF6 of CO2 is. Die wesentlike eienskap van SF6 is egter sy diëlektriese sterkte. Daarom sal 'n diëlektriese toets die gas eien en bewys of dit in staat is om sy hoefdoel as 'n isolant te dien.

5.1 SF6/lugmengsel (sien figuur 9)

'n Aansienlike hoeveelheid lug gemeng met SF6 is nodig voordat die diëlektriese weerstandsvermoë van die SF6/lugmengsel geraak word.

Lug teenwoordig in die SF6 is van belang aangesien, wanneer vulling met SF6 plaasvind, die oorblywende lug met die gas kan vermeng. 'n Klein hoeveelheid sal geen ongunstige uitwerking hê nie. Weereens, kan 'n vinnige beraming van die graad van kontaminasie gemaak word deur die diëlektriese sterkte van die gas te toets.

5.2 Waterinhoud

Die vervaardiger van die skakeltuig wat in Progress substasie geïnstalleer sal word, beweer dat vogtigheid in die SF6 geen nadelige uitwerking het nie tensy die hoeveelheid aansienlik is. 'n Voggehalte van 150 tot 200 mg/kg teen 20°C kan as normaal beskou, en aangeneem word. Kommersiële suiwer gas behoort 'n voggehalte van minder as 15 mg/kg te hê.

5.3 Kommersiële eienskappe

Kommersiële beskikbare gas bevat klein hoeveelhede onsuiwerhede wat geen effek op sy eienskappe het wanneer dit onder sekere perke val nie. Perke vasgelê in 'n I.E.C. aanbeveling is:-

Onsuiwerheid of Groep Onsuiwerhede	Maksimum Toelaatbare Konsentrasie
Koolstof tetrafluoriede (CF4)	0,5 g/kg
Suurstof+stikstof (lug)	0,5 g/kg
Water	15 mg/kg
Suurgehalte uitgedruk as HF	0,3 mg/kg
Fluoriedes onderworpe aan hidrolitiese ontbinding, uitgedruk as HF	1,0 mg/kg

6.0 ENKEL- OF DUBBELDRUK ONDERBREKER

Die vloei van SF6 gas, benodig vir boogblussing kan deur twee alternatiewe metodes verkry word.

In beide gevalle is die werklike proses van stroomonder-

Progress Substation. Difference between cost per charge quoted in Britain and the local cost is probably due to the fact that the British design has three SF6 pressurised columns with gas interconnections. This would require less gas per charge than the type installed at Progress Substation in which the three phase columns as well as the base or frame tank are filled with SF6. As stated earlier commercially pure SF6 is colourless, odourless and harmless. An interesting biological test to prove the purity of the gas is specified in I.E.C. Publication 376 (1st edition 1971) — "Specification and acceptance of new sulphur hexafluoride". The test provides for five mice to be left for 24 hours in an atmosphere composed of 79 per cent SF6 and 21 per cent oxygen. The five mice must survive and show no abnormal behaviour. (6).

At the high temperature associated with an electric arc the gas decomposes into various components, principally SF2 and SF4, with small amounts of sulphur and fluorine. All the chemically active elements recombine very quickly once the arc is extinguished and any remaining contaminants can be eliminated by using absorbing materials such as activated alumina in the circuit breaker.

While injurious arc products should all recombine or be absorbed one switchgear manufacturer states that as far as handling and maintenance is concerned, "commonsense precautionary measures should be taken such as the use of protective clothing and adequate ventilation".

In the light of these comments it appears necessary to investigate maintenance arrangements in greater detail.

5.0 ELECTRICAL PROPERTIES OF SULPHUR HEXAFLUORIDE (See Figure 8)

If doubt exists as to the nature of the gas a quick check can be made by feeding a small quantity into a container. As the SF6 is heavier than air it will fill the container. A burning paper thrust into the container will be extinguished if the gas is SF6 or CO2. However, an essential feature of SF6 is its dielectric strength. Thus a dielectric test will identify the gas and show whether it is capable of serving its main purpose as an insulant.

5.1 SF6/Air Mixture (See Figure 9)

A substantial quantity of air mixed with SF6 is necessary before the dielectric withstand capability of the SF6/Air mixture is affected.

Air present in the SF6 is of importance as, when filling with SF6, the residual air may mix with the gas. A small amount will not have any adverse effect. Again, a quick assessment of degree of contamination by air can be made by checking the dielectric strength of the gas.

5.2 Water Content

The manufacturer of the switchgear to be installed at Progress Substation claims that moisture in the SF6 has no adverse effect unless the quantity is substantial. A moisture content of from 150 to 200 mg/kg at 20°C may be considered normal and acceptable. Commercially pure gas should have a moisture content of less than 15 mg/kg.

5.3 Commercial Features

Commercially available gas contains small quantities of impurities which have no effect on its properties below certain limits. Limits laid down in an I.E.C. recommendation are:-

Impurity or Group of Impurities	Maximum Allowable Concentration
Carbon tetrafluoride (CF4)	0,5 g/kg
Oxygen+nitrogen (air)	0,5 g/kg
Water	15 mg/kg
Acidity expressed as HF	0,3 mg/kg
Fluorides subject to hydrolytic decomposition expressed as HF	1,0 mg/kg

6.0 SINGLE OR DOUBLE PRESSURE INTERRUPTER

The flow of SF6 gas necessary for arc extinction may be produced by two alternative methods.

In both cases the actual process of current interruption is

breking soortgelyk — na 'n boog word opgestel deur 'n mondstuk, deur die skeiding van kontakte en word onderwerp aan 'n aksiale gasblusstroom wat dit by die stroom nulpunt blus.

Die gasblusstroom kan verkry word deur 'n tweedruk stelsel (sien Figuur 10a) waar die werking van 'n blusklap toelaat dat gas van 'n hoogdruk opgaartenk deur 'n mondstuk na die laagdruk kamer vloei.

Die alternatief is 'n enkeldruk of „poffer" stelsel (sien Figuur 10a). Hier word samedrukking van die gas gedoen deur die beweging van 'n silinder oor 'n vaste suier (of omgekeerd). 'n Skematiese voorstelling van boogblussing in 'n „poffer" tipe breker word aangegee in Figuur 11.

Die „poffer" stelsel is minder ingewikkeld as die dubbeldruk stelsel, wat twee aparte opgaartenke, compressor en verhitters vereis teneinde te verhoed dat die gas vervloei by lae temperature. Verder is dit nodig om die bluskop met die kontakaardrywing te sinkroniseer.

'n Nadeel van die „poffer" inrigting is dat, aangesien die bewegende kontakaardrywer die gas vir boogblussing saampers, in kragtiger werksmeganisme benodig word, besonderlik vir die hoër aanslae. Dit kan geredelik bereik word deurmiddel van lugdruk of hidrouliese krageenhede. By laer werkverrigtingsvlakke gee veer — oopmaak meganismes, aanneembare werkverrigting. Daar word verwag dat die „poffer" tipe onderbreker die basis sal vorm vir meeste toekomstige ekstrahoogspannings stroombrekers.

7.0 STROOMBREKERS GESPESIFISEER VIR PROGRESS SUBSTASIE

Oliestroombrekers is gespesifiseer met die hooftrekke van die toerusting gespesifiseer, aangegee in Bylae B, tesame met besonderhede van toerusting waarvoor getender is.

In die spesifikasie wat gebruik is vir die aanvra van tenders, is 'n voltooiïngsdatum van April 1977 bepaal vir die hele kontrak. Dit het voorsiening, aflewering, oprigting en inwerkingstelling van 132 kV skakeltuig en meegaande geleistamme, isolatore, beaarding en beveiligingstoerusting ingesluit.

Die laagste totale prys is ingedien deur Tenderaar No. 1. Hierdie tenderaar het SF6 stroombrekers as die hoofaanbod aangebied. Verder is voltooiïng teen die gespesifiseerde datum gewaarborg indien die SF6 brekers aangeneem word.

Drukstroombrekers met minimum olie — inhoud is aangebied as 'n alternatief, maar omrede van lang afleweringstyd, sou aanname van die alternatiewe aanbod dit onmoontlik gemaak het om aan die beoogde voltooiïngsdatum vir die substasie te voldoen.

Die hoofaanbod, wat SF6 stroombrekers ingesluit het, is aangeneem.

Die Elektrisiteitsonderneming van die Oos-Londen munisipaliteit het twee 66 kV stroombrekers met minimum olieinhoud geïnstalleer in sy Kemba substasie wat Berlin naby Kingwilliamstown voorsien. Die twee stroombrekers by Progress substasie sal die eerste wees op die 132 kV stelsel van Oos-Londen.

7.1 Bondige beskrywing van die stroombrekers aangekoop

SF6 word gebruik as die diëlektriese en boogblusmedium. Die brekers werk op die „poffer" stelsel — wanneer die stroombreker-kontakte oopmaak, pers die bewegende kontak 'n hoeveelheid van die gas saam, wat dan op die boog gerig word om dit te blus.

Die drie pole van die stroombreker is geskei en op 'n gesamentlike raamwerktenk gemoniteer. Die tenk en die brekerpole vorm 'n enkele volume gevul met SF6 teen 340 kPa bokant atmosferiese druk.

Die elektriese eienskappe van SF6 skakeltuig hang van die digtheid van die gas af, d.w.s. die massa van die gas wat in 'n ruimte van gegewe volume ingepomp is. Sommige vervaardigers maak gebruik van digtheidsmoniteerapparaat om toesig te hou oor die gas, in metaalomhulde skakeltuig.

Vir 'n gegewe volume gevul met 'n gegewe massa gas, sal die druk styg met temperatuurtoename, terwyl die gasdigtheid nie geraak sal word nie. Dit is nodig om dit in berekening te bring wanneer die stroombreker gelaai word en by opvulling.

Soos gemeld, is die gaslaaidruk 340 kPa meterdruk teen 20°C en 'n atmosferiese druk van 760 millimeters kwik. Vir ander waardes van temperatuur en atmosferiese druk is dit nodig om die vuldruk as volg te wysig:-

Pr = 340 + P1 + P2 kPa waar
Pr die vuldruk is
P1 die drukwysiging met betrekking tot temperatuur is
P2 die drukwysiging met betrekking tot atmosferiese druk is — dit kan vereenvoudig word tot 'n wysiging vir hoogte bo seespieël.

similar — an arc is established through a nozzle by the separation of contacts and is subjected to an axial gas blast which extinguishes it at the current zero.

The gas flow may be achieved by a two-pressure system (See Figure 10b) where the operation of a blast valve permits gas to flow from a high pressure reservoir through a nozzle into a low pressure chamber.

The alternative is a single pressure or "puffer" system (See Figure 10a). Here compression of the gas is caused by movement of a cylinder over a fixed piston (or vice versa). A schematic representation of arc interruption in a "puffer" type breaker is given in Figure 11.

The "puffer" system is less complicated than the double pressure, which requires two separate gas reservoirs, compressor and heaters to prevent gas liquifying at low temperatures. Also, there is the need to synchronise the blast valve and contact drive.

A disadvantage of the "puffer" arrangement is that, as the moving contact actuator compresses the gas for arc extinction a more powerful operating mechanism is required, particularly in the higher ratings. This can readily be achieved by means of pneumatic or hydraulic power units. At lower performance levels spring opening mechanisms give acceptable performance. It is anticipated that the "puffer" type interrupter will be the basis of most future extra high voltage circuit breakers.

7.0 CIRCUIT BREAKERS SPECIFIED FOR PROGRESS SUBSTATION (7)

Oil circuit breakers were specified, the salient features of the equipment specified being given in Annexure B together with details of equipment tendered.

In the specification used for invitation of tenders, a completion date of April, 1977, was stipulated for the complete contract. This included the supply, delivery, erection and commissioning of 132 kV outdoor switchgear and associated busbars, isolators, earthing and protective equipment.

The lowest overall price was submitted by Tenderer No. 1. This tenderer offered SF6 circuit breakers as the main offer. In addition, completion by the specified date was guaranteed if the SF6 breakers were accepted.

Pressurised minimum oil circuit breakers were offered as an alternative, but due to long delivery, acceptance of the alternative offer would have made it impossible to meet the target completion date for the Substation.

The main offer which included SF6 circuit breakers was accepted.

The East London Municipal Electricity Undertaking has two 66 kV minimum oil volume circuit breakers installed at its Kemba Substation which supplies Berlin, near Kingwilliamstown. The two circuit breakers at Progress Substation will be the first on the East London 132 kV system.

7.1 Brief Description of Circuit Breakers Purchased

SF6 gas is used as the dielectric and arc extinguishing medium. The breakers operate on the "puffer" principle — when the circuit breaker contacts open the moving contact compresses some of the gas which is directed onto the arc to extinguish it.

The three poles of the circuit breaker are segregated and mounted on a common frame tank. The tank and the breaker poles form a single volume filled with SF6 at 340 kPa above atmospheric pressure.

The electrical characteristics of SF6 switchgear depend on the density of the gas, i.e. the mass of the gas pumped into a compartment of given volume. Certain manufacturers utilise density monitors for supervision of the gas in metal-clad switchgear.

For a given volume filled with a given mass of gas the presure will rise with increase in temperature, while the gas density will not be affected. It is necessary to take this into account when recharging the circuit breaker and when topping up.

As stated, the gas charge pressure for the switchgear purchased is 340 kPa gauge pressure at 20°C and an atmospheric pressure of 760 millimetres of mercury. For other values of temperature and atmospheric pressure it is necessary to connect the filling pressure as follows:-

Pr = 340 + P1 + P2 kPa where
Pr is filling pressure
P1 is pressure correction versus temperature
P2 is pressure correction for atmospheric pressure — this can be reduced to a correction for elevation above sea level.

Die vervaardiger het kurwes verskaf waarvan die gewysigde syfers afgelees kan word.

As voorbeeld, vir 'n temperatuur van 40°C by 'n hoogte van 1 600m bo seespieël

P1 = 34 kPa
P2 = 20 kPa
Daarom: Pr = 340 + 34 + 2 kPa
= 394 kPa

Sluiting en oopmaak van die brekers is deur veermeganisme. Die stroombrekers aangekoop is volgens I.E.C. aanbeveling vir droë en nat kragfrekwensie weerstandspannings van 275/275 kV teenoor die 300/275 kV gespesifiseer, getoets.

Voordele waarop aanspraak gemaak word vir SF6 skakeltuig is:-

Dit het min onderhoud nodig.
Die gas het 'n lae geleidingsvermoë vir klank en werking is daarom stil.
Indien nodig kan die gas aangevul word met die stroombreker onder spanning.
Veiligheidseienskappe sluit drukbeheerde kontakte in, om 'n alarm te gee by lae gasdruk en om die stroombreker uit te kling as die gasdruk met 10 persent benede die verwysingswaarde daal. Die vervaardiger is bereid om 'n gasdrukverlies van minder as 1 persent per jaar te waarborg. Wyd uiteenlopende aansprake word deur verskillende vervaardigers van SF6 skakeltuig gemaak en aanvullings tussentye wissel van 2 na 5 jaar.

Terwyl daarop aanspraak gemaak word dat die stroombreker min onderhoud sal vereis toon ondersoek van Bylae B geen wesentlike verskil aan tussen die inspeksietye vir verskillende stroombrekers wat aangebied word, wanneer hulle aangeslane lasspanning onderbreek, nie.

7.2 Onderhoud

SF6 skakeltuig vereis spesiale onderhoudstoerusting insluitende, benewens ander items, 'n vakuumpomp, drukmeter samestelling, drukverminderaar, SF6 gashouers, ens. Beraamde prys van die benodigde onderhoudstoerusting beloop R4 000,00.

8.0 TOEKOMSTIGE TENDENSE EN ONTWIKKELING

Die Elektrisiteitsvoorsieningskommissie het onlangs 'n aantal eenhede aangekoop soortgelyk aan die aangekoop vir Progress substasie. Twee van die Evkom eenhede is in die nuwe Port Rex gasturbinestasie in Oos-Londen geïnstalleer.

Die meederheid van vooraanstaande vervaardigers produseer nou SF6 skakeltuig vir buitenhuise gebruik, of beplan om skakeltuig van die tipe in die nabye toekoms te produseer. Na die skrywer se mening sal die tipe skakeltuig die plek van stroombrekers met minimum olie inhoud inneem. Metaalomhulde skakeltuig word in 'n toenemende mate in Suidelike-Afrika gebruik:-

330 kV metaalomhulde SF6 skakeltuig is by Ruacana hidro-elektriese stasie geïnstalleer.

Verder word SF6 skakeltuig van die metaalomhulde tipe gebruik in verskeie dele van die Republiek, teen spannings wat wissel van 88 kV deur 145 kV tot 275 kV.

In Europa het 'n ingenieursgroep met sukses SF6 gasgeïsoleerde skakeltuig vervaardig en getoets vir 'n stelselspanning van 800 kV. Ontwerpe is beskikbaar vir stelselspannings van 1 200 kV.

Amerikaanse vervaardigers is besig om vakuum stroombrekers vir gebruik tot met 765 kV te ontwikkel. 'n Japanese vervaardiger het gegewens omtrent 'n 66 kV vakuum stroombreker gepubliseer.

9.0 SLOTSOM

In die voorsienbare toekoms, teen spannings tot met 36 kV, sal die gebruik van vakuum stroombrekers meer algemeen word.

SF6 sal al hoe meer gebruik word teen spannings van 132 kV en hoër.

Teen 66 kV skyn die reeks van tipes stroombrekers beperk te wees tot dié met minimum olie-inhoud, met vakuum en SF6 as moontlike toekomstige alternatiewe.

'n Minimum olie-inhoud stroombreker met veerwerking is die eenvoudigste wat teenswoordig beskikbaar is.

Waar hoogsopgeleide vaklui nie beskikbaar is nie, met voorbehoud dat hierdie tipe toerusting kan voldoen aan die verlangde prestasievlakke, wil dit skyn dat daar sin in is om hierdie tipe stroombreker te gebruik.

10.0 ERKENNINGS

Die skrywer wens sy dank te betuig aan die Elektrotegniese Stadsingenieur van Oos-Londen vir die geleentheid om hierdie referaat aan te bied.

Verder wens die skrywer om die firmas wat tegniese inligting verskaf het vir gebruik in die opstel van die referaat, te bedank.

The manufacturer has provided curves from which the correction figures can be read.

For example, for a temperature of 40°C at an elevation of 1 600m

P1 = 34 kPa
P2 = 20 kPa
Therefore Pr = 340 + 34 + 20 kPa
= 394 kPa

Closing and opening of the breakers is by spring mechanism. The circuit breakers purchased have been tested to I.E.C. recommendation for dry and wet power frequency to withstand voltages of 275/275 kV compared with the 300/275 kV specified.

Advantages claimed for SF6 switchgear are:-
It requires little maintenance.

The gas has low conductivity to sound and operation is therefore quiet.

If necessary, the gas may be topped with the circuit alive. Safety features include pressure operated contacts to give an alarm on low gas pressure and to trip the circuit breaker should the pressure fall by 10 per cent of the reference value. The manufacturer is prepared to guarantee a gas pressure loss of less than 1 per cent per year. Widely divergent claims are made by various SF6 switchgear manufacturers and topping up intervals range from 2 to 5 years.

While it is claimed the circuit breaker will require little maintenance, examination of Annexure B does not indicate a material difference in inspection frequency for the various circuit breakers offered, when interrupting rated load current.

7.2 Maintenance

SF6 filled switchgear requires special maintenance equipment comprising, among other items, a vacuum pump, pressure gauge assembly, pressure reducer, SF6 gas bottles, etc. Estimated price of the necessary maintenance equipment is R4 000.

8.0 FUTURE TRENDS AND DEVELOPMENT (8) (9)

The Electricity Supply Commission has recently purchased a number of units similar to those purchased for Progress Substation. Two of the Escom units are installed at the new Port Rex gas turbine station in East London.

Most leading manufacturers are now producing SF6 switchgear for outdoor use, or plan to produce switchgear of this type in the near future. In the opinion of the author this type of equipment will replace minimum oil circuit breakers. Metal encapsulated switchgear is being used to an increasing extent in Southern Africa:-

330 kV encapsulated SF6 switchgear is installed at Ruacana Hydro-Electric Station.

In addition SF6 switchgear of the metal encapsulated type is being utilised in various parts of the Republic, at voltages ranging from 88 kV through 145 kV to 275 kV.

In Europe an electrical engineering group has successfully manufactured and tested SF6 gas insulated switchgear for a system voltage of 800 kV. Designs are available for system voltages of 1 200 kV.

American Manufacturers are developing vacuum circuit breakers for use up to 765 kV. A Japanese manufacturer has published data on a 66 kV vacuum circuit breaker.

9.0 CONCLUSION

In the foreseeable future at voltages up to 36 kV the use of vacuum switchgear will become more common.

SF6 will be used to an increasing extent at voltages of 132 kV and above.

At 66 kV the range of types of circuit breakers appears to be restricted to minimum oil volume, with vacuum and SF6 as posible future alternatives.

A spring-operated minimum oil volume type circuit breaker is the simplest available at present.

Where highly trained artisans are not available, provided that this type of equipment can meet the desired performance levels, there appears to be merit in utilising this type of circuit breaker.

10.0 ACKNOWLEDGEMENTS

The author wishes to thank the City Electrical Engineer of East London for the opportunity to present this paper.

In addition the author wishes to thank firms which provided technical information used in the preparation of this paper.

11.0 **VERWYSINGS**

(1) ASEA — Circuit Breaker Performance — J. Kempster.
(2) ASEA — System Aspects of Circuit Breaker Requirements — B. Thoren.
(3) Reyrolle.
(4) GEC — Modern Trends in Switchgear Design.
(5) Reyrolle and SF6.
(6) Delle-Alsthom — Sulfur Hexafluoride (SF6).
(7) Contract J233/9.7 — City of East London (Electricity Department): 132 kV and 33 kV Outdoor Switchgear and Association Equipment, Stoneydrift, Progress and Arcadia substations — Consulting Electrical Engineers: Merz and McLellan (South Africa).
(8) Siemens — Metal Encapsulated Switchgear — R. Steinberg.
(9) South African General Electric Company.

BYLAE A

BEREKENING VAN OORGANGS — HERSTELSPANNING

Deur middel van die syfers in Tabel 1 en met die kennis van die fasefaktor, kan die maksimum spanning oor die stroombreker en die spoed waarmee dit verskyn, bekend as die tempo van toename van heraansteekspanning; (t.t.h.s.) bereken word. Die maksimum spanning (U_{spits}) in die eerste fase om 'n drie fase fout te klaar (wat gewoonlik die ergste toestand is) sal wees:-

$$U_{spits} = K \times a \times \frac{Un \quad 2}{3} \text{ /kV/} \qquad (1)$$

waar K = pasefaktor
a = amplitudefaktor
U_n = Stelselspanning (leiding na leiding) kV, w.g.k.

en die t.t.h.s. (S)

$$S = K \times a \times 2f \times \frac{U_n \quad 2}{3} \text{ /V/mikro sek.} \qquad (2)$$

Waar f = ossilasiefrekwensie, kHz, en die ander simbole dieselfde is as in vergelyking (1)

Vir 'n 145 kV netwerk met K=1,5; a=1,4 en f=1,5 KHz (volle kortsluitkrag) word die volgende waardes verkry:-

$$U_{spits} = \frac{1,5 \times 1,4 \times 145 \times \quad 2}{3} = 250 \text{ kV}$$

$$S = \frac{1,5 \times 1,4 \times 2 \times 1,5 \times 145 \times \quad 2}{3} = 750 \text{ V/micro. sec.}$$

11.0 **REFERENCES**

(1) ASEA — Circuit Breaker Performance — J Kempster.
(2) ASEA — System Aspects of Circuit Breaker Requirements — B. Thoren.
(3) Reyrolle.
(4) GEC — Modern Trends in Switchgear Design.
(5) Reyrolle and SF6.
(6) Delle-Alsthom — Sulfur Hexafluoride (SF6).
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(8) Siemens — Metal Encapsulated Switchgear — R. Steinberg.
(9) South African General Electric Company.

ANNEXURE A

CALCULATION OF TRANSIENT RECOVERY VOLTAGE

By means of the figures in Table 1 and with knowledge of the phase factor, the maximum voltage across the circuit breaker and the speed with which it appears, known as the rate-of-rise of restriking voltage (r.r.r.v.) can be calculated. The maximum voltage (U_{peak}) in the first phase to clear a three-phase fault (which is usually the worst condition) will become:-

$$U_{peak} = K \times a \times \frac{Un \quad 2}{3} \text{ /kV/} \qquad (1)$$

where K = phase factor
a = amplitude factor
U_n = system voltage (line-to-line), kV, r.m.s.

and the r.r.r.v. (S)

$$S = K \times a \times 2f \times \frac{U_n \quad 2}{3} \text{ /V/micro sec.} \qquad (2)$$

where f = oscillation frequency, KHz, and the other notations are the same as for Eq. (1).

for a 145 kV network with K=1,5; a=1,4 and f=1,5 KHz (full short-circuit power) the following values are obtained:

$$U_{peak} = \frac{1,5 \times 1,4 \times 145 \times \quad 2}{3} = 250 \text{ kV}$$

$$S = \frac{1,5 \times 1,4 \times 2 \times 1,5 \times 145 \times \quad 2}{3} = 750 \text{ V/mikro. sek.}$$

BYLAE A — ANNEXURE A

TABEL 1 — TABLE 1

Heraansteekspanning — waardes van ossilasie frekwensie en amplitude faktor vir verskillende stelselspannings:-
Restriking voltages — values of Oscillation Frequency and Amplitude Factor for Different System Voltages:-

Stelselspanning System Voltage kV	Ossilasie frekwensie Oscillation Frequency KHz	Amplitude faktor Amplitude Factor
72,5	3,0	1,4
100	1,7	
123	1,5	
145	1,5	
170	1,3	
245	1,0	
300	0,8	
420	0,7	

132 KV STROOMBREKERS/132 KV CIRCUIT BREAKERS

BYLAE B/ANNEXURE B

LYS VAN GESPESIFISEERDE BENODIGHEDE, EN VERGELYKING MET TENDERS ONTVANG
SCHEDULE OF SPECIFIED REQUIREMENTS, AND COMPARISON WITH TENDERS RECEIVED

ITEM		Gespesifiseer Specified	TENDER 1		TENDER 2	TENDER 3
			Hoof aanbod Main Offer	Alt. aanbod Alt. Offer		
Aangeslane stelselspanning/stroom Rated System Voltage/Current	kV/A	132/400	132/400	Soos vir Tender 2 As for Tender 2	145/1250	132/1600
Hoogste stelselspanning System Highest Voltage	kV	145	—		—	—
Minimum vlak van impulsbestandheid Minimum withstand impulse level	kV	650	Soos gespesifiseer As Specified		650	750
Maksimum simmetriese kortsluitkrag beskikbaar Maximum Symmetrical short circuit power available	M.V.A.	3 500	—		—	—
Kritiese koronaspanning Critical corona voltage	kV	105	Soos gespesifiseer As Specified		105	105
Droëkrag frekwensie weerstandsspanning Dry power frequency withstand voltage	kV	300	275		—	—
Natkrag frekwensie weerstandsspanning Wet power frequency withstand voltage	kV	265	275		—	—
Stroombrekers geskik te wees vir aanpassing by hoogspoed drie fase outomatiese hersluiting Circuit breakers to be suitable for adaption to high speed three-phase auto reclosing		Nee/No				
Maksimum totale breektyd van stroombreker vanaf bekragtiging van uitlinkspoel teen 100% diens Maximum total break time of circuit breaker from energising of trip coil at 100% duty	ms	80	80		85	65
Verhouding van eerste fase tot klaring herstelspanning van stroombreker tot normale fasespanning om nie minder te wees as Ratio of first phase to clear recovery voltage of circuit breaker to normal phase voltage to be not less than		1,5	1,5		1,5	1,4 - 1,5
Spitswaarde van inherente heraansteekspanning om nie minder te wees as Peak value of inherent re-striking voltage to be not less than	kV	260	265(100%) 248(60%)		260(100%) 265(60%)	248(100%) 265(60%)
Maksimum spitswaarde van oorskakelspanning wanneer kapasatiewe strome tot met 60 amp gebreek word Maximum peak value of switching over voltage when breaking capacitive currents up to 60 amps			Herontsteekvry Restrike free		Herontsteekvry Restrike free	Herontsteekvry Restrike free
Maksimum spitswaarde van oorskakelspanning wanneer induktiewe strome tot met 100 amp gebreek word Maximum peak value of switching over voltage when breaking inductive currents up to 100 amps			296 kV		250 kV	
Normale dienskringloop van stroombreker Normal duty cycle of circuit breaker		83'-MB-3'-MB	Soos gespesifiseer As Specified		B-0, 3S-MB-3'-MB	BMB-3'-MB
Sluitingsvermoë van stroombreker Making capacity of circuit breaker	spits kA peak kA	39	Soos gespesifiseer As Specified		62,5	65
Brekingsvermoë van stroombreker: Simmetries	kA	15,3	Soos gespesifiseer		25	25
Asimetries	kA	18,75	Soos gespesifiseer		29	30 6
Breaking capacity of circuit breaker: Symmetrical Assymmetrical			As Specified As Specified			
Tempo van toename van heraansteekspanning: (a) teen 100% simmetriese breekvermoë	volts/microsec.	1 000	Soos gespesifiseer		Soos gespesifiseer	Soos gespesifiseer
(b) teen 10% simmetriese breekvermoë	volts/microsec.	6 000	5000		6000	5 000
Rate of rise of restriking voltage: (a) at 100% symmetrical breaking cap. (b) at 10% symmetrical breaking cap.			As Specified		As Specified	As Specified
Korttermyn aanslag — 3 sekondes Short time rating — 3 seconds	kA	15,3	Soos gespesifiseer As Specified		25	25

ITEM	Gespesifiseer Specified	TENDER 1		TENDER 2	TENDER 3
		Hoof aanbod Main Offer	Alt. aanbod Alt. Offer		
Stroombreker meganisme tipe Circuit breaker mechanism type	Nie gespesifiseer Not Spec.	Veer Spring		Veer Spring	Hidroulies Hydraulic
Tipe en soort aangebied Type and make offered		Delle-Alsthom tipe FLIA Delle-Alsthom type FLIA		Minimum olie: HLR 145/1252 Minimum oil: HLR 145/1252	Minimum olie: TR170.12fl Minimum oil: TR170.12fl
Verbrekings per pool Breaks per pole	Nie gespesifiseer Not Spec.	Een One		Twee Two	Een One
Tipe boogbeheer toestelle Type of arc control devices	Nie gespesifiseer Not Spec.	Self ontwikkeld SF6 blaas Self generated SF6 Blast		Kruisblaaskamer Cross blast chamber	Blussingskamer inlasse Quenching chamber inserts
Getal oopmaakhandelings toelaatbaar voordat inspeksie en onderhoud van kontakte en ander essensiële dele nodig is: Number of opening operations permissible before inspection and maintenance of contacts and other essential parts is necessary:					
(a) Teen aangeslane normale stroom (a) At rated normal current	—	1 000 teen 400 amps 1 000 at 400 amps		1 000 teen 1 250 amps 1 000 at 1 250 amps	1 000 teen 1 600 amps 1 000 at 1 600 amps
(b) Teen aangeslane breekvermoë (b) At rated breaking capacity	—	20 teen 15,3 kA 20 at 15,3 kA		10 teen 25 kA 10 at 25 kA	6 teen 25 kA 6 at 25 kA
Boogblusmedium Arc extinction medium		SF6	Olie Oil	Olie Oil	Olie Oil
Druk in boogbluskamer Pressure in arc extinction chamber		340 kPa		600-800 kPa (stikstof of lig) 600 - 800 kPa (nitrogen or air)	
Gewaarborgde gasverlies per jaar Guaranteed gas loss per annum		1%		Plaas onder druk elke 3-6 jaar Pressurise every 3-6 years	

FIG 1. WERKLIKE, VOORSPELDE EN BEVEILIGDE VERMOË VAN GROOTMAAT VOORSIENING.

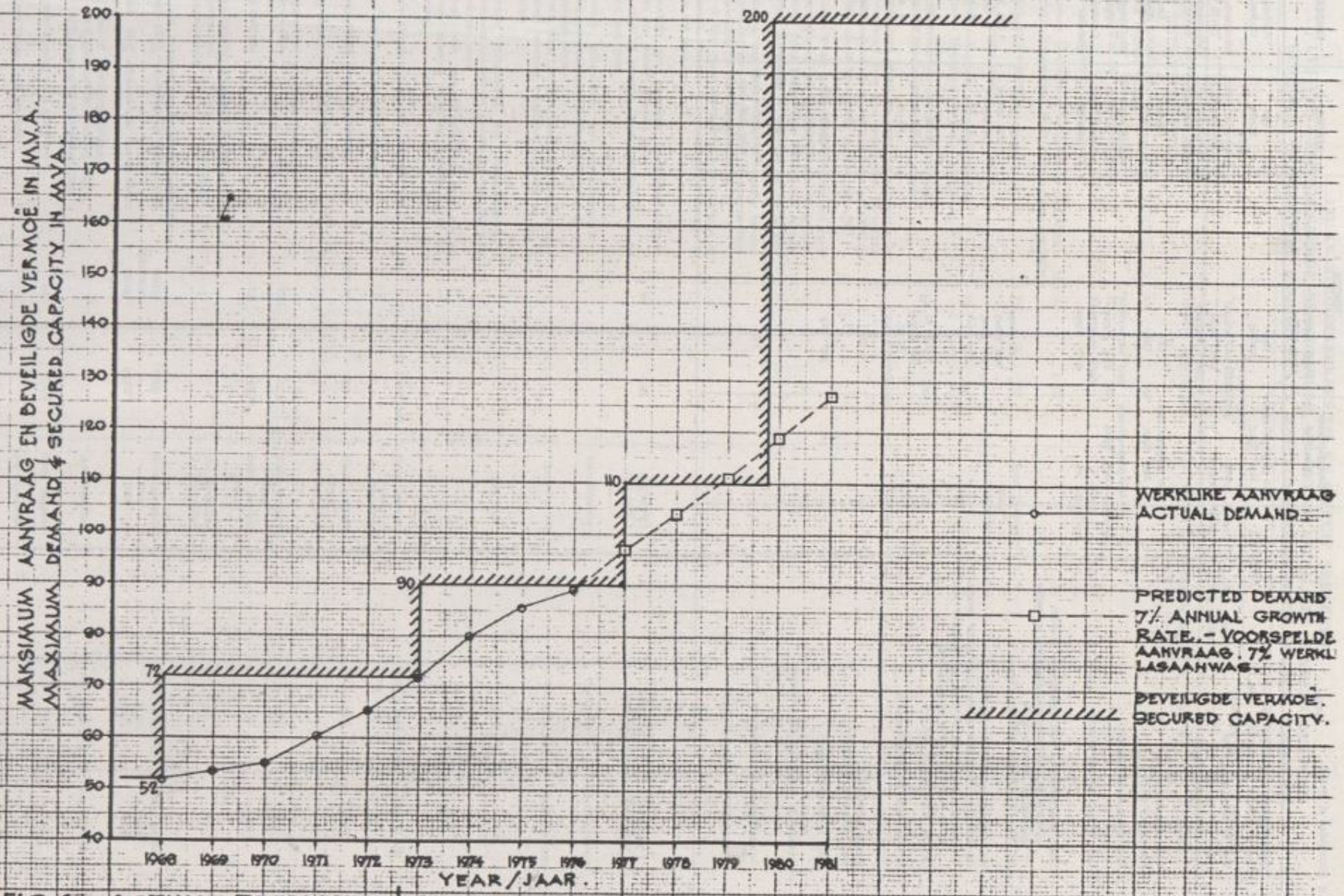


FIG 1. ACTUAL, PREDICTED & SECURED CAPACITY OF BULK SUPPLY.

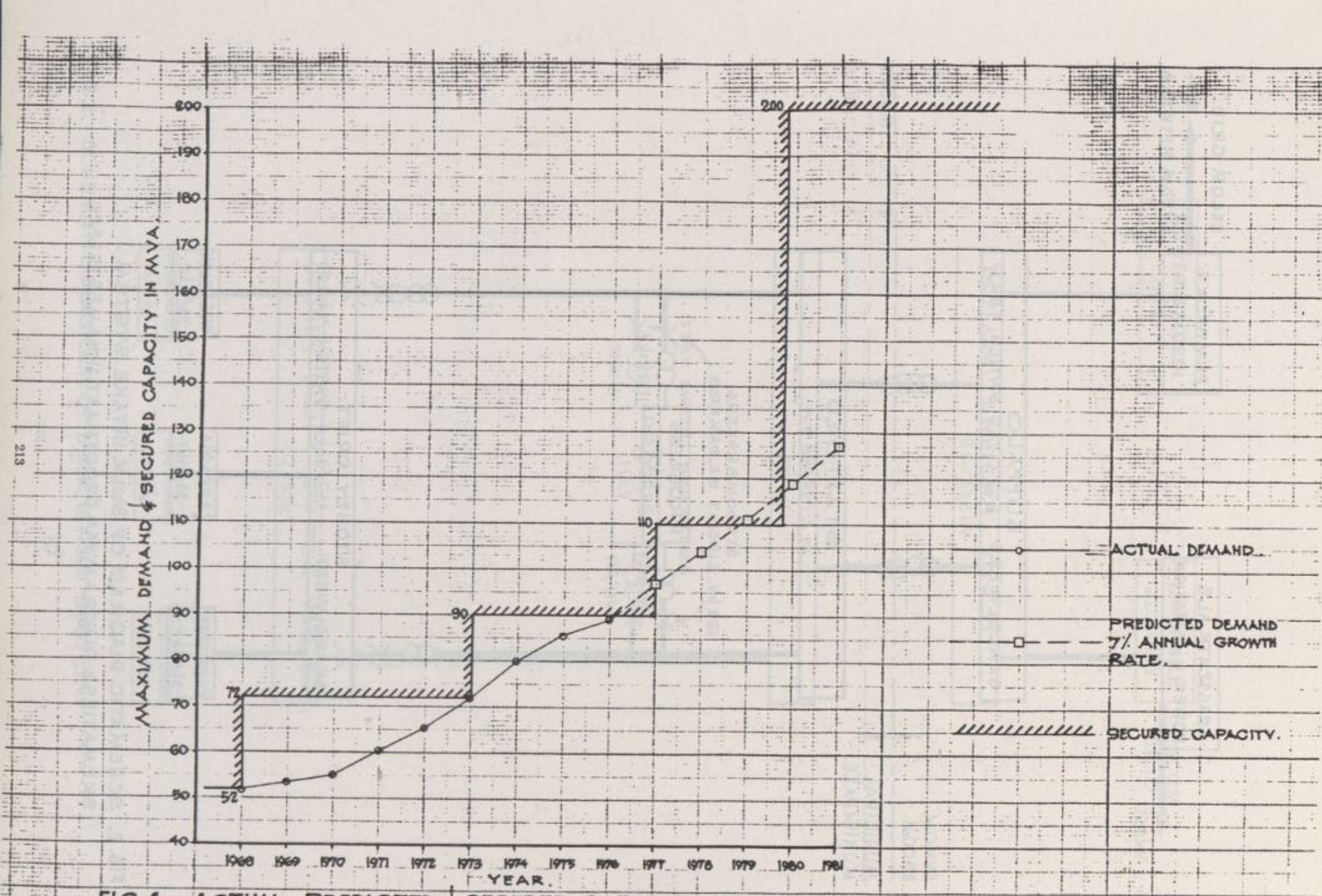


FIG 1. ACTUAL, PREDICTED & SECURED CAPACITY OF BULK SUPPLY.

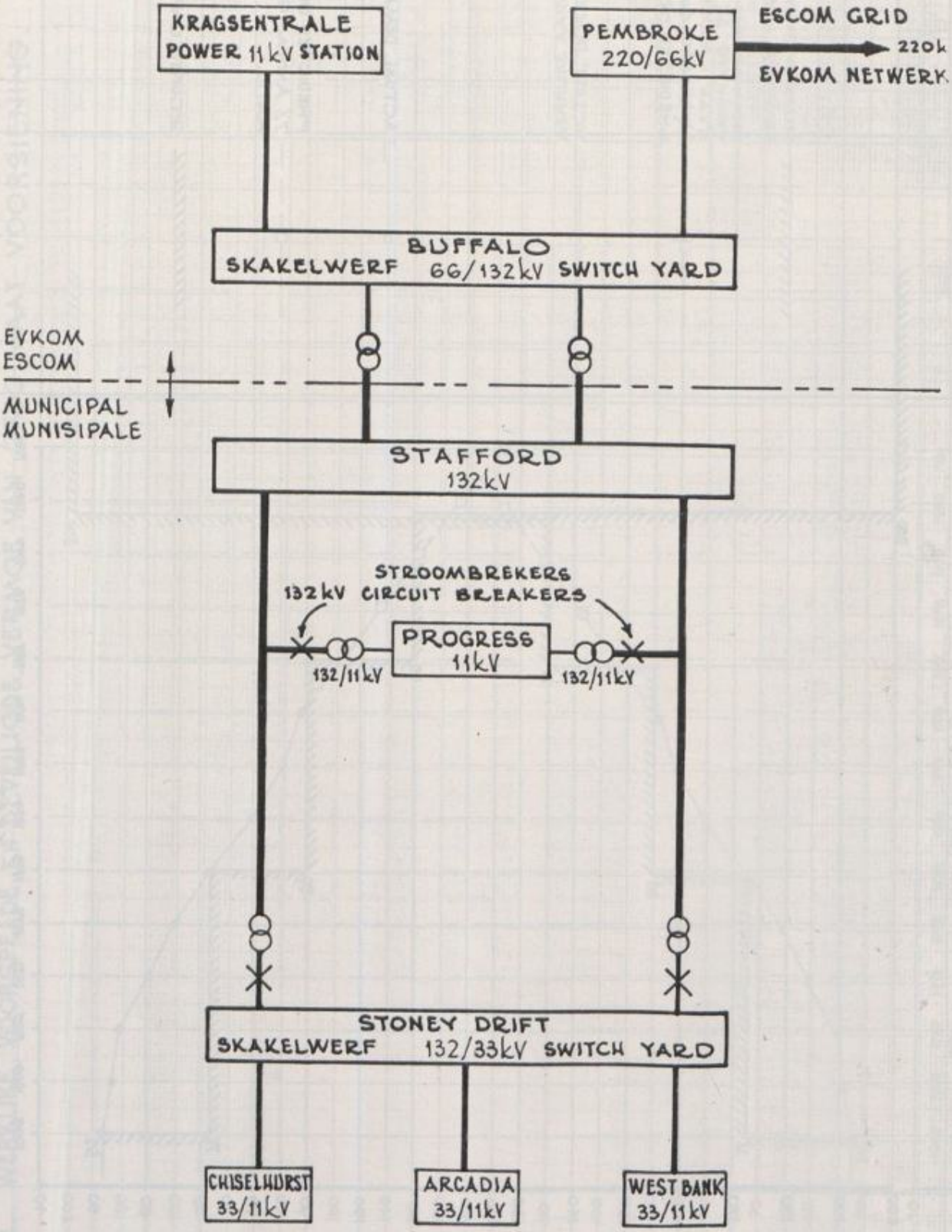


FIG. 2. SCHEMATIC DIAGRAM OF BULK INTAKE SYSTEM.
SKEMATIESE DIAGRAM VAN GROOTMAAT INNAMESTELSEL.

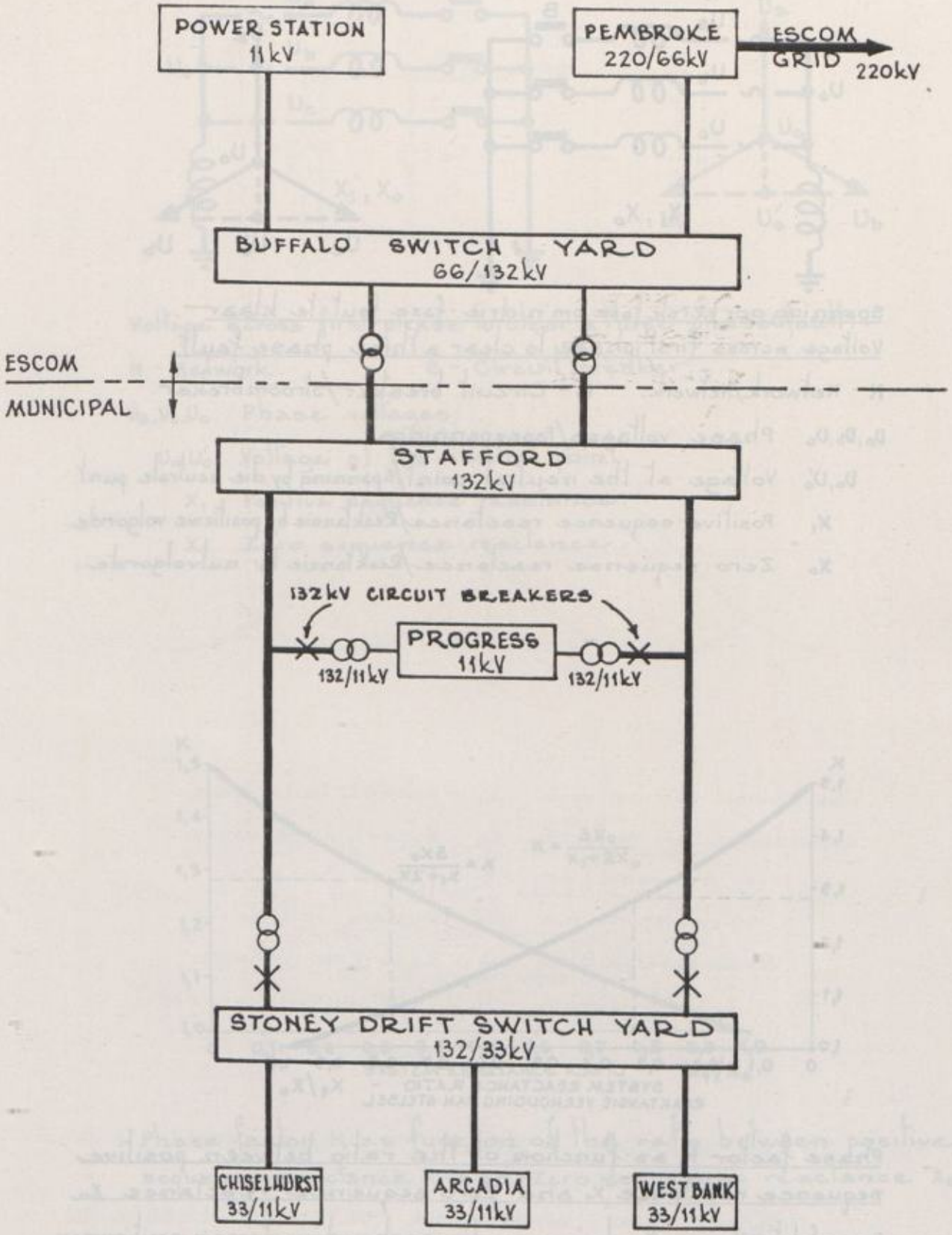
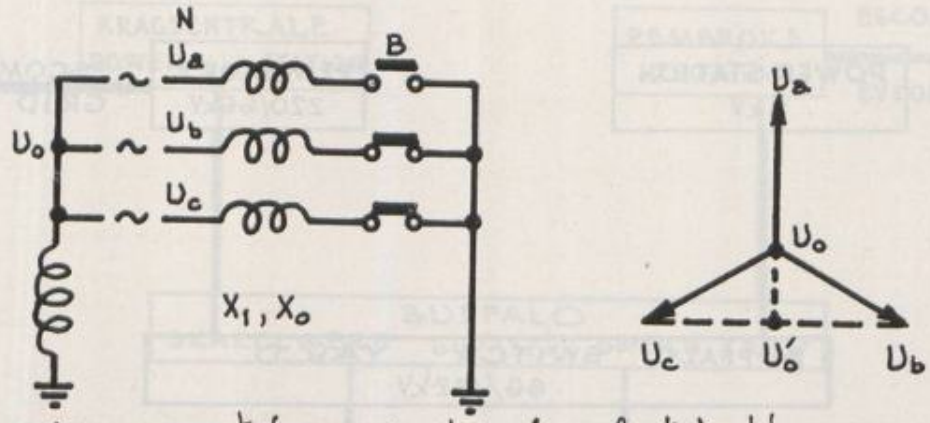


FIG. 2. SCHEMATIC DIAGRAM OF BULK INTAKE SYSTEM.

FIG 3 EERSTE FASE TOT KLARING FAKTOR
FIRST PHASE TO CLEAR FACTOR



Spanning oor eerste fase om 'n drie-fase fout te klaar.
Voltage across first phase to clear a three phase fault.

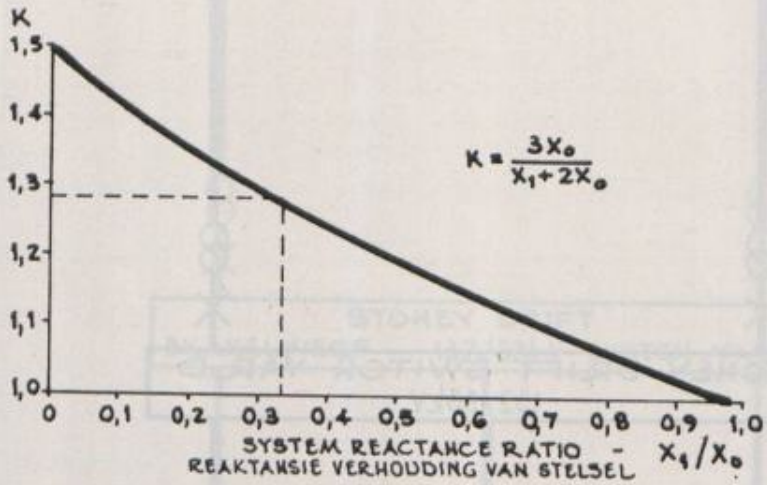
N - Network/Netwerk. B - Circuit breaker/Stroombreker.

U_a, U_b, U_c Phase voltages/Fasespannings.

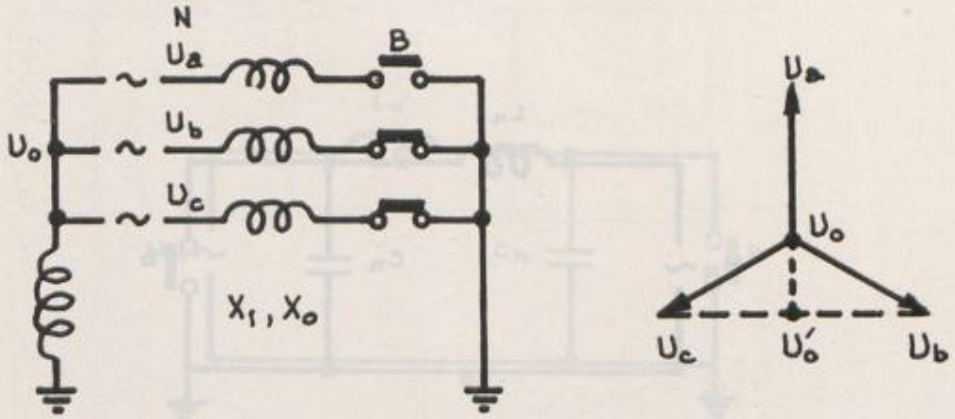
U_o, U'_o Voltage at the neutral point/Spanning by die neutrale punt.

X_1 Positive sequence reactance/Reaktansie by positiewe volgorde.

X_o Zero sequence reactance/Reaktansie by nulvolgorde.



Phase factor K as function of the ratio between positive sequence reactance X_1 and Zero sequence reactance X_o.
Fase faktor K as 'n funksie van die verhouding tussen positiewe reaktansie volgorde X_1 en nulvolgorderreaktansie X_o



Voltage across first phase to clear a three phase fault.

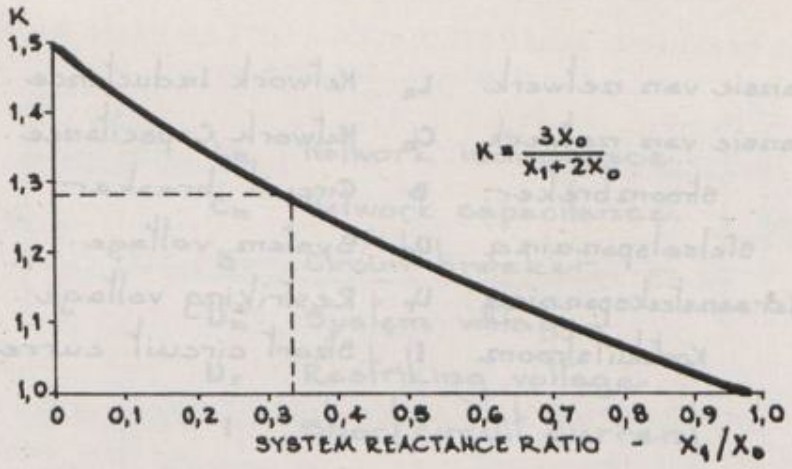
N - Network. B - Circuit breaker.

U_a, U_b, U_c Phase voltages.

U_o, U_o' Voltage at the neutral point.

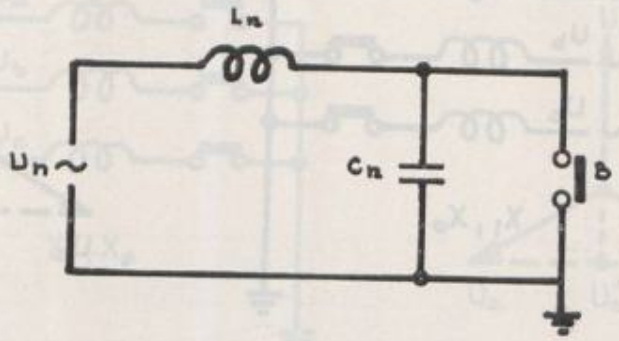
X_1 Positive sequence reactance.

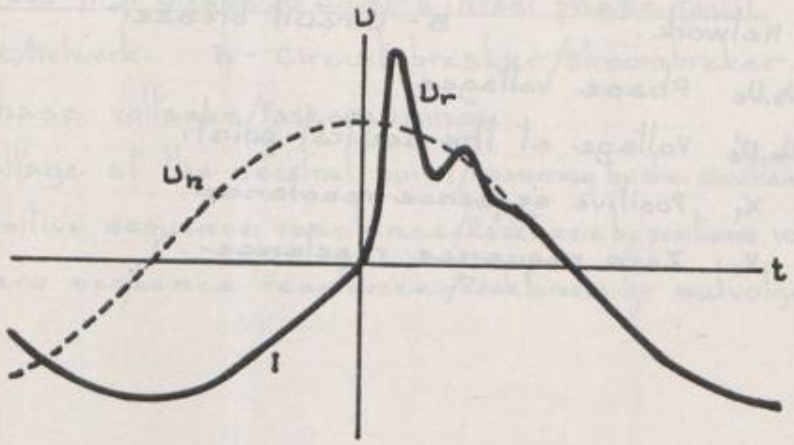
X_o Zero sequence reactance.



Phase factor K as function of the ratio between positive sequence reactance X_1 and Zero sequence reactance X_o.

FIG. 3. FIRST PHASE TO CLEAR FACTOR

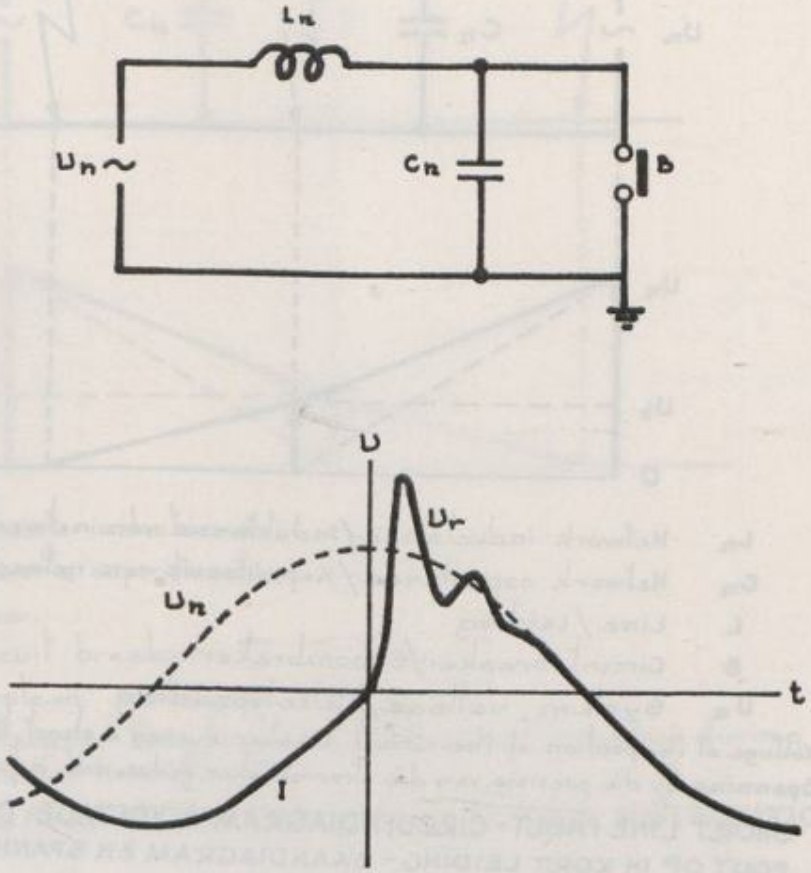




Induktansie van netwerk.	L_n	Network Inductance.
Kapasitansie van netwerk	C_n	Network Capacitance.
stroombreker:	B	Circuit breaker:
stelselspanning.	U_n	System voltage.
Heraansteekspanning.	U_r	Restriking voltage.
Kortsluitstroom.	I	Short circuit current.

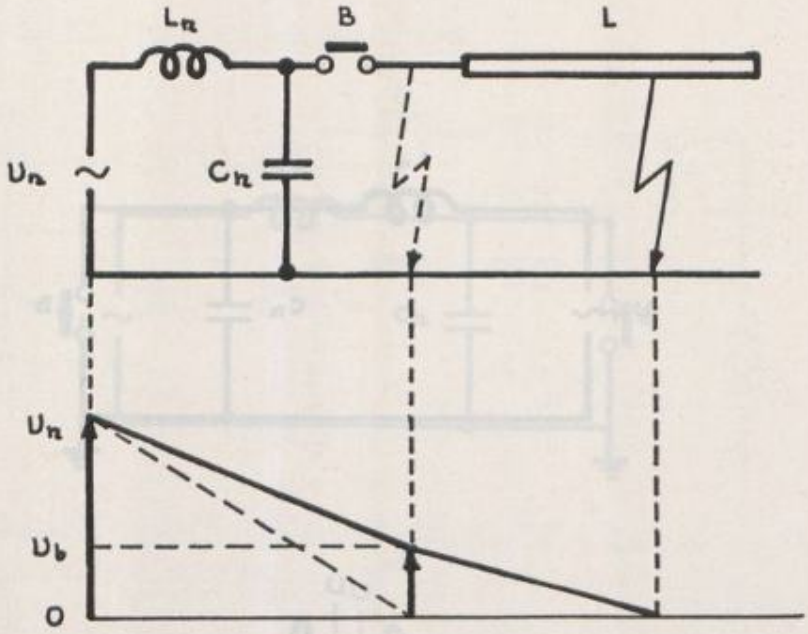
FIG. 4. TRANSIENT RECOVERY VOLTAGE AFTER SHORT CIRCUIT INTERRUPTION

OORGANGSHERSTELSPANNING NA KORTSLUITONDERBREKING



L_n	Network inductance.
C_n	Network capacitance.
B	Circuit breaker.
U_n	System voltage.
U_r	Restriking voltage.
I	Short circuit current.

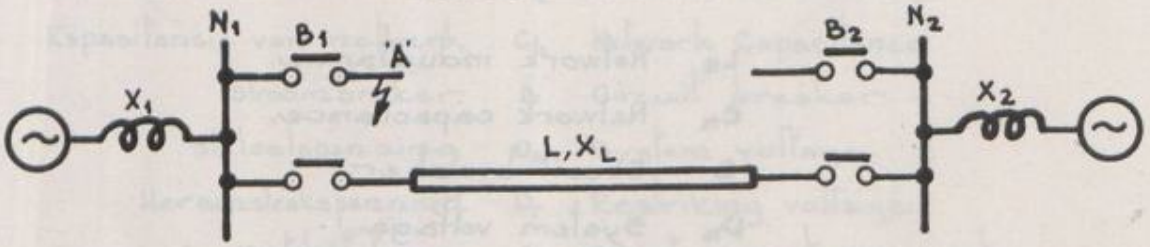
FIG. 4. TRANSIENT RECOVERY VOLTAGE AFTER SHORT CIRCUIT INTERRUPTION



L_n Network inductance/Induktansie van netwerk.
C_n Network capacitance/Kapasitansie van netwerk.
L Line/Leiding.
B Circuit breaker/Stroombreker.
U_n System voltage/Stelselspanning.
U_b Voltage at the position of the circuit breaker during a short line fault.
Spanning by die posisie van die stroombreker gedurende 'n fout op 'n kort leiding.

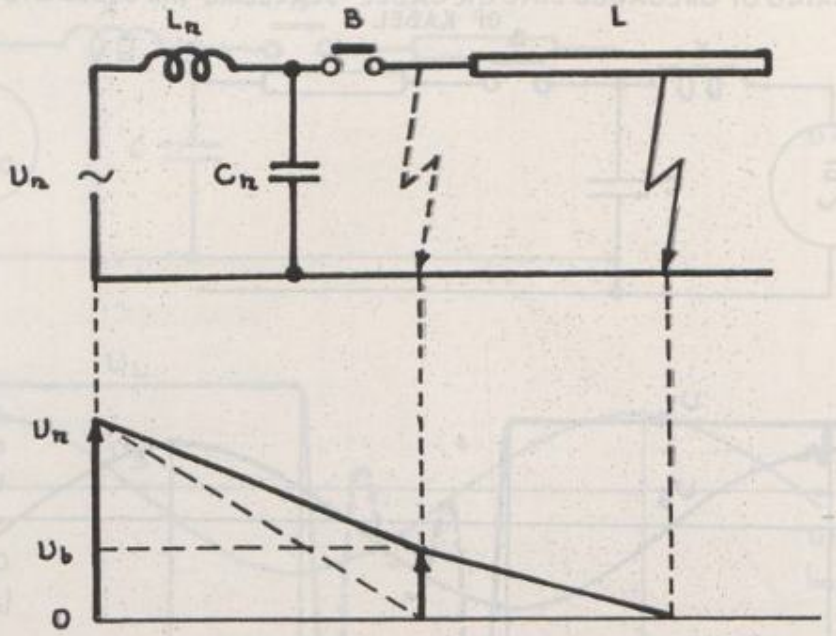
FIG.5. : SHORT LINE FAULT- CIRCUIT DIAGRAM & VOLTAGE DISTRIBUTION.
FOUT OP IN KORT LEIDING- BAAKDIAGRAM EN SPANNINGSVERDELING.

FIG.6. : UIT-FASE SKAKELING-ALGEMENE DIAGRAM -- OUT OF PHASE SWITCHING-GENERAL DIAGRAM



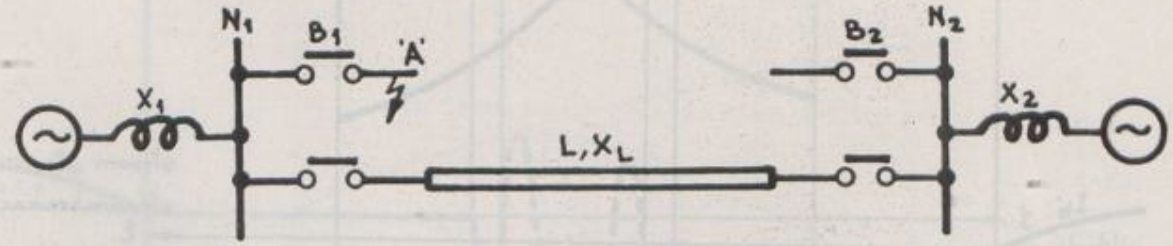
N_1, N_2 Interconnected Networks.
B_1, B_2 Circuit breakers.
L Interconnecting line.
X_1, X_2 Short circuit reactances of the networks.
X_L Short circuit reactance of the interconnecting line.

N_1 N_2 Onderling verbonde netwerke.
B_1 B_2 Stroom brekers.
L Onderling verbonde leiding.
X_1 X_2 Kortsluit reaktanse van die netwerke.
X_L Kortsluit reaktanse van die onderling verbonde leiding.



Ln Network inductance.
Cn Network capacitance.
L Line.
B Circuit breaker.
Un System voltage
Ub Voltage at the position of the circuit breaker during a short line fault.

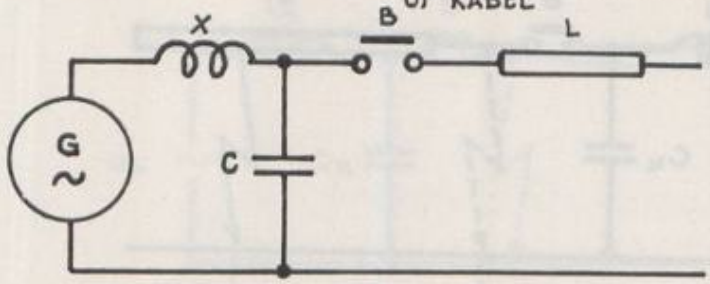
FIG.5. : SHORT LINE FAULT· CIRCUIT DIAGRAM & VOLTAGE DISTRIBUTION



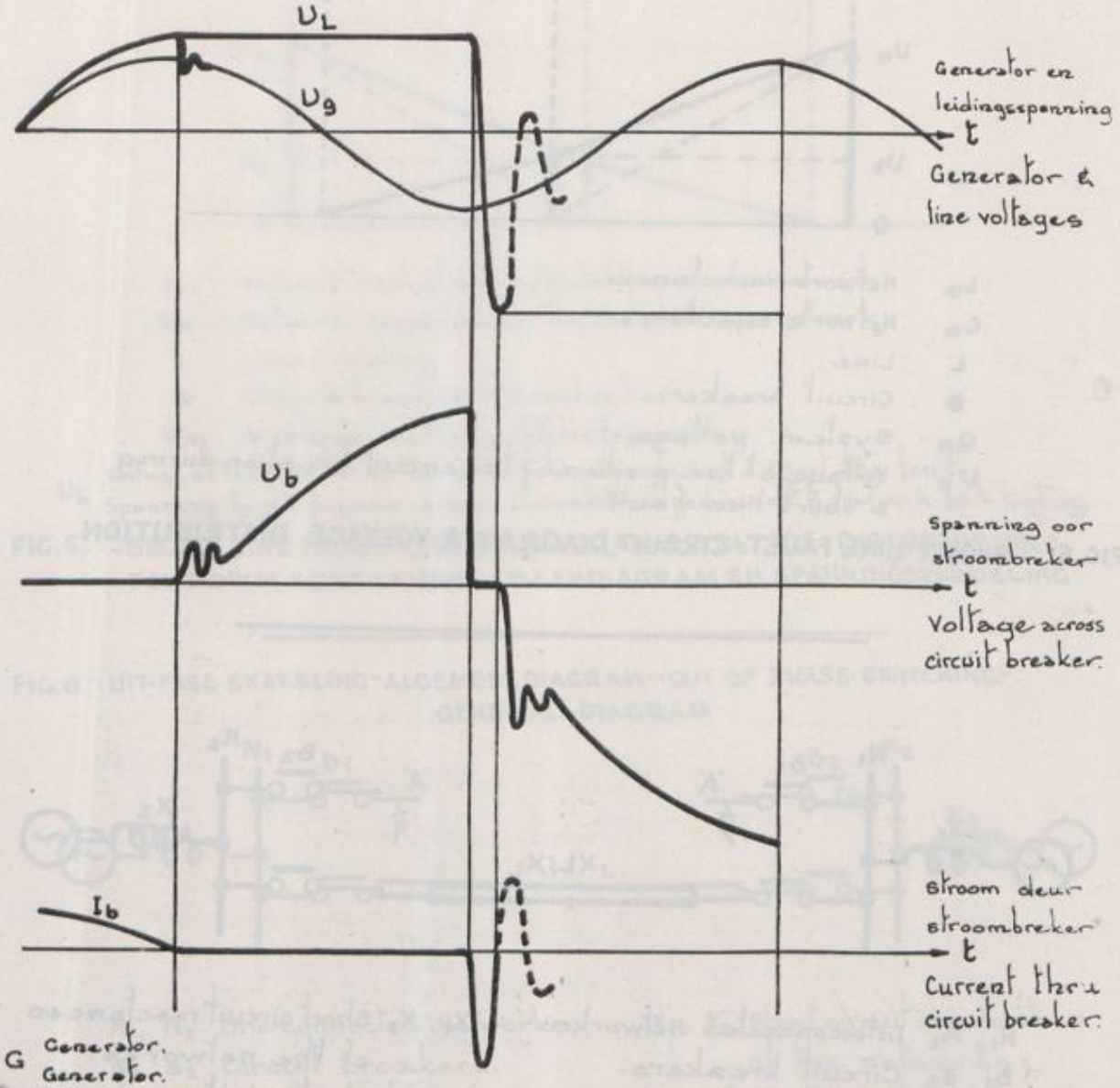
N_1, N_2 Interconnected Networks.
B_1, B_2 Circuit breakers.
L Interconnecting line.
X_1, X_2 Short circuit reactances of the networks.
X_L Short circuit reactance of the interconnecting line.

FIG.6. : OUT OF PHASE SWITCHING : GENERAL DIAGRAM

FIG.7 : SWITCHING OF UNLOADED LINE OR CABLE - SKAKELING VAN ONBELASTE LEIDING OF KABEL



Diagram



G Generator. Generator.

X Network reactance. Reactansie van Netwerk.

C Kapasitansie van Netwerk. Network capacitance.

B Circuit breaker. Stroombreker.

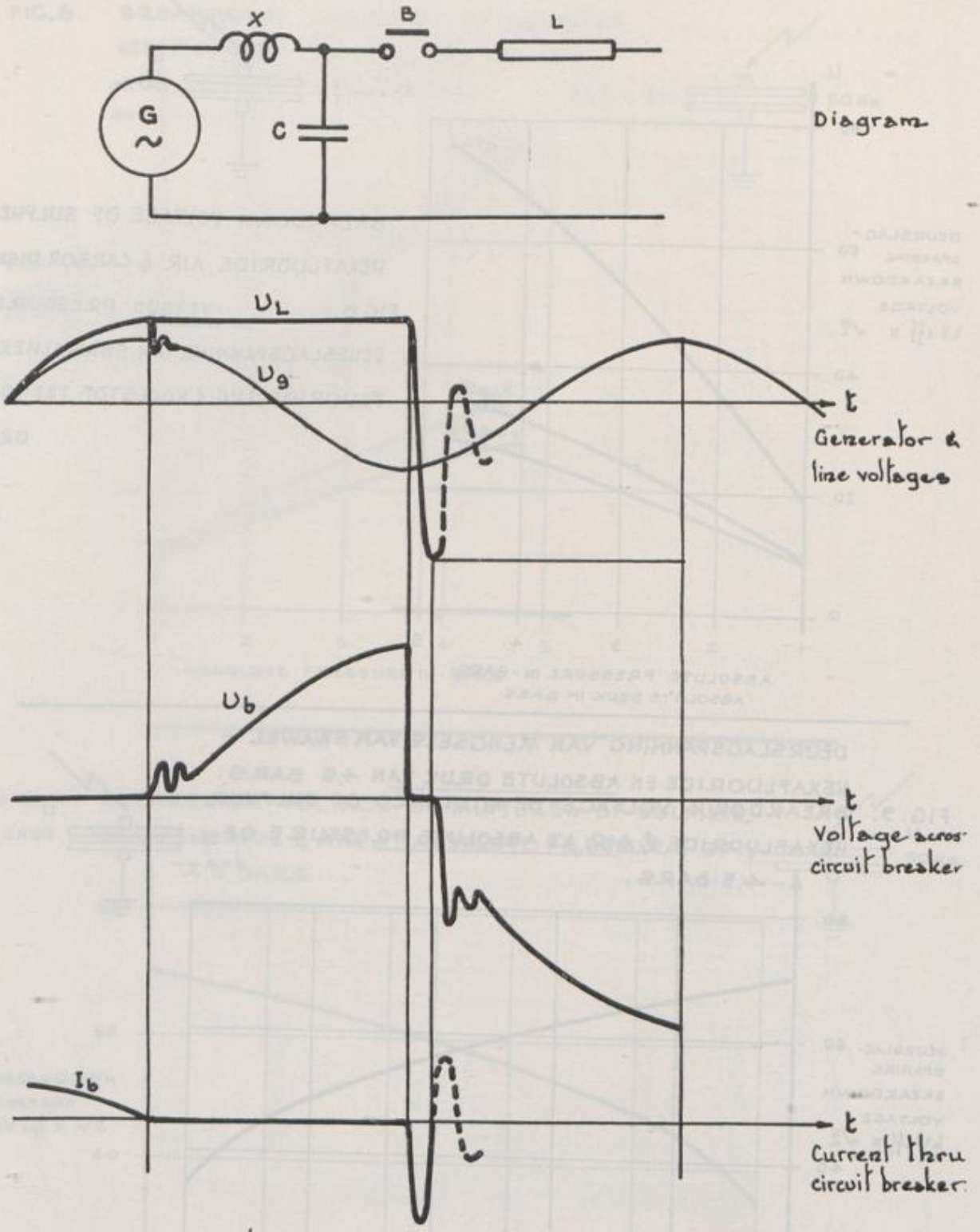
L Leiding Line

U_g Generator voltage. Generatorspanning.

U_L Leidingsspanning. Line voltage.

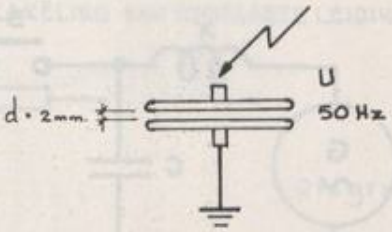
U_b Voltage across circuit breaker. Spanning oor stroombreker

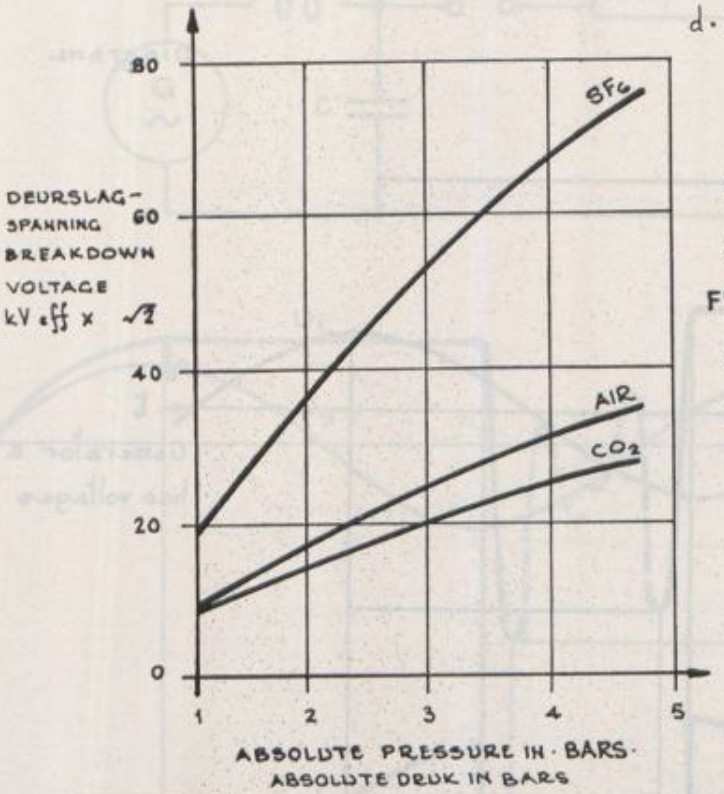
I_b stroom deur die stroombreker. Current thru the circuit breaker.



G	Generator.	U_g	Generator Voltage.
X	Network reactance.	U_L	Line Voltage.
C	Network capacitance.	U_b	Voltage across circuit breaker.
B	Circuit breaker.	I_b	Current thru the circuit breaker
L	Line.		

FIG.7 SWITCHING OF UNLOADED LINE OR CABLE



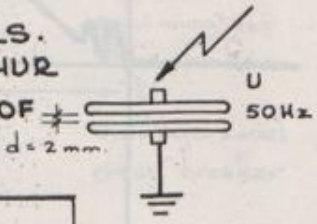


BREAKDOWN VOLTAGE OF SULPHER HEXAFLUORIDE, AIR & CARBON DIOXIDE VERSUS PRESSURE.

FIG 8. DEURSLAGSPANNING VAN SWAWELHEXA-FLUORIDE, LUG & KOOLSTOF TEENOOR DRUK

DEURSLAGSPANNING VAN MENGSELS VAN SWAWEL-HEXAFLUORIDE EN ABSOLUTE DRUK VAN 4,5 BARS.

FIG. 9. BREAKDOWN VOLTAGE OF MIXTURES OF SULPHUR HEXAFLUORIDE & AIR AT ABSOLUTE PRESSURE OF 4,5 BARS.



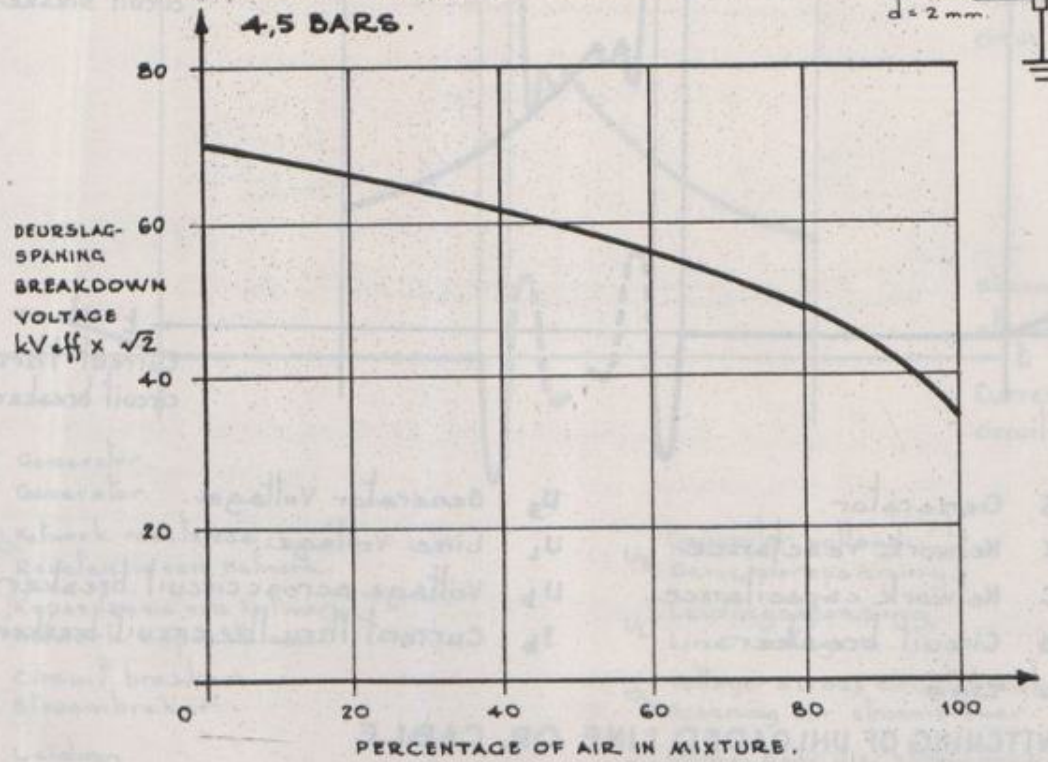
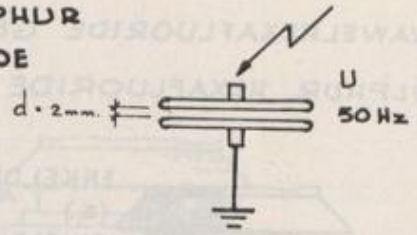


FIG. 8. BREAKDOWN VOLTAGE OF SULPHUR HEXAFLUORIDE, AIR & CARBON DIOXIDE VERSUS PRESSURE.



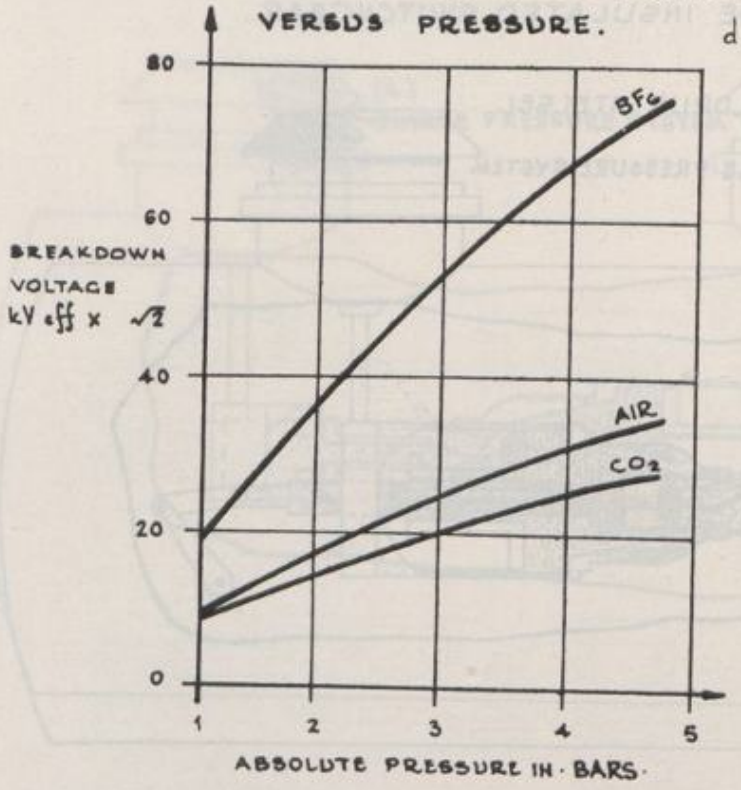
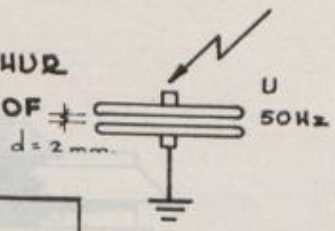


FIG. 9. BREAKDOWN VOLTAGE OF MIXTURES OF SULPHUR HEXAFLUORIDE & AIR AT ABSOLUTE PRESSURE OF 4,5 BARS.



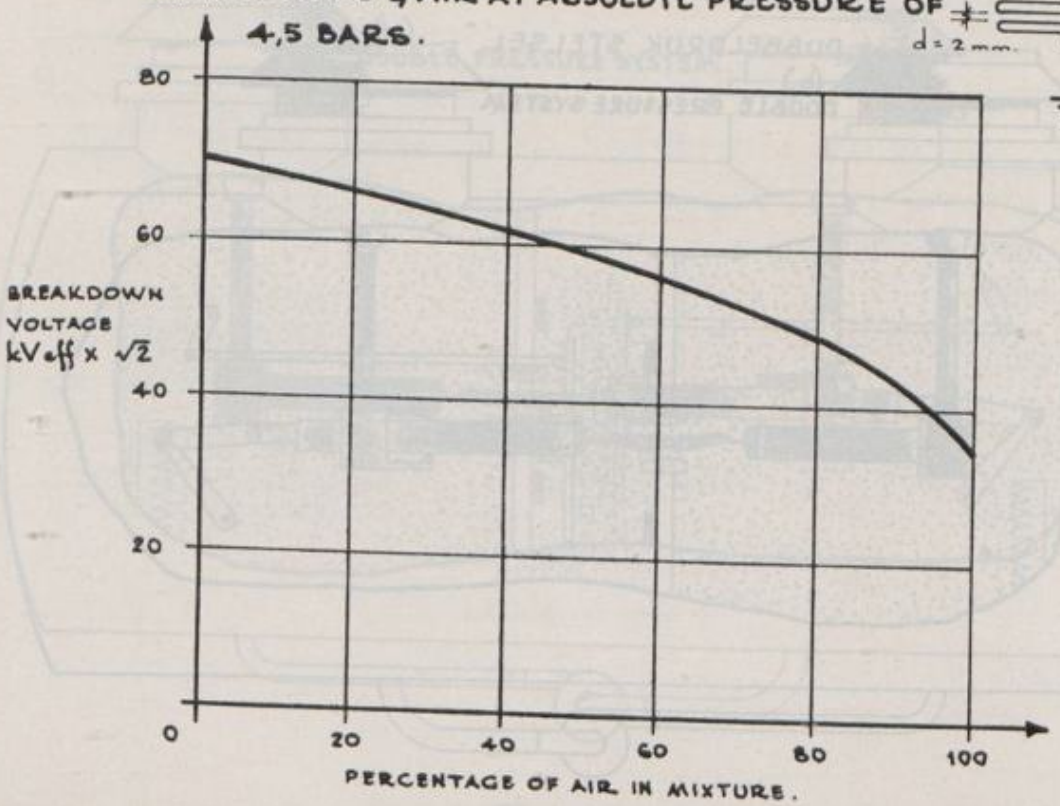
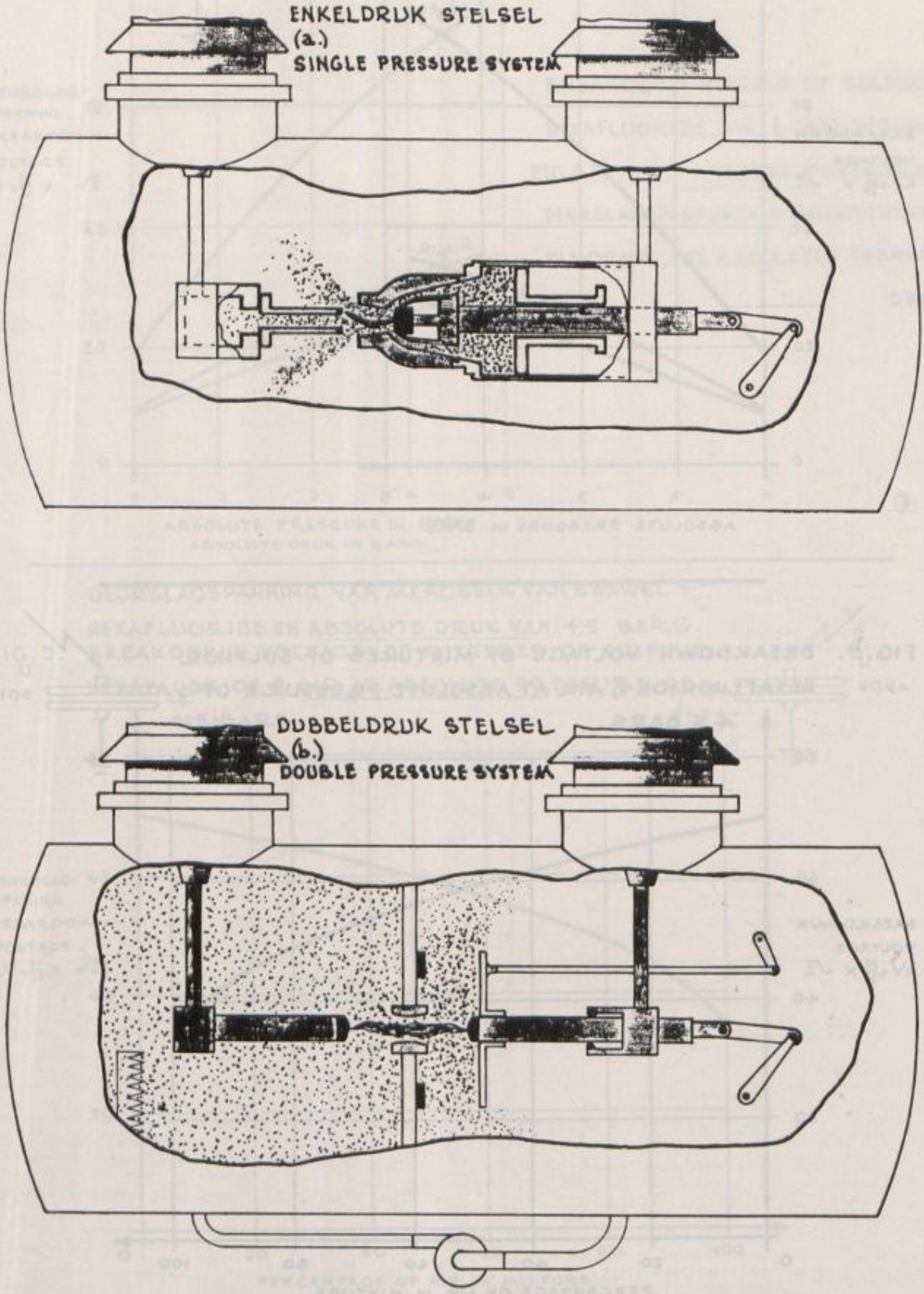


FIG 10.
SWAWELHEXAFLUORIDE GEÏSOLEERDE SKAKELTUIG.
SULPHUR HEXAFLUORIDE INSULATED SWITCHGEAR.



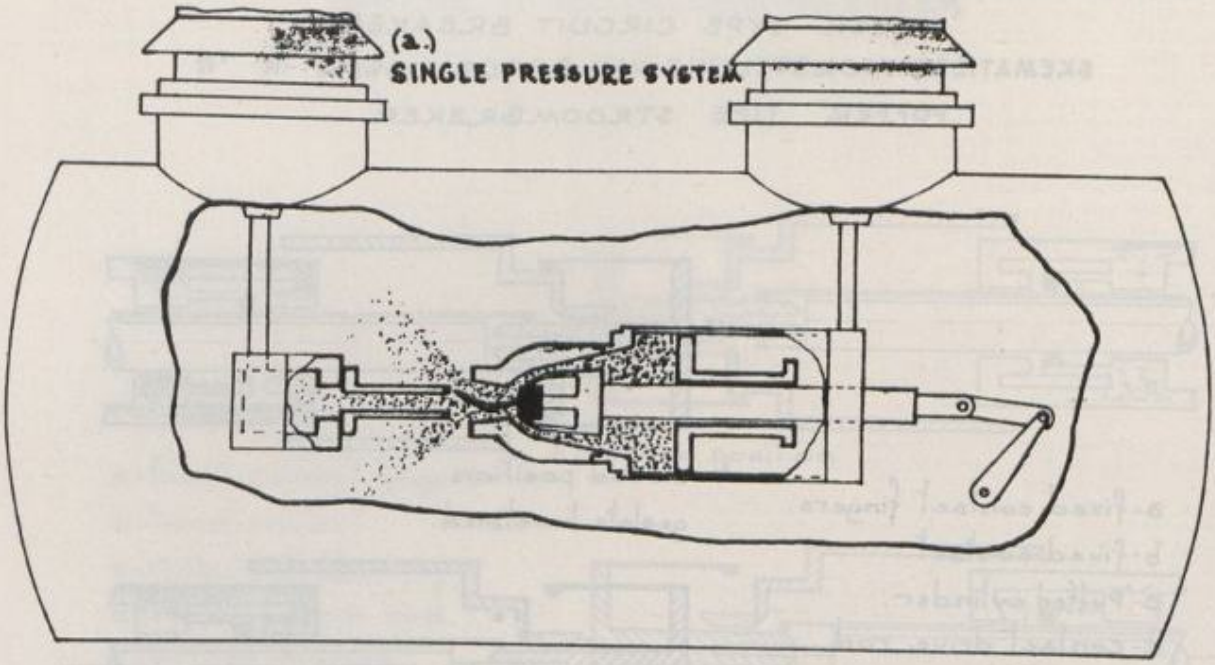


FIG. 10 SULPHUR HEXAFLUORIDE INSULATED SWITCHGEAR.

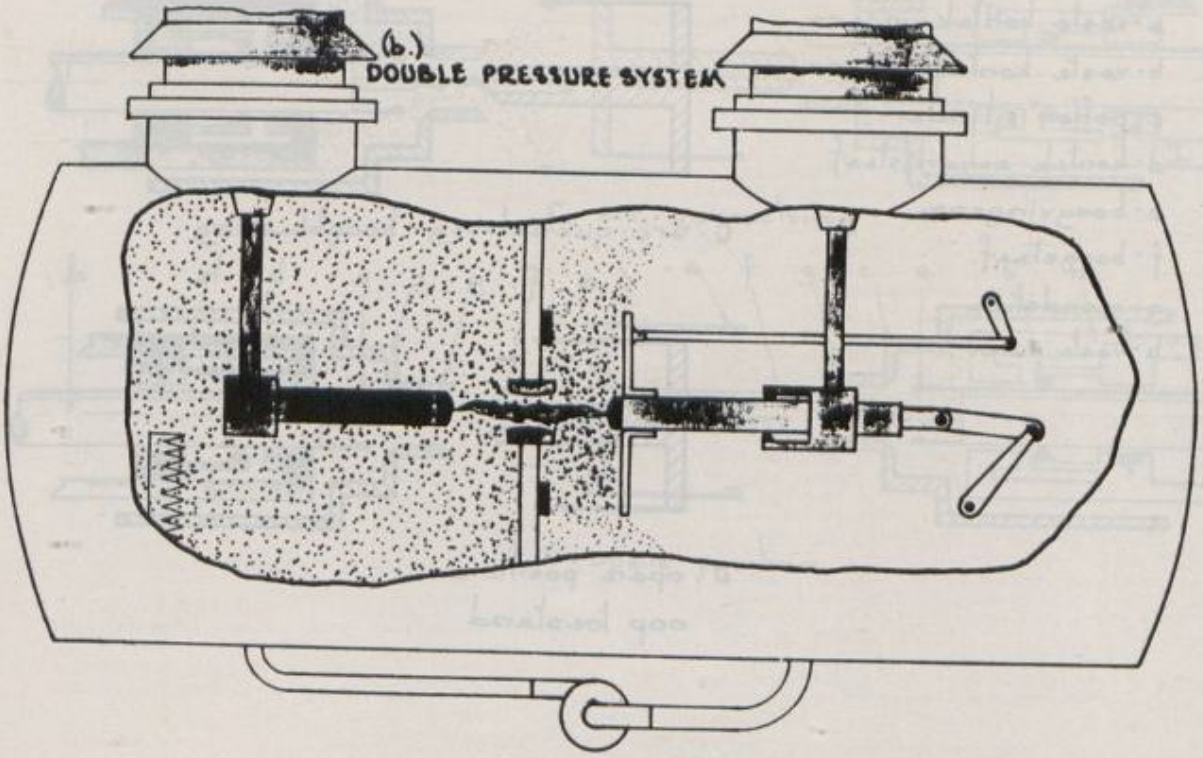
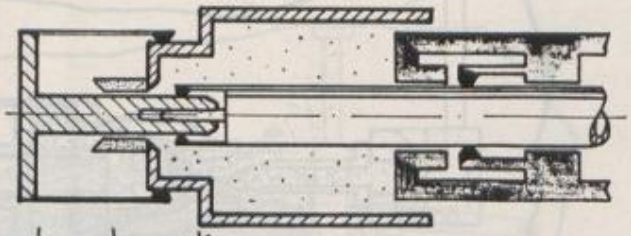


FIG.11. SCHEMATIC REPRESENTATION OF ARC-QUENCHING IN A 'PUFFER' TYPE CIRCUIT BREAKER

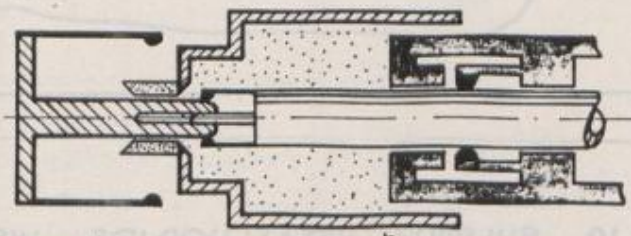
SKEMATIESE VOORSTELLING VAN BOOGBLUSSING IN 'n „POFFER" TIPE STROOMBREKER

a-fixed contact fingers.
b-fixed contact.
c-'Puffer' cylinder.
d-contact drive rod.
e-arcing fingers.
f-arcing rod.
g-nozzle.
h-fixed piston.

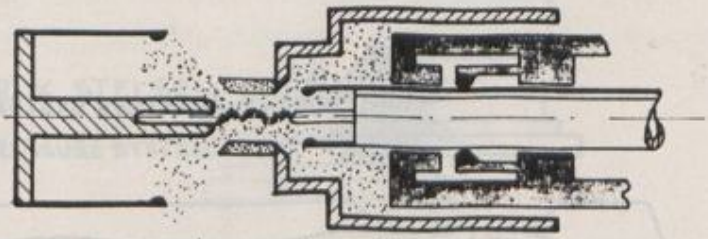
a-vaste kontak vingers.
b-vaste kontak.
c-„poffer" silinder.
d-kontak aandryfstaaf.
e-boogvingers.
f-boogstaaf.
g-mondstuk.
h-vaste suier.



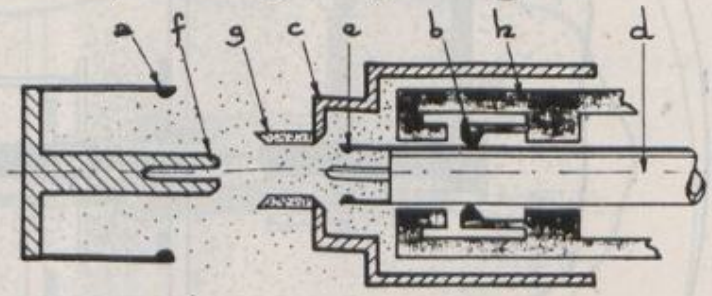
A. closed position.
geslote toestand.



B. opening-compression stage.
oopmaak-saamdruk stadium



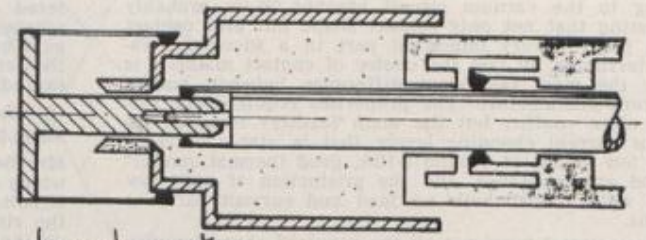
C. arc-quenching-boogblussing



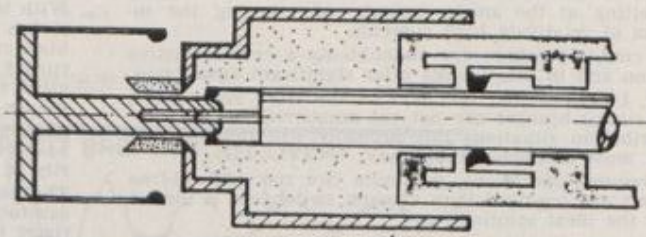
D. open position
oop toestand

FIG.11. SCHEMATIC REPRESENTATION OF ARC-QUENCHING IN A 'PUFFER' TYPE CIRCUIT BREAKER

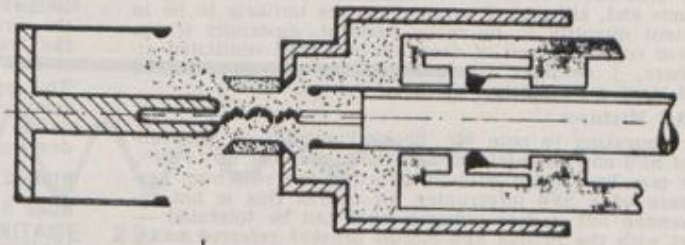
a-fixed contact fingers.
b-fixed contact.
c-'Puffer' cylinder.
d-contact drive rod.
e-arcing fingers.
f-arcing rod.
g-nozzle.
h-fixed piston.



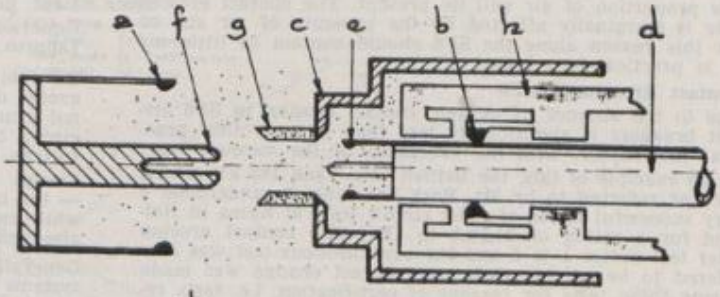
A. closed position



B. opening - compression stage.



C. arc-quenching



D. open position

MR. K. G. ROBSON, President:

I am now pleased to call on Mr. Nat Kirschner to open the discussion on the paper and to propose a vote of thanks.

MR. N. KIRSCHNER, Affiliate:

Meneer die President, mnr. Beck, mev. Beck en here,

Ons het geluister na 'n hoogs interessante referaat wat op hierdie tydstip van groot belang is ten opsigte van die elektriese ontwikkeling in ons land.

Mnr. Beck moet geluk wens word met sy puik voorstelling van 'n baie veelsydige onderwerp.

Ek wil graag kommentaar lewer oor die vakuum en SF6 Puffer Stroombrekers en sal afsluit met twee aspekte van stroombreker kortlyn fout prestasies — aangesien ek dink dat verdere toeligting hieroor nuttig sal wees.

P6 Vacuum Interrupter Contacts

Referring to the vacuum circuit breaker, it is probably worth noting that not only contact shape but also contact material plays a very important part in a successful vacuum interrupter. In fact the choice of contact material is probably the most significant difference between bottles of different manufacture. The properties required are varied and often conflict but the main features required include low current chopping levels, that is, stable currents down to low values of around 5-10A, good thermal conductivity and arc resistance, and the production of only low strength welds under both no load and current carrying conditions.

No single material possesses all the required characteristics and an alloy comprising two or more metals is usually employed.

The contacts formed with this material are usually shaped or slotted so that the arc is caused to rotate, preventing gross melting at the anode contact and allowing the interruption of relatively high currents.

Vacuum circuit breakers are undoubtedly a very attractive proposition and in many cases offer significant advantages.

However, I believe that the days of the tried and proven bulk oil circuit breaker are not yet numbered and for normal distribution situations this probably still provides the best and most economical solution.

Where frequent operations, minimum fire risk and oil-free equipments are required then vacuum switchgear is almost certainly the ideal solution.

P.7 — Turning now to the Sulphur Hexafluoride or SF6 Switchgear.

I would have some reservations about checking whether a gas is SF6 by the burning paper test suggested by Mr. Beck. This could result in the production of harmful by-products and, although I agree these are unlikely to be in sufficient quantity to be really harmful, especially if the test was conducted out of doors or in a well ventilated atmosphere, I consider the most satisfactory test method would involve a dielectric check on the gas.

SF6/Air Mixtures

It is interesting to note Mr. Beck's comment on the subject of SF6 and air mixtures and the claim that up to 20% of air may be present without affecting the switching performance of a SF6 interrupter. Of course this is not recommended but it does indicate what can be tolerated — in fact with the British SF6 circuit breaker referred to by Mr. Beck the equipment is evacuated to a level of about 2mm Hg prior to filling with SF6 so that in practice a very low proportion of air will be present. The contact erosion rate is marginally affected by the pressure of air and so for this reason alone the SF6 should contain as little air as is practical to achieve.

Contact Erosion in SF6

Due to the absence of oxygen, contact erosion in SF6 circuit breakers is significantly less than in any other practical interrupter, with the exception of the vacuum type.

As an example of this, the British Live Tank 145 kV circuit breaker referred to by Mr. Beck has recently undergone a very successful series of short circuit tests at Kema in Holland for a rating of 31,5kA to IEC. The contact erosion after test duties 1 to 5 and the asynchronous test was considered to be 'slight'. Only one contact change was made during these tests for reasons of certification, i.e. tests required on clean contacts.

A subsequent certification series to meet the U.K. market specification at 25kA was completed without any contact change and the contacts were again noted to be in excellent condition after all the tests — certainly capable of many more tests.

Contact erosion at load current levels is barely discernible and all the evidence points to these circuit breakers having extremely long contact life — in many cases it seems unlikely that contact changes will be necessary during the lifetime of the circuit breaker.

Metalclad Substations

The growth of metal enclosed busbars, isolators and circuit breakers for space and security reasons has grown beyond all expectation in the past few years all over the world.

Experience in operation is now allowing revised attitudes to maintenance periods and the correct employment of this technique to get the maximum benefit per sq. metre and per Rand.

As individual operators gain confidence in the assembly integrity that can be achieved, the reliability that can be obtained with this type of equipment becomes apparent.

In particular, this can apply to the substitutions of high current rating cable runs by compressed gas trunking.

The use of gas enclosures for difficult situations has altered the economics of many previously 'borderline' schemes, for example, underground pumped storage such as is being undertaken at Drakensberg. Even in urban areas the crossing of roads, bridges and railways by this method can offer substantial savings in many respects.

On the sections 3.2/3.3 Transient Recovery Voltage and Short-line Faults

Mr. Beck's Figure 4 shows a typical restriking transient which appears across a circuit breaker after clearing a short circuit which is close to the circuit breaker. The slope of the rising voltage governs the degree of severity imposed on the circuit breaker and is identified as rate of rise of restriking voltage — RRRV. Luckily on most systems the RRRV at high fault level situations is low, and RRRV at low fault level situations is high — this matches the interrupting characteristics of most circuit breakers.

With increasing fault level on large interconnected systems, it has been found that circuit breakers (particularly air blast circuit breakers) could **fail** to clear a fault which occurred some distance down a line, although they could clear a fault close by.

Investigation led to the discovery of the short-line fault phenomenon mentioned by Mr. Beck in Section 3.3. It might be useful to demonstrate the reason for the increased severity of the short-line fault.

The oscillation on the line side of a circuit breaker has a saw-tooth wave form with a rate of rise up to about ten times that of a terminal fault although the peak value is low .

Slide 1 Demonstrates this and shows how the line and supply side transients add up across the circuit breaker.

The short-line fault peak occurs within a few micro-seconds following the current zero while the residual arc path in the circuit breaker interrupter is still being de-ionised. If the transient comes above the re-ignition voltage of the circuit breaker then failure would occur.

This phenomenon has been widely investigated and most specifications for circuit breakers rated above 20kA now define the S.L.F. required. Tests are now included in the development and proving series.

Slide 2 Shows an actual oscillogram for such a test.

Slide 3 Shows how the severity changes as the fault position is considered at greater distances from the circuit breaker. (British 400 kV System).

The fault current and the RRRV diminish but the transient peak increases.

Generally the most onerous fault is that occurring ¼-1 mile (approx. 1-2½ km) along the line.

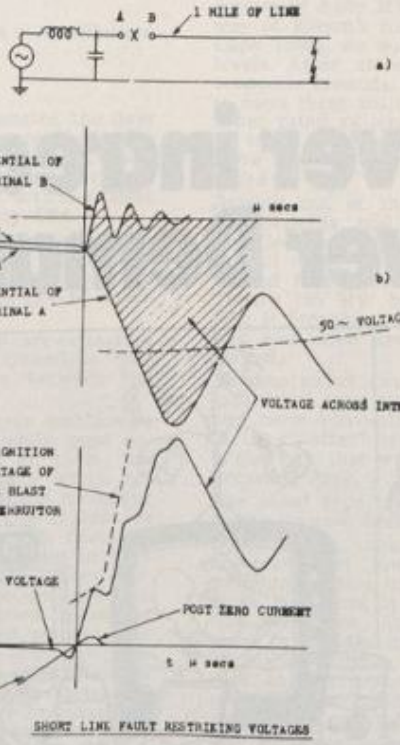
3.5 While the paper describes the theoretical sequence of events during a restriking sequence, in practice this does not usually occur because the contact gap in the restriking circuit breaker will usually break down before the 2x peak voltage is reached.

Circuit parameters also affect the overvoltages produced — the impedance of the line or cable has a damping effect while capacitance on the source side of the circuit breaker also reduces overvoltages.

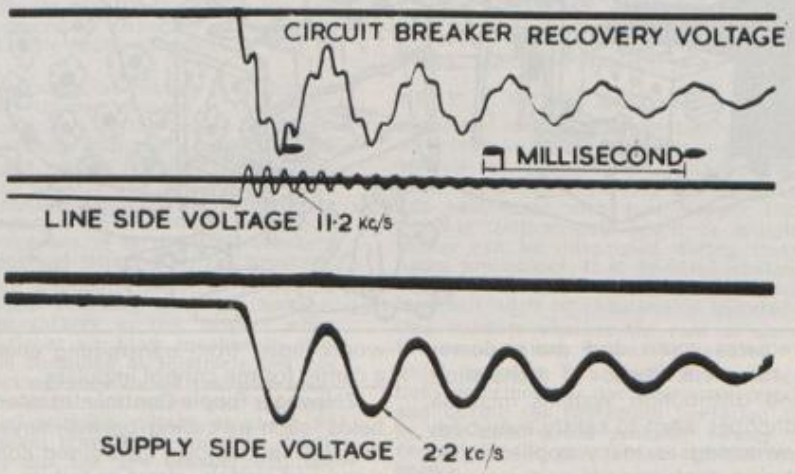
Generally, restrike-free performance is not required for systems up to 66kV and 132 kV. During a full series of cable switching tests done on a 66kV small oil volume breaker in accordance with IEC56-4 the maximum overvoltage ratio was only 1.97.

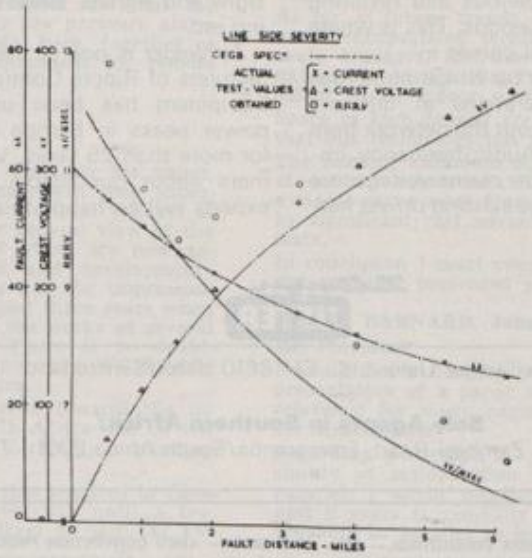
For systems above 132kV restrike-free performance is usually necessary as insulation levels of such overhead lines are more difficult and costly to achieve.

Dit is nou met groot genoë dat ek 'n mosie van hartlike dank aan mnr. Beck voorstel vir sy uitstekende verhanderling. Baie Dankie.



SHORT LINE FAULT RESTRIKING VOLTAGES





MR. K. G. ROBSON, President:

Thank you Mr. Kirschner. Mr. Dan Howe has a contribution which he would like to make.

MR. H. D. HOWE, Affiliate:

It seems, influenced by deliberate pricing policies, the days of the small oil volume circuit-breaker are numbered in such applications as progress substations, and at 132kV and above. Mr. Beck, as a user, is to be complimented very sincerely, on making the effort to come to grips with the latest developments in circuit-switching, particularly SF6.

The pricing policies are evident in that SF6 breaker designs have higher ratings in term of both fault and normal current, but tender prices show that they are competitive with, or even cheaper than, established designs of minimum oil circuit-breakers.

In respect of SF6, Mr. Beck has dealt with arc-extinction and maintenance per se, and I wish to underline that there is more than usual interdependence between the two.

The paper in fact describes the arc interruption mechanism in oil, vacuum and SF6 gas breakers and, while good design can achieve acceptable performance in all cases, the SF6 medium possesses a particular advantage which enables better arc control to be achieved, resulting in longer periods between maintenance at all duties. The reason for the improved performance with SF6 lies in its chemical and physical properties, which manifest themselves in high conductivity of the arc plasma, enabling much higher currents to be carried without impairing the resealing capability of the gap at current zero. Other gases, including those of dissassociated oil molecules, do not possess this capability to the same extent and over the same temperature ranges and, therefore, present greater difficulties to the designer in obtaining a good breaking characteristic over the full range of duties. Further, the improved interrupting performance enables a total opening time of 30-50ms to be achieved, resulting in a reduction of damage to arcing surfaces. Therefore, at high fault ratings, the SF6 breaker should be more successful than the oil types in that maintenance, while a little more complicated, will be less frequent.

In support of Mr. Beck's remarks in Section 7.1, changes in equipment design usually involve changes to the associated control circuit practice and, with the use of SF6 breakers, the matter of gas sealing requires attention. Compared with water and oil, gas sealing is relatively difficult, requiring carefully designed gaskets and a high degree of machine finishing to the mating surfaces. This same state must be reflected during erection on site. While little concern has been expressed over loss of oil from oil breakers it is usual to provide alarms and tripping on gas breakers.

In one installation complete automatic isolation is iniated in the event of low pressures resulting from gas leakage. SF6 as an insulant has advantages in this respect when compared with the conventional air blast breaker in that full working voltage can be sustained at relatively low gas pressures. The normal working pressure of the SF6 breaker lies in the region 300-400kPa and indications are that most designs will withstand working voltage at about 50 kPa, at which pressure, gasket type leaks would be fairly slow. It appears therefore, that the SF6 breaker will not present operating problems in this respect and that the situation may be catered for with only low pressure alarm and tripping facilities, as stated by Mr. Beck, together of course with the use of telecontrol equipment for remote isolation.

Thank you.

MR. D. C. PALSER, Cape Town:

Mr. President, as mentioned by Mr. Beck in his paper, there is little doubt that SF6 switchgear will soon supersede small oil volume switchgear, particularly at voltages of 132kV and above. I believe this is the general view of the world's major manufacturers, most of whom are now apparently concentrating their research and development efforts in this direction. At least, this was the impression I gained on two overseas visits in the past three years when I was fortunate in being able to visit the works of several leading manufacturers in this field. There is no doubt, therefore, that we are going to see many more SF6 installations in South Africa in the near future.

A factor definitely influencing this trend towards the increasing use of SF6 switchgear in South Africa will be the steadily rising fault levels on Escom's rapidly expanding generation and transmission systems.

In point of fact it was this very factor that resulted in Cape Town's entering the SF6 field recently. Up until a few years ago we had worked to a fault level on our 132 kV system of 3 500 MVA. But with the construction now under way of Escom's Koeberg nuclear power station just outside Cape Town, we will shortly be faced with far higher fault levels. After discussions with Escom it was decided, on economic grounds, to look ahead and install switchgear now to meet these anticipated higher fault levels and not install lower rated switchgear and face uprating in 10 years' time or so. A fault level of 31,5 kA, that is about 7 200 MVA, more than twice our previous rating, was accordingly specified.

Arising out of this decision four 132kV SF6 metalclad switchboards and one conventional outdoor switchboard installed indoors in semi-cellular configuration, comprising a total of 50 panels, are now on order at a total cost of around R8-million. One of these switchboards is for Cape Town's 180 MW hydro-electric pumped storage power station at Steenbras and the others are for an existing substation and three new switching stations on the transmission system.

The metalclad switchgear is of the latest three-phase encapsulated type and is even more compact than the earlier and more conventional single-phase type. All breakers are of the "puffer" type and, as mentioned by Mr. Beck, this is the type that will probably supersede the earlier "double pressure" type.

The other type of circuit-breaker referred to by Mr. Beck is the vacuum breaker.

Although the vacuum circuit-breaker has won wide general acceptance at lower voltages, particularly for frequent switching duties in industrial, mining and traction applications, its future at voltages of 132kV and above is perhaps not so certain. At this stage most major manufacturers seem to be concentrating on SF6 rather than vacuum. One of the difficulties, apparently, is to design and manufacture an interrupter of sufficiently high voltage rating to minimise the number of stages required in series.

That both SF6 and vacuum circuit-breakers are here to stay, however, is perhaps evidenced by a new British Standard just issued covering the maintenance of switchgear up to 145kV. It is perhaps significant that this standard includes both SF6 and vacuum breakers.

Thank you Mr. President.

MR. P. J. BOTES, Roodepoort:

While the insulating properties of an SF6/Gas mixture are acceptable to reasonably high concentrations of pollutant the same is not true for solid contaminants.

Some comments regarding the possible performance of the SF6 switchgear with dust, copper filings, salt and other possible contaminants might be enlightening. The foreign matter can be introduced during installation and maintenance procedures. It is doubtful whether the contact changing or cleaning procedure can be satisfactorily undertaken in a salt-laden or industrially polluted atmosphere.

One wonders whether the case of maintenance claimed by the suppliers can in fact be realised.

Quiet operation is a doubtful advantage (in the configurations described) as operations are certainly very infrequent and during the protection operation the sound generated by the fault would probably swamp that of the breaker (except in the case of an airblast breaker which is very noisy).

As far as future trends are concerned, it is felt that the metal encapsulated technology should be extended to include breakers, instrument transformers and cable terminations to ensure that full advantage is taken of the insulant in an indoor substation.

Space in high density areas is at a premium and it is here that this technology has the most to offer.

The existing minimum oil circuit-breaker used in traditional outdoor substations has served the Republic well and a major move away from this will have to be precipitated by significant cost advantage in the present economic climate.

In conclusion I must congratulate Mr. Beck on an interesting and ably presented paper. Thank you.

MR. W. BARNARD, Johannesburg:

Mr. President,

I would like to add my congratulations to Mr. Beck for the presentation of a paper which I am sure will be a useful reference for many engineers concerned with circuit-breaker applications.

Regarding paragraph 3.7, which briefly describes the possibility of maloperation when circuit-breakers operate in parallel, I might mention that Johannesburg has for the past 9 years successfully used two 2 000A, 250MVA, 11kV breakers in parallel as incomers at its major 80/11kV sub-

stations instead of a single 3 000A circuit-breaker. No problems have been experienced when operating under fault conditions, but special steps have been necessary to ensure equal sharing of load current.

In heavily developed urban areas, where it is sometimes necessary to incorporate substations into large building complexes, the fire risk must be reduced to a minimum. Although transformers with their large volume of oil do constitute a fire risk, oil-filled circuit-breakers regularly breaking load and fault currents are considered to present the greater hazard. To date in Johannesburg, no fires resulting from transformer faults have occurred in major substations, whereas several switchgear explosions have resulted in fires, fortunately of a minor nature. At present, it seems that, up to 11kV, vacuum circuit-breakers probably offer the best means of avoiding the fire risk. The higher cost of vacuum and SF6 switchgear, compared with small oil volume and bulk oil circuit-breakers can be offset against lower maintenance costs and the elimination of fire-fighting equipment.

At voltages of 275kV and 88kV Johannesburg has had satisfactory operating experiences with oil-filled SOV, air-blast and also SF6 circuit-breakers.

At present, for outdoor stations in situations where fire risk is not of major consequence, SOV breakers have been the most economical and comprise the practice on which we have standardised.

It is of interest to note that, in reporting to SANCWEC, the chairman of this committee, Dr. Strazacker reported that in both Germany and Sweden the trend in conurban areas is towards the use of metal clad SF6 switchgear with Sweden favouring the use of the aluminium tank to avoid contamination which Mr. Beck mentioned. On the outskirts however, conventional outdoor switchgear is still being used. Thank you.

MR. R. M. SIMPSON, Honorary member:

Mr. President I can't let this Convention end without saying a few words. First I would like to congratulate you on your election as President of this Association and also to congratulate you on the very fine Convention held here and the standard of your papers.

Referring to the particular paper under discussion, I don't propose to ask questions, but it might be of interest to pass on some experience that I have had since retiring from my old position. In certain steelworks operating on furnaces we had great trouble in maintaining the normal standard type of breaker controlling the furnace transformers. These were continually giving trouble due to breakages. A lot of it was due to metal fatigue caused by the large number of operations they have to stand up to. We finally switched over to vacuum switches and these have been a very great success. To date one of them has done over 60 000 operations without any trouble. I thought I would just pass that on as a point of general interest. Thank you.

MR. J. A. LOUBSER, Benoni:

Mr. President, may I add my congratulations to yours and the others on Mr. Beck's paper. It was very interesting. I have only one question to ask and that is can Mr. Beck perhaps give us the comparison of cost between say SOB and SF6? Thank you.

MR. D. H. FRASER, Durban:

Mr. President, there don't seem to be many questions put to Mr. Beck and I don't think he should be let off quite so lightly. The installation of 132kV breakers at this Progress Substation certainly provided scope for the presentation of the paper to this Convention, but I wonder if Mr. Beck could just expand a little on the basis of the decision to put in circuit-breakers as distinct from the alternative of using the source and circuit-breakers and installing motorised isolators at the receiving end. He did indicate that the isolation of the transformer in those circumstances would have necessitated switching out one of the circuits, but presumably the transformers of the substations connected to the duplicate line are provided with complete standby. Is there really a difficulty in the isolation of a transformer? One of the problems of course is that of relaying protection circuits back to the source end transformer to tell operators to clear a faulty transformer. This can be overcome, but it may be that an economic comparison justified the installation of circuit breakers.

Thank you.

MR. K. G. ROBSON, President:

Thank you Mr. Fraser. Mr. Beck would you reply to the contributors.

MR. H. D. BECK, East London:

Mr. President, delegates, perhaps I should deal with Mr. Fraser's question first, or attempt to deal with it.

A point which I did not make in my presentation, but came to me as you asked your question, is that at this stage we do not have circuit-breakers at Stafford Switchyard which is the point where we take our supply from Escom. We rely on the Escom breakers for switching and protection purposes on the line. Perhaps it is not a very scientific reason, but it seems to be taking things a bit too far to rely on their breakers as well for further switching on this feed-off connection. That is the main reason.

Referring to Mr. Loubser's question on the cost of small oil volume circuit-breakers as compared with that of the SF6 breakers, I don't have the figures with me. I thought of tabulating them in the paper but that would have made it a little complicated. From memory the interesting point is that the small oil volume breaker offered as an alternative was actually marginally cheaper than the SF6 breaker. I think there was another breaker which was about the same price or a little more expensive, but it was a considerably more sophisticated breaker and it more than satisfied the requirements of the specification. The one which was more or less equivalent to the SF6 breaker, in this instance, was actually marginally cheaper.

It is interesting to hear the comments concerning vacuum gear at 11kV and I wonder, Mr. President, if there would be time for anyone to tell us whether they have in municipal service vacuum switchgear in operation at 11kV?

I would like to thank Mr. Kirschner, Mr. Howe and all the others who have commented for their interest. I would like to say that the method of checking SF6 gas purity by putting in a burning paper might be a bit hypothetical, because it is somewhat unscientific, but it is rather a way of demonstrating the characteristics of the gas than of considering that method as an actual check in practice. Similarly my reference to the air/SF6 mixture was intended rather to give reassurance as to how the mixture behaves than to suggest that the situation should be tolerated in practice because, as you point out Mr. Kirschner, you actually evacuate the interrupter head before you put the SF6 in. I would like to thank Mr. Howe for pointing out the complexities which can arise if you want to take care of every situation that can occur in the event of gas loss on a breaker of this type.

Finally I would like to state that Mr. Carswell of ESCOM has agreed to an inspection of SF6 132kV breakers at the Port Rex Gas Turbine Station this afternoon after the closing session. Arrangements have been made for Bus No. 1 to take those of you who wish to inspect these breakers to that Station. After the inspection the bus will either take you to the Airport or back to your hotels. The bus is a 49-seater and the tour will take about 30 minutes so if anybody is interested will you please show your hands so that we may know whether more than 49 want to go. Thank you very much for your interest and we look forward to seeing you on the bus this afternoon after the closing session.

MR. K. G. ROBSON, President:

May I repeat Mr. Beck's question? Would anyone care to offer the results of some experience with vacuum switchgear? It would add to the value of the paper.

MR. P. J. BOTES, Roodepoort:

Mr. President I can't offer any experience, but I can say that I installed a bank of 6.6kV vacuum switchgear just before I left for this Convention and, over the two-way radio, I heard some of my staff complaining because the phasing was out and it was difficult to check this. That is the only experience we have had so far.

MR. K. I. ANDREWS, Somerset East:

Mr. Chairman I would like to ask Mr. Beck if he has had any experience with regard to tracking on this type of switchgear. I have in mind the situation where the switch is in the open position, but energised on the one side.

MR. H. D. BECK, East London:

Mr. President, as stated in the paper, we plan to commission these breakers next month, so we have had no experience of tracking in the breaker and I hope we never will. Thank you.

MR. K. G. ROBSON, President:

We have now come to the end of what is the meat of the Convention in terms of papers and reports and I think you will agree with me that this paper of Mr. Beck's is indeed going to form a very valuable part of the records of this Convention. It is a timely paper and, as has been mentioned

by Mr. Barnard, it will be used as a reference work by many engineers in the country, dealing as it does with new developments. For the care which Mr. Beck has taken in preparing the paper and for his presentation I would like on your behalf to thank him. There is no doubt that the information that he has collated over a long period will prove useful.

In thanking you, Mr. Beck, may I — not-with-standing any chaffing that may ensue — present you with an AMEU tie.

TOEKENNING VAN ERELIDMAATSKAP — CONFERNMENT OF HONORARY MEMBERSHIP

MR. K. G. ROBSON, President:

Mr. Mayor, Madame Mayoress, distinguished guests, Ladies and Gentlemen, first of all may I say how delighted we are to have you back with us this afternoon, particularly the ladies up in the gallery and those down here in front of me. With due regard to the Escom representatives, it certainly has improved the picture in the front row that I have grown accustomed to over the past few days.

The first item on the agenda this afternoon is one that we in the AMEU consider to be certainly as important as any other in our proceedings and that is the conferment of Honorary Membership of the AMEU on a number of distinguished Engineers down through the years. I must say that Honorary Membership is not lightly given. The decision to do so is taken only after careful consideration and in exceptional cases and we are particularly privileged to have at this 1977 Convention four distinguished Engineers whom we wish so to honour. It is my privilege first to call on Mr. Piet Botes who will propose conferment of Honorary Membership on Dr. R. L. Straszacker.

MNR. P. J. BOTES, Roodepoort:

Mnr. die President, mnr. die Burgemeester, Burgermeestersvrou, dames en here,

Dit is nie 'n maklike taak om besonderhede van Dr. Straszacker se werk en prestasies te skets nie. Nie maklik nie in dié sin dat hy reeds só baie in sy leeftyd vermag het dat 'n mens eintlik baie tyd nodig het om daaroor te praat. Aangesien tyd so beperk is, moet ek my dus net tot die hoofpunte beperk. Gebore in 1910 in die Oranje-Vrystaat, matrikuleer hy 15 jaar later aan die Hoërskool Vrede. Ek het ook by dieselfde hoërskool gematrikuleer en daarom is dit vir my so 'n groot voorreg om Dr. Straszacker vir erelidmaatskap voor te stel.

Toe Dr. Straszacker in 1929 sy graad BSc (Ing) met lof aan die Universiteit van die Witwatersrand verwerf het, het ek egter eers die eerste lewenslig aanskou!

In 1930 word die destydse Unie se nagraadse beurs vir buitelandse studie aan hom toegeken en nadat hy in 1931 die graad MSc (Ing.) verwerf het, vertrek hy na Duitsland vir verdere studie waar hy in 1933 eers die graad vir Dipl. Ing. met lof en 'n jaar later ook die graad D.Ing. met hoogste lof verwerf.

In 1935 aanvaar hy 'n lektoraat in Meganiese Ingenieurswese aan die Universiteit van die Witwatersrand en in 1941 'n senior lektoraat aan die Universiteit van Stellenbosch. Hier het hy gehelp met die stigting van die Ingenieursfakulteit en baanbrekerswerk gedoen om 'n Afrikaanse ingenieursvaktaal te skep. In 1944 word sy arbeid op gepaste wyse beloon met 'n professoraat, 'n pos wat hy tot in 1962 beklee het. Dit was vir my dan ook 'n besondere voorreg om onder leiding van Dr. Straszacker in Stellenbosch te studeer. So ook 'n groot aantal ingenieurs vandag hier teenwoordig.

In 1962 het hy die voorsitterskap van EVKOM oorgeneem maar sy verbintenis met EVKOM gaan sover terug as 1952 toe hy lid van die Kommissie geword het. As Voorsitter van EVKOM is groot eise aan hom gestel.

Kenmerkend van Dr. Straszacker het hy die probleme as Ingenieur en nie as Wetenskaplike aangepak. Vroeg in 1966 gee hy 'n toekomsblik van kragvoorsiening tot aan die einde van die eeu en daarmee word die grondslag gelê vir die gekoördineerde beplanning van kragvoorsiening in die hele Republiek.

Kort na sy ampsaanvarding as Voorsitter van EVKOM het Dr. Straszacker die jaarkongres van die VMEO in Margate geopen en daarmee die fondament vir hegte samewerking tussen die munisipaliteite en EVKOM gelê.

Onder sy leiding is onderhandelings met die Portuguese oor die invoer van elektrisiteit vanaf Cabora-Bassa begin wat later gelei tot 'n ooreenkoms tussen Portugal en die Republiek.

Dr. Straszacker het groot bydraes tot die ontwikkeling van ons land as lid van verskeie staats- en openbare instansies gelewer. Hieronder tel die Buro van Standaarde, die WNNR, die Raad op Atoomkrag, die Wetenskaplike Adviesraad van die Eerste Minister, die Adviesraad vir die Oranjerivierprojek en die Beplanningsadviesraad van die Eerste Minister. So byvoorbeeld ook het die verslag van die Desimalisasiekomitee van die Raad van Standaarde wat onder sy voorsitterskap opgestel is die grondslag gevorm vir die desimalisering van ons muntstelsel.

As bewys van Dr. Straszacker se briljante en uitnemende loopbaan is die feit dat hy reeds met drie ere-doktorsgrade beloon is deur die Universiteite van Stellenbosch, RAU en Witwatersrand.

Mnr. die President, dit is dus met groot genoeë dat ek aanbeveel dat hierdie Vereniging erelidmaatskap aan Dr. Straszacker toeken vir voortreflike diens wat hy gelewer het aan elektrisiteitsvoorsiening in die besonder op Nasionale en internasionale vlak. Dankie.

MNR. K. G. ROBSON, President:

Hiermee word meegedeel dat hierdie Sertifikaat namens al die lede van die Vereniging toegeken is aan Dr. Rheinhardt Ludwig Straszacker. Dr. R. L. Straszacker is gekies as 'n ere lid van die Vereniging van Munisipale Elektrisiteitsondernemings van Suid-Afrika in Mei 1977 en hierdie Sertifikaat is 'n aandenking van sy verbintenis en sy getroue dienste deur bevordering van die doelstellings van die Vereniging. Baie hartlik geluk Dr. Straszacker.

DR. R. L. STRASZACKER, EVKOM:

Mnr. die President, mnr. die Burgemeester, dames en here, u het so pas gehoor dat ek 'n paar eerbetonings reeds ontvang het. Ek kan vir u sê dat vandag vir my 'n heel besondere dag is want u weet as ek terug dink aan die houding wat daar was tussen Evkom en u Vereniging in die jaar 1962/1963 toe ek die eer gehad het om u Konvensie te open en ek sien wat die houding vandag is deurdat dieselfde Vereniging nou aan my hierdie baie hoë eer betoon, die hoogste eer wat hulle kan toeken, dan voel ek werklik 'n groot mate van genoegdoening dat hierdie verhouding so goed kan wees. Ek voel dit besonder aan omdat ek op daardie stadium eers gevoel het dat daar geen onderskeid tussen ons behoort te bestaan nie. Die VMEO en Evkom strewe na presies dieselfde doel en dit is om ons land te dien deurdat ons elektrisiteit voorsien daar waar dit nodig is. Daar is in die verskil tussen Evkom en u Vereniging eintlik maar net een, en ek sal sê 'n klein verskil, en dit is in die orde van grote waarin ons funksioneer. Daar is geen verskil in die strewe na die soort diens wat ons wil lewer. Ons lewer elektrisiteit aan die land. Dat daar 'n groot deel van hierdie elektrisiteit deur u organisasie gaan is vir ons net 'n grondslag vir blydskap want ons weet dit is in hande wat daardie diens baie goed begryp en baie goed verstaan en dit op dieselfde wyse wil verrig as wat Evkom probeer doen. Ons lewer in baie gevalle direk aan u en u lewer dan verder aan die verbruiker. In enkele gevalle lewer ons ook regstreeks aan die verbruiker maar daar is eintlik geen botsing van belange nie. Wanneer dit kom by die kwessie van wat 'n mense vir daardie diens moet betaal, dan is dit natuurlik so dat ons aan 'n Wet gebonde is wat nog al vir u lede nie heeltemal so stremmend is nie, want u Wet sê nie dat u geen profyt mag maak nie maar ons Wet sê dit wel. Ons moet lewer teen koste. Nou kan u natuurlik argumenteer dat die verandering van ons Wet wat ons 'n paar jaar gelede in staat gestel het om 'n kapitaalontwikkelingsfonds te stig, dat dit 'n bedekte wins is, maar u sal baie goed ook weet as besigheidsmense, veral u raadslede wat in die sakewêreld staan, sal weet dat dit niks anders is as 'n gesonde beginsel om 'n bietjie voorbrand te maak vir die toekoms. Ons sien dus ook hierdie kapitaalontwikkelingsfonds as net 'n assuransie vir die voorsienings te alle tye van voldoende, elektrisiteit teen wat ek altyd nog beskou as 'n baie billike prys. Dit is altyd 'n bietjie gewaag om voorspellings te waag maar ek dink ek kan dit vir u sê dat die basis waarop die tariefverhogings van onlangs moes plaasvind, sal ons nou in staat stel om vorentoe baie meer redelike aanpassing van tariewe te kan volg, miskien net van die orde van wat ons deur die inflasiedruk moet indervind.

You will recall, ladies and gentlemen, that the Honourable Minister, Mr. Botha, expressed a view here that we should all think of the future of our Country in the sense that we should save electricity. Now I am in full agreement that we should not waste electricity, but I must sound a note of warning that, as in everything in life, one must never go to extremes. I believe that it will be a hardship for Escom exactly as it will be a hardship for your members if we drive this saving campaign to an extreme. We all have to project into the future and we all have to build

Dr. R. L. Straszacker, voorsitter van Evkom, ontvang sy Sertifikaat van Erelidmaatskap van Mnr. K. G. Robson, President van die VMEO.

Mr. A. A. (Pat) Middlecote of SABS receives His Honorary Membership Certificate from the President.

on what we hope is going to be our income from the sale of electricity. All municipalities have to do that; we as Escom have to do that and there is a very large qualification that I would like to add to this idea of saving electricity and that is saving it in the right place. When I say that, I mean anything that can help to decrease the installation of new equipment is the right way of saving, because this equipment is so expensive. The capital that we have to find in order to be able to install such new equipment is large and also it is expensive in the rate of interest we have to pay to obtain it. If we can save in this direction this is exactly what we should try to do, but if we want to save every little kilowatt hour in units then we get to the stage where we have a lot of existing plant which suddenly finds itself not bing used to its best capacity and, in that sense, saving kilowatt hours in the wrong place may not be very helpful. If we keep this in mind, Mr. President, I believe that this is a thing that your Association can do to help in reducing the future demands for electricity as much as possible. Once again Mr. President I would like to thank you very much indeed for the singular honour which you have bestowed on me this afternoon, an honour which I value — I'm quite frank in saying this — more than anything else I have received up until now. Thank you very much.

MR. K. G. ROBSON, President:

It is now my privilege to call on Mr. Wessel Barnard, the City Electrical Engineer of Johannesburg, to propose conferment of honorary membership on Mr. A. A. Middlecote.

MR. W. BARNARD, Johannesburg:

Mr. President, Mr. Mayor, Madame Mayoress, ladies and gentlemen, the AMEU Constitution provides for the election by the Convention, of Honorary Members, who shall be "Distinguished persons whom the Association desires to honour for outstanding services'. There surely cannot be anybody more deserving of this honour than Alfred Albert Middlecote.

Pat graduated from the University of Cape Town with the degree of BSc in Electrical Engineering (cum laude) in 1940 and, after serving in the Navy during the war, joined the S.A.R, where he served as an engineer in the Electrical Test and Research Laboratories until 1953, after which he joined the SABS and was appointed Director of Electrical Engineering and Physics in 1968, and Deputy Director General on 1 September 1975.

During his career, Pat has led 13 Delegations to International Electro-Technical Commission Annual meetings and at the Washington Meeting in 1970 he was appointed Chairman of IEC/TC 64 on Electrical Installation of Buildings. He also serves on many other councils and committees and is a Past President of the SAIEE.

Pat's association with the AMEU has been long and illustrious. He first attended the AMEU Convention at Bloemfontein in 1954. This, from all reports, was quite uneventful and few probably realised what was to come in later years.

The first paper Pat presented was at Margate in 1957 on "Earth Leakage".

This paper is still, today, used as a work of reference, but I believe he made his mark also in other directions. From authentic sources I hear that, on the second day, he was elected a judge of the Hibiscus Beauty Queen Competition and, on the night of the finals, was seen streaking through the centre of Margate adorned only by a double Hibiscus behind his left ear and being chased by an unsuccessful beauty queen.

The second paper Pat presented was on "The Effect of Standardization on the Economy of Electricity Supply" at East London in 1962. If one takes account of the cost, as opposed to the economy of electricity supply — in particular, supply from Escom — I would suggest he "Cast His Pearls Before Swine".

The third paper, presented at Port Elizabeth in 1965 on "Transmission and Distribution Line Equipment", has completely evaded me. I have tried to obtain a copy from every possible source, but in vain.

I finally contacted the previous Secretaries, who informed me that all copies of the Proceedings of this most memorable Convention had to be destroyed on instructions from the Censor Board.

His fourth paper, presented at Umtali in 1969, was on "The Analysis of kWh Consumption Curves". This paper is certainly a valuable addition to the AMEU's Proceedings. It was at this time Pat also became involved in committees dealing with metrication. For the information of the ladies and affiliates this means converting to centimetres. I believe he took along the first metric tape measure to this Convention and, before the last day, had converted to metric units, all curves of the Delegates' wives by direct measurement.

The last paper presented to date was at Kempton Park (Technical Meeting) in 1974, on "The Responsibility of the Power Supply Engineer as Regards Formulation of Standard Specifications" and, today, I estimate he has more Municipal Engineers working for the Bureau than for the municipalities.

Pat has certainly left his mark and we hope will continue to do so for many years to come, and I have great pleasure in formally recommending that Mr. A. A. Middlecote be elected an Honorary Member of the AMEU.

MR. K. G. ROBSON, President:

Mr. Mayor, Madame Mayoress, Ladies and gentlemen,
"Be it known hereby that this certificate has been presented on behalf of all the members of the Association to Albert Alfred Middlecote. Mr. A. A. Middlecote was elected an Honorary Member of the Association of Municipal Electricity Undertakings of South Africa in May 1977 and this certificate is a token of appreciation of his long and loyal services in fostering the objects of the Association".

MR. A. A. MIDDLECOTE, SABS:

Mr. President, Mr. Mayor, Madame Mayoress, Ladies and Gentlemen I would like to thank you sincerely for this great honour you have bestowed on me today. I have had some 23 years close association with the members of your Association and had begun to feel that I was indeed one of them. Today you have made me a member and my cup may now be said to be full.

I have always had the highest regard for city and town electrical engineers. They have the important task of ensuring reliable and low-cost energy to our industries and this is an essential requirement for sound industrial and economic growth. Also, because they can measure energy growth accurately, they are in a position to accurately forecast general trends in the progress of the community — much more so than any of the other professional men. I pointed this out in a paper to you in Umtali some eight years ago and might say that work I have continued to do in this regard emphasises this. The municipal electrical engineer is indeed in a position to become a real leader of the community.

I attended my first AMEU Convention in Bloemfontein in 1954. Your President was then Mr. Muller, City Electrical Engineer of Bloemfontein.

It was then that I decided to get to know this marvellous set of people known as municipal electrical engineers, who worked for corporations. I started by finding out exactly what a corporation was and my investigations found that a Mr. Walsh many years ago defined the corporation to the Tralee Assizes (and it had to be an Irishman to do this) as follows:

"A corporation cannot blush. It is a body that is true and it certainly has a head — a new one every year. Arms it has — very long ones which can reach deep into anyone's pockets. It has a throat to swallow the rights of the communtiy and a stomach to digest them. But who ever yet discovered in the anatomy of any corporation either soul or heart".

These sardonic words were said long before there was electricity supply to bring light to the corporation and constitute its soul. And the city electrical engineer provided the heart to the corporation, suitably fortified where necessary by an electrical pacemaker.

I then turned my attention to the make-up of the electrical engineer himself and as usual delved into history.
Electrical engineering has classic origins since it was the Greeks who found that when amber was rubbed it — to quote — "would pick up straws and bits of fluff". Ever since, municipal electrical engineers have clutched at straws and picked up bits of fluff mainly in clubs and pubs.
Tact and understanding came when Englishman Gilbert of Colchester found a similar effect was produced when other substances were rubbed. This experience taught us never to rub people or authorities up the wrong way and get a negative return. The right way always gets positive results.

The first important application of science in electrical engineering was when Edison or Swan or both found that if a charge passed through the filament of a lamp you got light.

This memorable discovery was immortalised by the poet Laureate, Alfred Lord Tennyson when he wrote "The Charge of the Light Brigade".

This poem is also worth attention because it shows us engineers how much more difficult it is for a poet to change to the metric system. He has not only to metricate, i.e. change to the metre but also metrify, i.e. change the metre

of his verse. Under existing systems the "Charge of the Light Brigade" reads:

"Half a league
Half a league
Half a league onward
Into the valley of death
Rode the six hundred"

This becomes, when fully metricated and metrified:

"Two thousand four hundred and fourteen metres
Two thousand four hundred and fourteen metres
Two thousand four hundred and fourteen metres onward the few
Into the valley of death rode the six times ten to the two"

Economics entered the life of the electrical engineer when municipalities discovered that electric charges or currents could give light or drive motors. They saw a golden opportunity for offsetting the financial losses on other activities such as roadmaking or Parkinson's disease. They charged the Engineer to charge for his charges. This resulted in Tariffs and Capitalisation formulae. Lord Kelvin did excellent work in this regard by helping invent the house service meter. He also invented the Kelvin current balance by means of which he would weigh currents. We, being metricated, would no doubt now call it the Kelvin current mass meter. This not only proved to be an excellent standard but also led him to the discovery that there were two kinds of current. Heavy current which could make light or drive motors and light current which could work telephones and radios. He thus also invented the heavy and light current engineer.

It was not long however, before we found out that there were in fact other kinds of current. These middle, light heavy, and welter currents led to the acceptance by most that one has just to be a plain electrical engineer.

The Presidents of the AMEU it has been my pleasure to know have been leaders as well as engineers — but have also been pleasant and entertaining people and in many cases "characters". Clarence Kinsman, Halle, Jimmy Mitchell, Hannes van der Walt to name but a few hardworking but also quick-witted. I always remember the first paper I presented to you at Margate in 1957. It was on "earth leakage". Mr. Sibson of Bulawayo, whom many of you will remember as an excellent musician who headed his own orchestra, in his vote of thanks explained how he got caught up on some live wires and got badly shocked by the earth current which flowed through his body. As quick as lightning, the President, Hannes van der Walt, quipped — "So now we all know how Mr. Simpson became a conductor".

One also remembers the case of the small town electrical engineer who during the members' forum cited a case of a bull electrocuted by a fence which had become alive and wanted advice as to who was liable. Clarence Kinsman immediately referred the matter to Jimmy Mitchell who, he said, was so good on cattle he was exporting some to the Argentine and was a first class bull shipper.

I hope and trust that for all the serious work you must do during your Convention you will all retain your predecessors' quick wit and humour and continue to make such Conventions the enjoyable affairs they have always been.

I would also like to mention the fine people one has met among the affiliates and visitors attending your Conventions. One in particular perhaps is that fine French scholar Monsieur Jorrison known for short as Mon Jorrison.

A wonderful raconteur; a great friend of Dr. Spooner; and a fellow with a most amazing set of friends. One of these, Mat Diddlecote (I thank Mon Jorrison for sparing me the more obvious but much ruder spoonerism), does the most amazing things at Mon's behest, such as inventing Gogonometers to convert go-go girls' frictional energy into electrical energy.

However it was not Mat who did the research work on the gogonometer. Being a member of the SABS he referred this work to Wordy van Dyk of the CSIR who awoke from hibernation, rubbed himself and thus picked up the necessary bits of fluff. Since CSIR is rather pressed for funds he fed these into a discriminator thus rejecting those with positive charges and only accepting those with negative charges. These he fed into his analogue computer and then set them up on his Integrated Circuit Manufacturing Unit of which he is always bragging. What happened then I cannot tell since this is classified work and Wordy shows very few people his famous Integrated Circuit Manufacturing Unit.

When the problem was solved he referred the matter back to the SABS asking them to draw up a standard specification for gogonometers and more important a Code of Practice for Safe Handling of Go-Go Girls. The specification was completed very soon but the Code has got gummed up in the committee stages mainly due to the large membership of the committee. It is a popular project and the AMEU itself provided a dozen members — including the co-ordinator himself — Piet Botes.

Mr. President — my speech of thanks to you has been in a light vein, but do not be misled. It is but a light cover to a sincere and serious appreciation of the honour you have done me today.

MR. K. G. ROBSON, President:

Thank you Mr. Middlecote. Ons kom nou by die toekenning van ere lidmaatskap aan mnr. C. G. Theron en stel nou mnr. Jules von Ahlften aan die woord. Hy is die Elektrotegniese en Meganiese Stadsingenieur van Springs.

MNR. J. K. VON AHLFTEN, Springs:

Meneer die President, mnr. die Burgemeester, dames en here, ek ken Hawie Theron seker beter as die meeste van sy kollegas daar ek die voorreg gehad het om as jong leerling ingenieur vir 4 jaar saam met Hawie te kon gewerk het. Hy was 'n streng maar regverdige leermeester en kon ek baie van hom leer waarvoor ek hom dank verskuldig is. Hy en Jireh het my natuurlik ook geleer hoe om "baby sitting" te doen — dit is nou nie die soort wat julle aan dink nie — dit is die soort met doeke aan.

Hawie kom 'n lang pad saam met die VMEO en het vir baie jare op die U.R. gedien en ook as President tydens daardie genotvolle en uitstaande Konvensie in L.M. in 1967. Hawie het ook die grondslag gelê van die baie suksesvolle SABS ko-ordinerende komitee met sy besondere kennis van munisipale elektrisiteitsvoorsiening en dit was derhalwe ook nie verbasend dat hy die eerste persoon was wat die VMEO by 'n internasionale vergadering van die IEK in Brussels verteenwoordig het. Hawie het oor die besondere vermoë beskik om as President die vergaderings van die U.R. doelgerig te lei en dit was derhalwe vir die VMEO 'n voorreg om hom as President te kon gehad het. Dit is net jammer dat Louis Jamneck ook nie vandag hier teenwoordig is nie.

Mr. President, Hawie Theron was elected to the Executive Council for the first time in 1962 when the Convention was held in East London when Percy Giles assumed the office as President. I therefore think it fitting that after a period of 15 years Honorary Membership should be bestowed upon Hawie at the same venue and in the same hall.

In terms of our Constitution Honorary Members shall be distinguished persons whom the Association desires to honour for outstanding services and I can think of no one more suitably qualified to receive this honour than Hawie Theron. It therefore gives me great pleasure in formally proposing that Honorary Membership be bestowed upon him.

MR. K. G. ROBSON, President:

Mnr. die Burgemeester, mev. Yazbek, dames en here, "Hiermee word meegedeel dat hierdie sertifikaat namens al die lede van die Vereniging toegeken is aan Gabriel Christiaan Theron. Mnr. G. C. Theron is gekies as 'n erelid van die Vereniging van Munisipale Elektrisiteitsondernemings van Suid-Afrika in Mei 1977 en hierdie sertifikaat is 'n aandenking van sy verbintenis en sy getroue dienste ter bevordering van die doelstellings van die Vereniging". Baie hartlik geluk, Hawie.

MNR. G. C. THERON, Vanderbijlpark:

Mnr. die President, mnr. die Burgemeester, dames en here. Baie dankie vir hierdie baie groot eer wat u aan my gedoen het. Ek ken vir mnr. von Ahlften, het hom geleer ken as 'n baie ernstige persoon, 'n jong man by my.

Maar mnr. die President, vir die wat wel in die verrigtinge van die Vereniging opgeteken staan, vernaamlik die hoogte punt, die besoek en afvaardiging aan Brussels waar ons die eerste keer die eerste treëtjie gegee het op die internasionale vlak. Daarvoor en vir die ander dinge wat daar wel aangeteken staan sê ek vir die lede van die VMEO, en die Uitvoerende Raad wat saam met my behulpsaam daarvoor was baie, baie hartlik dankie. Sonder u hulp en u bystand, sou ek dit nie kon bereik het om 'n paar handtekeninge aan die verrigtinge te kon kry nie. Vir die groot eer van vanmiddag baie hartlik dankie — dit is die hoogte punt in my loopbaan. Dankie.

MR. K. G. ROBSON, President:

And now finally, it is my privilege to call on Mr. Denis Fraser, the City Electrical Engineer of Durban, to propose Mr. Waddy as an Honorary Member.

Mnr. G. C. (Hawie) Theron voormalige President van die VMEO,ontvang sy Erelidmaatskap Sertifikaat van die President, Mnr. K. G. Robson.

Mr. John Morrison express a word of appreciation on behalf of the Affiliates.

MR. D. H. FRASER, Durban:

Mr. President, Ladies and Gentlemen,

I have been privileged to know Mr. Jack Waddy for many years but confess that I have only now found out that his real name is John. During this time I have learned to respect him for his ability, integrity, perseverance and numerous other sterling personal qualities. Above all, I admire his courage in adversity which in recent years has been an example to everyone who has witnessed his determination in overcoming difficulties and in making re-adjustments after several serious illnesses.

Jack was born in Regina, Saskatchewan, Canada, but received his education and training mainly in England. His early engineering experience was with private industry, but he was drawn into the municipal sphere when he joined the Johannesburg Electricity Department on emigrating to South Africa in 1938. He responded to his adopted country's call soon after the start of World War II and served in the South African Engineer Corps until he was recalled for essential civilian service.

In 1952 he came down to the heart of the Garden Province to become Assistant City Electrical Engineer and Transport Manager of Pietermaritzburg. Five years later he was promoted to head the Electricity Department and has guided the expansion and development of the Electricity Undertaking in the Capital City for the past 20 years.

His association with the AMEU goes back as far as 1954, when he became en Engineer Member. Since then he has rendered invaluable service to our Association, having served on the Executive Council for several periods. He is a foundation member of the Natal Branch, which he helped to form in 1958 and acted as its Chairman in 1960/61.

The wonderful contribution which Jack has made to the AMEU was recognised when he was elected to the office of President in 1973. This function he carried out with distinction and his dedication to this task earned him the admiration of all.

Jack Waddy has also taken an active part in furthering the interests of the profession of Electrical Engineering in South Africa through membership of the S.A. Institute of Electrical Engineers. He gave freely of his time as a member and also Chairman of the Natal Centre Committee and was justly rewarded by the Institute when he was appointed to the office of Honorary Vice President.

Mr. President, Ladies and Gentlemen, I am sure you will agree that Jack Waddy, with the support and encouragement of his charming wife, Phyll, has left his mark in the annals of Municipal Electrical Engineering in this country.

The time is approaching when he will take a well earned rest in retirement from his present onerous responsibilities as City Electrical Engineer of Pietermaritzburg. It is fitting that he should join the ranks of the AMEU who have been honoured for their service.

It is with much pleasure therefore, that I propose John Coulson Waddy for Honorary Membership of the AMEU.

MR. K. G. ROBSON, President:

Mr. Mayor, Madam Mayoress, Ladies and Gentlemen, "Be it known hereby that this Certificate is being presented on behalf of all the members of the Association to John Coulson Waddy. Mr. J. C. Waddy was elected Honorary Member of the Association of Municipal Electricity Undertakings of South Africa in May 1977 and this Certificate is a token of appreciation of his long and loyal services in fostering the objects of the Association." My sincerest congratulations.

MR. J. C. WADDY, Pietermaritzburg:

Mr. President, Mr. Mayor, Madam Mayoress, Ladies and Gentlemen, I have no hope of matching the eloquence to which you have been treated by several previous speakers, so I would just like to thank Mr. Fraser in the first place for his kind remarks and I would like to say that what he calls courage is, merely the survival instinct, the desire to remain alive. When I received the Agenda of the Convention I was very surprised but also very pleased to see that when I was to be made an Honorary Member of the Association — I was surprised because I had heard nothing about it and I was also somewhat perplexed — I think perplexed because I felt that I had not really earned this, the benefits that I had derived from the Association very greatly outweighed or, Pat, should I say "outmassed" the little that I had been able to do for it. I was also very pleased because I know what an important body this Association is and what a great deal it contributes directly and indirectly to the life of this nation. It serves not only the municipalities, but also a great majority of the residents in our cities and even some of our rural areas by assisting in providing an efficient, safe and economical supply of energy for all their requirements in their factories, on their farms, in their businesses and in their homes. Mr. President, finally I would like to say that I greatly appreciate this honour and that the Certificate which you have kindly presented to me will be hung on a wall in my house in a prominent position, where it will be a constant reminder of the many friendships and the very happy times that I have enjoyed in this Association over the years. So I say thank you to you all — the Engineer Members, the Affiliates, the Councillors and all the ladies who have attended these Conventions and whom I have had the pleasure of knowing throughout the years. Thank you.

AFSLUITINGSTOESPRAKE — CLOSING ADDRESSES

MR. K. G. ROBSON, President:

It is now my pleasure to call on His Worship the Mayor, Councillor J. A. Yazbek to give the Closing Address on behalf of the City of East London.

FAREWELL SPEECH BY HIS WORSHIP, THE MAYOR, COUNCILLOR J. A. YAZBEK.

Mr. President, ladies and gentlemen, thank you very much for giving me the opportunity to speak to you again — this time to say farewell and to wish you all a safe return to your homes. The Mayoress and I, the City Councillors and the people of East London have indeed been most happy to have had you all with us for this short while.

From what I have seen and heard, this has indeed been a most successful Convention and I am in no doubt that much of what you have discussed, heard and learnt will be taken back with you to your various undertakings and organisations.

My congratulations to all who were involved in the planning and organisation of this 45th Convention with its action packed programme. A special word of commendation to those members of the staff of the Electricity Undertaking who worked so hard and enthusiastically to ensure the success of this memorable Convention and to your Secretary, Mr. Bennie van der Walt for his contribution to its undoubted success.

It has been for my wife, Bertha and me, a pleasure to have met so many of you during this week. It remains for me only to bid you farewell and may travelling mercies be yours as you go your several ways home.

MR. K. G. ROBSON, President:

Mr. Mayor, Ladies and Gentlemen, we have a number of very fine traditions in the AMEU and traditions are not easily formed, but this is one that has become so much part of the Conventions of the AMEU that without it, something would certainly be lost. I don't need to say anything more because you will see just what that tradition means to us after I have called on my very good friend Mr. John Morrison to make the Closing Address on behalf of the Affiliates.

MR. JOHN MORRISON, Affiliate:

Mnr. die President, mnr. die Burgemeester, dames en here,

Viertien jare gelede het ek my eerste toespraak gelewer by 'n VMEO Konvensie, en nou eers moet ek verneem dat dit beter is om te swyg en 'n gek te lyk, as om jou mond oop te maak en dit te bevestig.

Ek sal nooit leer nie.

This morning we had a most enlightening paper by Mr. Leach on "The Management of Loss Causation" and at the end, I was sorely tempted to contribute by cataloguing the innumerable causes of loss that keep your Affiliates in the constant state of extreme poverty.

However, time was short and I felt that this was possibly a subject that might serve to uplift the intellectual standard of my own contribution which, over the past years, may appear to have deteriorated into an intimate discourse on the generating capacity of go-go girls. Accordingly, I propose to devote the next hour or so to a serious examination on that section of Mr. Leach's paper which covered the aspect of how business is subject to constraint by the environment in which it operates.

Here I make reference to the CIGRE Study Committee No. 31 which met in Paris last year, when the Australian delegate complained that the new generating plant in Melbourne had been banned for three years, because the discharge of warm water into the bay had raised the temperature by 2° Celsius, regardless of the fact that the surface temperature of these waters would change by as much as 7° during the course of a single day.

This report prompted me to look further into our own problems of temperature control and I have come across two quite conflicting examples.

Firstly, we had the case some months ago of dead mackerel being washed up on the Cape beaches when it was flippantly suggested that Escom, by the strategical use of their cooling towers, might consider diversification both into the fishing and the catering industries by serving up the end product already poached.

Conversely, an extract from the local council minutes indicates that the Manager of the Municipal Swimming Baths is experiencing difficulty in keeping his temperature down when some of the local lovelies take the plunge. He complains that this causes his glasses to steam up and has now applied for help in the form of an exposure meter. Isn't it a strange phenomenon Mr. President, that whenever you see an electrifying girl, she is not too well insulated which, of course, bears out the current fashion forecast that nothing will replace the bikini — and in many cases it already has!

Reading further into the minutes, I notice, with interest, that one councillor has even suggested building a complex of three swimming baths — one with hot water — one with cold and one empty — because not everyone can swim!

In other areas, it is established that we now have a permanent team of geologists prospecting for oil — on Durban beach — and you will also recall that one of our members was plagued by newspaper reports that the smoke from their oil-fired furnaces caused nylon to disintegrate and that ladies were embarrassed when intimate articles of clothing fell down in the street. Whilst this devilish accusation was hotly denied by the City Electrical Engineer, I can only report on the fact that in our local branch alone 320 man hours were lost by sales representatives hanging around the power station with the hope of picking up a little bit of business.

Not for one moment am I suggesting that all pollution problems are to be found at the coast. We, in Johannesburg, suffer from smog and some of our more careful citizens have now taken up smoking in the belief that it is considered safer than breathing.

I hasten to add that these environmental troubles also apply to your Affiliates in the normal course of their business lives. Take for example my own trip down to this Convention.

Since the introduction of petrol restrictions, journeys have to be carefully planned and I calculated that a tank full would enable me to reach the little dorp of Blikkiesfontein by nightfall. On arrival, I was greeted with the news that the only available accommodation was to be found in the Caledonian Hotel — an establishment which, in the gathering dusk, closely resembled a derelict farmhouse — long since abandoned by the more selective cattle.

Admittedly, it had not been recommended in the A.A. Manual — which was strange, because I would have thought that it was absolutely first class for breakdowns! And in this category, I include the ancient blonde receptionist, who must have been at least 80 in the shade and had had her face lifted so many times there was absolutely nothing left in her shoes. I suppose I should have had a warning of what there was in store for me when I came to sign the register where there was an extra column headed "Next of Kin" — but I was tired and spurred on with the parting comment that dinner would be off in 10 minutes, I went straight through the door labelled "Eet Kamer" to find myself the sole occupant of a room in which the only movement was the erratic churning of an old fan which probably did part time service as an egg whisk.

My arrival undoubtedly generated a flurry of activity behind the proverbial green door which ultimately edged open to reveal a wizened old African — apparently of Egyptian ancestry, in that he was wearing a dirty long nightshirt and had a moth-eaten fez perched on top of his head. He promptly announced that "dinner was off" but after discussing his parentage at length, we finally established that there was still a little cottage pie left — which duly arrived in a dish engraved with the name "Rover".

The stoney silence which greeted my angry complaints could only have been bettered by the Sphinx itself, and then with a sleight of hand that would have been the envy of every Municipal rate fixer, he produced a grubby card from his nightshirt which read:

"If you consider the waiter uncivil — you ought to see the Proprietor".

Unfortunately for me, Mr. Cameron McTavish had pure Scotch blood in his veins — at that stage about 90% proof which I immediately realised as he addressed me from a distance of 4 inches.

"Aha — Mr. Robson", he shouted (well that was a bad omen to start off with!) "I hear that you are complaining about cockroaches — well let me tell you there is not a single cockroach in my hotel — they're all married with children", and with that I signed for a bottle of whisky and we drank to their health. Many cockroaches later as I stumbled up to bed, he grasped my hand and in a confidential whisper announced, "You know, Mr. Robson, I never forget a face — but maybe just in your case, I will make an exception".

I shall never know whether it was the lack of food or the surfeit of drink, but that night I had a terrible dream that McTavish was forcing me to eat a huge plate of spaghetti. With relief I finally awoke — only to find that my pyjama cord was missing!

By now Mr. President, you will realise that, contrary to general belief, the lives of your Affiliates on their stormy voyages are beset with a multitude of environmental hazards — and this is why we welcome shelter in the safe harbour of your Convention. Here we relish the calm intellectual uplift of many fine papers; we bask in the warm hospitality extended to us by the Mayor and the Mayoress who cared so well for our ladies: we admire the facilities so efficiently provided by the Electricity Department and Bennie van der Walt and, last but not least, we enjoyed the very great pleasure of meeting old friends once more.

On behalf of the Affiliates, Mr. President, may I congratulate you on a wonderful Convention and thank you personally for the happy environment in which it was conducted.

MR. K. G. ROBSON, President:

Mnr. die President, dames en here dit is vir my nou aangenaam om mev. Annatjie van der Walt aan die woord te stel namens die dames.

Mev. Annatjie van der Walt:

Mr. President, Mr. Mayor, Madame Mayoress, on behalf of the ladies I would like to thank the gentlemen for deciding to hold this Convention of the AMEU in East London. But for this, we would not have been here and would not have had this lovely week we have enjoyed so much in East London. Thank you to the people of East London, it was most lovely to be in your hospitable City and to enjoy the love and care of our hostess, Maureen.

It was a most enjoyable stay and we, the ladies, would like to thank you very much for everything you arranged for us.

We wish Mr. Robson well on his Moscow trip. Take with you the sunshine and the light of South Africa. Take also with you the love and goodwill of this Convention. Have a fruitful meeting in Moscow, bring back all possible tips you can get and return home safely. Thank you very much.

MR. K. G. ROBSON, President:

Dankie Annatjie,

Dames en here die tyd het nou aangebreek om af te sluit.

Hierdie Konvensie is 'n onvergeetlike geleentheid in my lewe en ek is seker dat die sowat 500 afgevaardiges wat gedeel het in die verskillende bedrywighede en funksies gedurende hierdie vier dae, ook voel dat die samesyn aangenaam was. Ou vriendskappe is hernuwe en versterk en nuwes is gevorm.

Daar is 'n groot aantal persone en organisasies aan wie opgeregte dank uitgespreek moet word en sonder wie se geesdriftige samewerking en uiters harde werk dit nie moontlik sou gewees het nie.

Dit is vir my 'n baie aangename taak om dankie te sê

First of all, ladies and gentlemen, on behalf of the Executive Council and all delegates and their ladies, grateful thanks to His Worship the Mayor, Councillor Joe Yazbek, and the City Council for hosting this 45th Convention and for the delightful Civic Reception on Tuesday evening. I have said, Mr. Mayor, so many times in public and also in private to you just how much we, the delegates, and certainly those of us who have been responsible for the organisation, have appreciated the tremendous amount of time that you and the Mayoress have given to us here during this Convention. You have no idea what a difference it makes to the President's job and to those who have have been responsible for the organisation because, immediately, a completely new spirit is introduced into the Convention, just by virtue not only of your office but of your personality and that of the Mayoress. It makes a tremendous difference and for that very thoughtful gesture we thank you most sincerely.

To our charming Mayoress, Mrs. Bertha Yazbek, special thanks for her graciousness, her many kindnesses and for the wonderful Mayoress' Tea Party at Gonubie on Tuesday. The ladies will remember you, Madam Mayoress, with

Geagte Leser,

Die 1977-konvensie het nogeens geleentheid gebied vir aangename samesyn en prikkelende gedagtewisseling.

Maar u is bes moontlik weer volstoom in die tuig en so belas met die veelvuldige aspekte van u werk dat u nog weinig geleentheid gehad het om hierdie gedagtes weer te oorpeins of toe te pas.

Daarom is ons bly dat ons met die plasing van hierdie advertensie 'n bydrae kan lewer tot die publikasie van die verslag van die konvensieverrigtinge waarin die meeste van daardie gedagtes vir u geboekstaaf is.

Die maatskappy is natuurlik al 4 jaar lank intensief gemoeid met die installering en inwerkingstelling van verspreidingsnetwerke van velerlei aard. En ons het dit nog altyd geniet om met u saam te werk. As u persoonlik dalk nog nie met ons saam gewerk het nie, skakel gerus van u kollegas wat wel die geleentheid gehad het.

Ons ervaring en kundigheid kom egter al baie verder as die afgelope 4 jaar en behels ook volkome vertroudheid met die omstandighede en beperkings waaronder u moet werk. Dit is tot u, maar ook tot ons voordeel.

Waar u nou waarskynlik nie die geleentheid het om u toegewyde aandag aan hierdie aspekte van u werk te gee nie, hoekom raadpleeg u ons nie om u daarmee te help en ook om u benodighede vas te stel en daarvoor te beraam nie?

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Dear Reader,

The 1977 convention was yet another enjoyable occasion which gave much food for thought. But by now you are most probably again snowed under the multiple aspects of your task and have not had any chance for retrospection.

That is why we are so glad to be able to contribute to this publication of the report on the proceedings at the convention in which much of the food for thought is minuted.

The company has been intensively occupied with the installation and commissioning of various types of distribution networks for the past 4 years. And we have enjoyed it thoroughly to work together. If you perhaps haven't had that opportunity, take the trouble of 'phoning a colleague who has.

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real affection and if I may ask my wife Maureen to perform a small duty now, I am sure that she will do it with utmost pleasure.

(Mrs. Robson handed flowers to Mayoress)

A sincere expression of appreciation to my wife Maureen for her constant support, her personal contribution to this Convention and her forebearance in all circumstances.

May I ask, Annatjie, if you will perform your small task.

Thank you.

(Mrs. van der Walt makes presentation to Mrs. Robson)

Aan Annatjie van der Walt ons innige dank vir haar hulp aan Bennie te alle tye asook vir haar vriendelikheid en steun vir Maureen. Die lede van die VMEO het dit baie waardeer, Annatjie.

(Mrs. Robson makes presentation to Mrs. van der Walt)

I record my deep gratitude to my secretary, Mrs Terry Kerr, and to Mrs. Joy Swanson for an incredible amount of typing and other work and for sharing my load so uncompiainingly and efficiently throughout the whole period of preparation and during the Convention and now I'm going to ask them both to come up to the platform as well.

Now of the next two people who come up onto the stage, I want you to have a very good look at one, particularly at his suit, because this is what is known in the Electricity Undertaking as "Reg Walsh's Convention Suit" and if you had been very observant you would have noticed that he wore it on the first day and is now wearing it on the last day, so obviously it's going to last him a long time. My thanks to members of my staff who served on what we called the Convention Planning Committee, which worked for a full year on the preparations, and especially to Reg Walsh and Jack Springett and I'm going to ask them to come up. I'm not sure which is the good-looking one, but you can make your own decision when you see them. There is also one lady who is part of this team and I would ask Mrs Nellie Reddell to come onto the platform — she also has a new dress you'll notice.

One of the most enjoyable parts of this Convention has been handing out ties that I haven't paid for. And now I'm going to have very great pleasure in giving away a few more, which originally were supposed to have been left over to sell in future years to pay for the ones you got for nothing. It is a real pleasure to make the recipients unofficial members of the AMEU by virtue of the fact that they will now be authorised to wear AMEU tiese and I'm going to call them up one by one because I think it is essential that they stand and be recognised, particularly George Branford and Lindsay Hesse who have looked after me so well during this week. I would not have managed without them. First of all George — I'm just going to get them up in a long line:

George Branford
Jimmy Robb
Alan Heger
Lindsay Hesse
Clive Morris
Edgar Solomon and
Geoff Cormack

(Graham Abbott was presented with a tie later on)

I did say one lady only but somehow the Mayor's Secretary has disappeared. Unfortunately she forgot she had to be in this gathering here this afternoon and so she didn't wear a new dress, but she still looks very attractive — Mrs. Marie Muller, the Mayor's Secretary.

And now Mr. Ian Muirhead and Mr. Terry Lee who have been responsible for the public address and the recording systems — that is a most important job as you know and I say in all sincerity that they contributed in no small degree to the success of these proceedings.

Ons hartlike dank aan sy Edele die Minister van Arbeid en van Mynwese, mnr. S. P. Botha vir die eer wat hy aan ons gedoen het om die Konvensie amptelik te open. Special thanks to the authors of the five papers for the important contributions they have made to the success and the influence of this Convention:

Dr. Henry Olivier
Mr. Charles Adams
Mr. Stewart McCullough
Mr. Ben Leach
Mr. Harden Beck

For the fun, fellowship and music at the Barn Dance on Monday night our appreciation is extended to:

Messrs. Hawker Siddeley Africa Transformers (Pty) Ltd.
Hawker Siddeley Africa Switchgear (Pty) Ltd.
Aberdare Cables Africa Ltd.
Chemilite (Pty) Ltd.
Crompton Parkinson (SA) (Pty) Ltd.
Phosware (Pty) Ltd.
Pirelli General Cables (SA) (Pty) Ltd.

I would like to make particular mention of Messrs. North and Robertson (Pty) Ltd who did a tremendous amount of work here and especially to Mrs. Rusty Harrington for her arrangements for the Barn Dance. It really was her handywork.

Thanks also to my colleague, Mr. Bob Odell, the Director of Parks and Amenities, for this magnificent exhibition and for all the other floral decorations which he has provided during the week and will do for the ball this evening. We are most grateful.

To Mr. Adoplh Lipke, the Transport Manager, and his competent and friendly team of drivers and couriers. I am in no doubt that they will long be remembered.

Our appreciation is recorded to the following East London Companies and Institutions which arranged inspection tours of their plants and their buildings:

Messrs. Car Distributors Assembly (Pty) Ltd
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Hoover (SA) (Pty) Ltd
Chloride Oldham Ltd
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Then to the Art Centre, the Director and staff of the East London Museum and the Curator of the Aquarium and his staff;

To the following for their various contributions and services, our thanks are recorded:

Mrs. Philpott and her helpers in the kitchen for the delicious refreshments. The Town Clerk and his staff for translation and printing services. The City Hall caretaker and his staff for the willing help in arranging the tables for the various sessions and the functions.

Mr. Owen Burgess of the East London Camera Shop for photographic services.

Siemens Ltd for the Convention folders.

SA Phillips Telecommunications for the closed circuit television.

Tedelex Electronics (Pty) Ltd for the headphones for the translation facilities.

Stewarts & Lloyds of SA Ltd for note pads.

Rothmans of Pall Mall London for cigarettes.

Wilson Rowntree (Pty) Ltd for sweets and Mr. Peter Osner of the Hotel Osner in anticipation of the catering services for the Convention Ball tonight.

The ladies of the Marina Glen Tea Garden for morning teas for the ladies.

My persoonlike dank aan die Aangewese President, mnr. Piet Botes, vir sy ondersteuning en samewerking by hierdie Konvensie. Baie dankie Piet.

A most sincere thank you to Bennie van der Walt, our Secretary, for his constant support and his enthusiasm. My own staff obviously enjoyed working with him throughout the time of his stay here in East London, and I look forward with real pleasure to our continuing association and friendship during the next two years.

Baie, baie dankie Bennie.

We have now come to the end of yet another great Convention of the AMEU.

Hopefully many of us will meet again at the 46th Convention in Port Elizabeth in 1979.

However a number of our illustrious colleagues and friends will retire gracefully from the AMEU scene before then and its always extremely difficult to know who they are and to get this information before the Convention. I would very much like to have been able to put the names forward but its an impossible task really so what I thought I might do is ask them to rise so that we can have our last look at them at a Convention. Those who will not be back in 1979.

May we give you a special farewell.

To them I say simply "Go well".

"May the roads rise with you
May the winds be always at your back
And may the Lord hold you in the hollow of His hand".

RAADSLID V. J. STRYDOM, Uitenhage:

Mnr. die President, sy Agbare die Burgemeester, Rld Joe Yazbek, sy sjarmante Burgemeestersvrou, mev. Yazbek, die uitgelese verhoogparty hier voor ons, dames en here, ek het die besondere aangename taak vanmiddag om vir die President hartlik te bedank vir wat hy hier vir ons gedoen het by die Konvensie in Oos-Londen.

Mnr. die President dit is vir my besonder aangenaam om vir u te bedank en ook vir u sjarmante Maureen wat vir ons alreeds Sondagaand 'n voorsmaak gegee het van Oos-Londense gulhartigheid en vir ons aan u huis onthaal het as lede van die Uitvoerende Raad en ander vriende waaronder ook die Burgemeester en sy gade was. Ons sê vir u baie dankie daarvoor. U was 'n besondere aangename gasheer en vrou. Dan op Maandagaand moet ons vir u baie dankie sê vir die wonderlike „Boeredans" wat u vir ons gereël het. Dit was absoluut 'n reuse-sukses en die blou hoedjies wat deur die geaffilieerdes geskenk is het bygedra tot die sukses.

Op Woensdagaand mnr. die President was u besonder konsiderend gewees, u het nie vir ons een funksie gereël nie. Baie dankie ons het dit nodig gehad na die vorige drie aande.

On Thursday evening Mr. President you have arranged for us a Convention Ball. We are obviously very delighted to be in your charming City.

Die referate wat gelewer is mnr. die President, wil ek u mee felisiteer. Dit was van besonder hoogstaande gehalte en u kan nie gekritiseer word met een keuse van 'n spreker nie. Baie dankie daarvoor.

Mr. President your handling of the Convention as Chairman was immaculate — our felicitations. Then to your charming wife I'd like to say thank you for looking after our good ladies so well. Thanks very much Maureen.

Mnr. die President dankie vir die fasiliteite wat u geskep het soos die mikrofone wat werk, telefone, onderhandelings om vlugkaartjies gereeld te kry, vervoer, die busse. Wees verseker mnr. die President ons waardeer dit. Dis 'n enorme hoeveelheid werk en ons weet wat u en u personeel daarin gesteek het.

Nogmaals, baie, baie dankie.

MR. K. G. ROBSON, President:

Baie dankie Raadslid Strydom vir u woorde van waardering. En nou een meer verklaring, die 45ste Konvensie van die VMEO is gesluit.

I hereby declare the 45th Convention of the AMEU closed and thank you for your attendance.

Mev. Annatjie van der Walt bedank die VMEO namens die Dames.

MEMBERSHIP ROLL — LEDELYS

HONORARY MEMBERSHIP/ERELEDE

Beesley, W.: Deputy City Electrical Engineer, P.O. Box 1803, Bulawayo.
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Waddy, J. C.: City Electrical Engineer, P.O. Box 388, Pietermaritzburg 3200.

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Conradie, D. J. R.: Posbus 1009, Bloemfontein 9300.
Cronje, W. F.: Wenningstraat 37, Groenkloof, Pretoria 0181.
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Harvey, A. Q.: 71 Garden Street, Redhouse, Port Elizabeth 6001.
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Honiball, G. T.: Posbus 17031, Groenkloof 0027.
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Liebenberg, S. J.: Posbus 98, Pretoria 0001.
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Mathews, J. A.: c/o De Beers Consolidated Mines Limited, P.O. Box 616, Kimberley 8300.
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Mole, E. W.: P.O. Box 39663, Bramley 2018.
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Theron, W. C.: Rouxweg 19, Worcester 6850.
Verschoor, D. R.: P.O. Box 36, Fort Beaufort 5720.
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Wylie, R. J. S.: P.O. Box 217, Germiston 1400.

ENGINEER MEMBERSHIP/INGENIEURSLEDE

A

Aalbers, C.: Elektrotegniese Ingenieur, Posbus 12, Wellington 7655.
Adams, C. E.: City Electrical Engineer, P.O. Box 369, Port Elizabeth 6000.
Andrews, K. I.: Electrical Engineer, P.O. Box 21, Somerset East 5850.

B

Bailey, R. V.: Borough and Electrical Engineer, P.O. Box 72, Stanger 4450.
Bamber, F. W.: City Electrical Engineer, P.O. Box 1803, Bulawayo, Rhodesia.
Barnard, P. J.: Elektrotegniese Ingenieur, Posbus 6, Delmas 2210.
Barnard, W.: City Electrical Engineer, P.O. Box 699, Johannesburg 2000.
Barton, R. W.: City Electrical Engineer, P.O. Box 708, Welkom 9460.
Beard, G. R.: Town Electrical Engineer, P.O. Box 176, Grahamstown 6140.
Berhardij, L.:
Bleach, R. L.: Town Electrical Engineer, Empangeni 3880.
Bobek, K. H.: Borough Engineer, P.O. Box 37, Eshowe 3815.
Booysens, L.: Elektrotegniese Ingenieur, Posbus 155, Vrede 2455.
Boshoff, T. L.: Electricity Department Civic Centre, Oudtshoort 6620.
Botes, P. J.: Elektrotegniese Ingenieur, Posbus 217, Roodepoort 1725.
Botha, N. S.: Town Electrical Engineer, P.O. Box 288, Bloemfontein 9300.
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Bozyczko, W.: P.O. Box 15, Estcourt 3310.
Briers, D. B.: Elektrotegniese Ingenieur, Posbus 302, Kroonstad 9500.
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C

Clarke, M. P. P.: Assistant Electrical Engineer, P.O. Box 399, Pietermaritzburg 3200.
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D

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Dreyer, L.: Elektrotegniese Ingenieur, Posbus 19, Westonaria 1780.
Du Plessis, C. P.: Elektrotegniese Ingenieur, Posbus 37, Worcester 6850.
Durant, J. L.: Stads-elektrotegniese Ingenieur, Posbus 15, Brakpan 1540.

E

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F

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Fraser, D. H.: City Electrical Engineer, P.O. Box 147, Durban 4000.
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Futcher, L.: Municipal Electrical Engineer, P.O. Box 13, Kempton Park 1620.

G

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H

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K

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L

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M

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O

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T

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V

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L

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M

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W

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LOCAL AUTHORITIES/PLAASLIKE BESTURE

A

Adelaide, C.P.
Alberton, Tvl.
Aliwal North, C.P.

B

Barberton, Tvl.
Benoni, Tvl.
Bloemfontein, OVS.
Brakpan, Tvl.
Burgersdorp, KP.
Beaufort-Wes, KP.
Bethal, Tvl.
Boksburg, Tvl.
Bredasdorp, KP.
Bantoesake-Administrasieraad, Suid-Transvaal.
Bedfordview Village Council, Tvl.
Bethlehem, OVS.
Bothaville, OVS.
Brits, Tvl.

C

Cape Town
Carolina, Tvl.
Carletonville, Tvl.
Ceres, KP.
Carnarvon, KP.
Cradock, KP.

D

De Aar, KP.
Duiwelskloof, Tvl.
Delmas, Tvl.
Dundee, Natal.
Dewetsdorp, OVS.
Durban.

E

East London, CP.
Ermelo, Tvl.
Evander, Tvl.
Edenvale, Tvl.
Eshowe, Natal.
Empangeni, Natal.
Escourt, Natal.

F

Fochville, Tvl.
Fort Beaufort, CP.

G

George, CP.
Gobabis, SWA.
Grahamstown, CP.
Germiston, Tvl.
Gordonsbay, CP.
Greytown, Natal.
Glencoe, Natal.
Graaff-Reinet, CP.

H

Heidelberg, Tvl.
Henneman, OVS.
Howick, Natal.

J

Jeffreysbaai, KP.
Johannesburg.

K

Kakamas, KP.
Kenhardt, KP.
Kirkwood, KP.
Kokstad Oos-Griekwaland.
Kroonstad, OVS.
Keetmanshoop, SWA.
Kimberley, KP.
Klerksdorp, Tvl.
Komgha, CP.
Krugersdorp, Tvl.
Kemptonpark, Tvl.
Kingwilliamstown, CP.
Knysna, KP.
Koppies, OVS.
Kuruman, KP.

L

Ladybrand, OVS.
Louis Trichardt, Tvl.
Ladysmith, Natal.
Lydenburg, Tvl.
Lichtenburg, Tvl.

M
Mafeking, KP.
Meyerton, Tvl.
Mooi Rivier, Natal.
Matatiele, Oos-Griekwaland.
Middelburg, Tvl.
Mosselbaai, KP.
Messina, Tvl.
Middelburg, KP.

N
Nelspruit, Tvl.
Newcastle, Natal.
Nigel, Tvl.

O
Odendaalsrus, OVS.
Orkney, Tvl.
Oos-Randse Bantoesake Administrasieraad.
Otjiwarongo, SWA.
Oudtshoorn, KP.

P
Paarl, KP.
Pietermaritzburg, Natal.
Plettenbergbaai, KP.
Port Shepstone, Natal.
Potgietersrus, Tvl.
Peri-Urban Areas Health Board, Pretoria, Tvl.
Parys, OVS.
Pietersburg, Tvl.
Port Alfred, CP.
Postmasburg, KP.
Pretoria, Tvl.
Phalaborwa, Tvl.
Piet Retief, Tvl.
Port Elizabeth, CP.
Potchefstroom, Tvl.

Q
Queenstown, CP.

R
Randfontein, Tvl.
Robertson, CP.
Richardsbaai, Natal.
Roodepoort, Tvl.
Riversdale, CP.
Rustenburg, Tvl.

S
Sandton, Tvl.
Somerset West, CP.
Stanger, Natal.
Strand, KP.
Sasolburg, OVS.
Springs, Tvl.
Stellenbosch, CP.
Swakopmund, SWA.
Somerset East, CP.
Standerton, Tvl.
Stilfontein, Tvl.

T
The Divisional Council of the Cape.
Tarkastad, KP.
Thabazimbi, Tvl.
Tzaneen, Tvl.

U
Uitenhage, CP.
Umtata, Transkei.
Upington, CP.

V
Vanderbijlpark, Tvl.
Viljoenskroon, OVS.
Vredenburg-Saldanha, CP.
Vereeniging, Tvl.
Virginia, OVS.
Vryburg, KP.
Verwoerdburg, Tvl.
Volksrust, Tvl.
Vryheid, Natal.

W
Walvisbay, SWA.
Wellington, KP.
Westonaria, Tvl.
Witbank, Tvl.
Worecester, KP.
Warmbad, Tvl.
Wes-Randse Bantoesake-Administrasieraad, Tvl.
Winburg, OVS.
Witrivier, Tvl.
Welkom, OVS.
Windhoek, SWA.
Wolmaransstad, Tvl.

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Adams Ripley & Durr, P.O. Box 31126, Braamfontein 2017. Tel.: 724-3565.
African Cables Limited, P.O. Box 172, Vereeniging 1930. Tel.: 4-2021.
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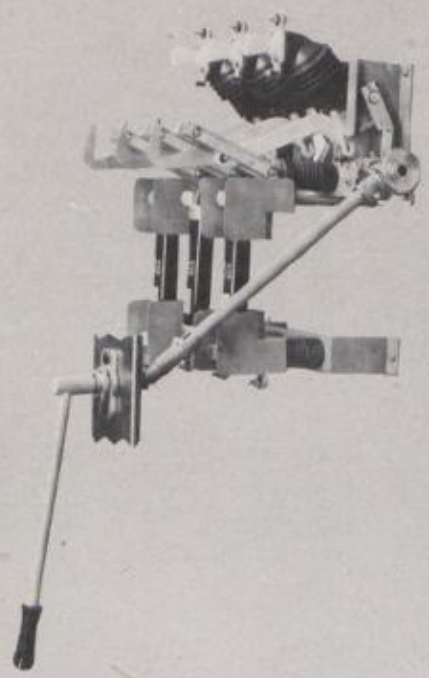

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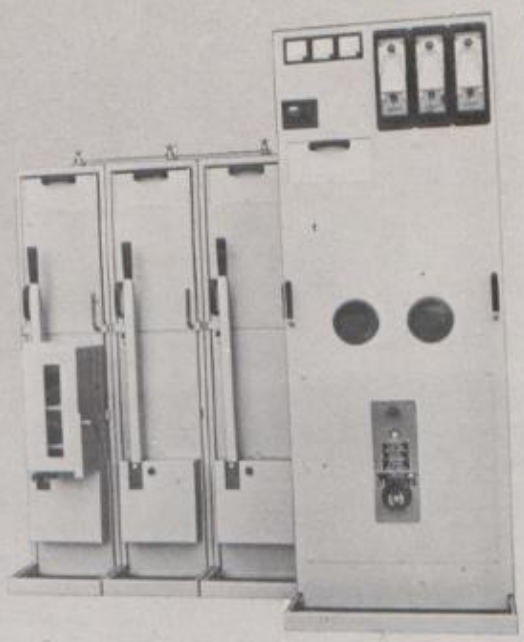

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