VERRIGTINGE 1973

DEEL 1

43ste KONVENSIE

30ste APRIL tot 3rde MEI 1973

PIETERMARITZBURG

Die Vereniging van Munisipale Elektrisiteits-ondernemings van Suid-Afrika

PROCEEDINGS 1973

VOLUME 1

43rd CONVENTION

30th APRIL to 3rd MAY 1973

PIETERMARITZBURG

The Association of Municipal Electricity Undertakings of South Africa

The Association of Municipal Electricity Undertakings of South Africa.

1973 CONVENTION

INFORMATION

1. OFFICIAL OPENING

   The official opening of the Convention will be held in the CITY HALL, COMMERCIAL ROAD, PIETERMARITZBURG on MONDAY, 30th APRIL, 1973.

2. REGISTRATION

   Delegates are requested to register at the City Hall prior to the Official Opening.

3. VENUE

   The Convention venue will be the CITY HALL where an information, telephone, telegram and message service will be available.

4. TRANSPORT FACILITIES

   Buses will be available as indicated on the programme.

PROGRAMME — 43rd CONVENTION

City Hall, Pietermaritzburg

MONDAY, 30th April, 1973.

FIRST SESSION

8.30 a.m.	Registration of delegates in the City Hall.
9.30 a.m.	Opening Prayer. Welcome to Pietermaritzburg by His Worship the Mayor, Councillor C. W. Wood. Official Opening — Mr. Percy Fowle, M.E.C. Induction of President. Greetings.
10.30 a.m.	Refreshments.
11.00 a.m.	Election of President Elect. Presidential Address — Mr. J. C. Waddy, City Electrical Engineer, Pietermaritzburg. Venue of 1974 Technical Meeting. Venue of 1975 Convention. Election of Executive Council.
12.30 p.m.	Luncheon.

Afternoon Session

2.15 p.m.	Report of Secretariat. Reports of Sub-Committees and Representatives.
4.00 p.m.	Adjournment and Refreshments.

Die Vereniging van Munisipale Elektrisiteitsondernemings van Suid-Afrika.

KONVENSIE 1973

INLIGTING

1. AMPTELIKE OPENING

   Die amptelike opening van die Konvensie word gehou in die STADSAAL, COMMERCIALWEG, PIETERMARITZBURG op MAANDAG, 30 APRIL 1973.

2. REGISTRASIE

   Afgevaardigdes word versoek om te registreer in die Stadsaal voor die amptelike opening.

3. PLEK

   Die Konvensie word voortgesit in die STADSAAL waar 'n inligtingsdiens, 'n telefoondiens en boodskapdiens beskikbaar sal wees.

4. VERVOERFASILITEITE

   Busse sal beskikbaar wees volgens die aanwysings op die program.

PROGRAM — 43ste KONVENSIE

Stadsaal, Pietermaritzburg

MAANDAG, 30 April 1973.

EERSTE SITTINGS

8.30 vm.	Registrasie van die afgevaardigdes in die Stadsaal.
9.30 vm.	Openingsgebed. Verwelkoming na Pietermaritzburg deur Sy Agbare die Burgemeester, Raadslid C. W. Wood. Amptelike Opening — Mnr. Percy Fowle, L.U.K. Inhuldiging van President. Boodskappe.
10.30 vm.	Verversings.
11.00 vm.	Verkiesing van aangewese President. Presidentsrede — Mnr: J. C. Waddy, Stads-Elektrotegniese Ingenieur, Pietermaritzburg. Plek van 1974 Tegniese Vergadering. Plek van 1975 Konvensie. Verkiesing van Uitvoerende Raad..
12.30 nm.	Middagete.

Middagsitting

12.15 nm.	Verslag van Sekretariaat. Verslae van Onderkomitees en Verteenwoordigers.
4.00 nm.	Verdaging en Verversings.

6.00 p.m. Civic Reception at the New Municipal Administration Building opposite Churchill Square.

TUESDAY, 1st May, 1973.

SECOND SESSION

9.00 a.m. PAPER—"Generation and Transmission in the Escom System" by Mr. H. B. Norman, Chief Engineer (System Planning) ESCOM.
Discussions.

10.30 a.m. Refreshments.

11.00 a.m. PAPER — "The Electricity Amendment Act, 1971 and the resulting changes in Escom's organisation" by Mr. T. C. Stoffberg, Chief Planning Officer of Escom.

Discussions.

12.30 p.m. Luncheon.

Afternoon Session

2.15 p.m. PAPER — "Industrial Accident Prevention" by Mr. G. S. Strydom, Operation Manager of NOSA.
Discussions.

4.00 p.m. Adjournment and Refreshments.

WEDNESDAY, 2nd May, 1973.

THIRD SESSION

9.00 a.m. PAPER—"Underground Power Distribution Cables — a review of a changing technology" by Mr. D. H. Booth, B.Sc. (Eng.), C.Eng., F.I.E.E. Managing Director of Scottish Cables (S.A.) Ltd.
Discussions.

10.30 a.m. Refreshments.

11.00 a.m. Discussion on Papers and Reports.

12.30 p.m. Luncheon.

Afternoon Session

3.00 p.m. Visit to Scottish Cables (S.A.) Ltd. followed by refreshments.
Buses available.

Evening Braaivleis, Midmar Dam.

THURSDAY, 3rd May, 1973.

FOURTH SESSION

9.00 a.m. PAPER — "Live-Line Maintenance on overhead lines" by Mr. L. G. Baker, Divisional Manager of Hudale (Hubert Davies).
Discussions.

10.30 a.m. Refreshments.

6.00 nm. Burgemeestersonthaal in die Nuwe Munisipale Administrasiegebou oorkant Churchill Plein.

DINSDAG, 1 Mei 1973.

TWEEDE SITTING

9.00 vm. REFERAAT — "Kragontwikkeling en transmissie in die Evkomstelsel" deur mnr. H. B. Norman, Hoof-Ingenieur (Stelselbeplanning) EVKOM.
Besprekings.

10.30 vm. Verversings.

11.00 vm. REFERAAT — "Die Elektrisiteitswysigingswet van 1971 en die voortspruitende veranderings in Evkom se organisasie" deur mnr. T. C. Stoffberg, Hoofbeplanningsbeampte van Evkom.
Besprekings.

12.30 nm. Middagete.

Middagsitting

2.15 nm. REFERAAT — „Nywerheidsongeluksvoorkoming" deur mnr. G. S. Strydom, Bedryfsbestuurder van NOSA.
Besprekings.

4.00 nm. Verdaging en Verversings.

WOENSDAG, 2 Mei 1973.

DERDE SITTING

9.00 vm. REFERAAT—„Ondergrondse distribusiekabels—'n oorsig van 'n veranderende tegnologie" deur mnr. D. H. Booth, B.Sc. (Eng.), C.Eng., F.I.E.E. Besturende Direkteur van Scottish Cables (S.A.) Bpk.
Besprekings.

10.30 vm. Verversings.

11.00 vm. Besprekings van referate en verslae.

12.30 nm. Middagete.

Middagsitting

3.00 nm. Besoek aan Scottish Cables (S.A.) Bpk. gevolg deur 'n onthaal.
Busse beskikbaar.

Aand Braaivleis, Midmardam.

DONDERDAG, 3 Mei 1973.

VIERDE SITTING

9.00 vm. REFERAAT — „Kragdraad-instandhouding t.o.v. lugdrade" deur mnr. L. G. Baker, Adelingsbestuurder van Hudalec (Hubert Davies).
Besprekings.

10.30 vm. Verversings.

11.30 a.m. Question's Forum.

12.30 p.m. Luncheon.

Afternoon Session

2.00 p.m. Members' Forum.

2.30 p.m. Refreshments.

4.00 p.m. Closing Session of Convention.
Honorary Membership.
Closing Address.

8.00 p.m. Convention Social at the Imperial Hotel, Loop Street. Dress formal or dark suit.

FRIDAY, 4th MAY, 1973.

9.00 a.m. Executive Council Meeting at the Imperial Hotel.

LADIES' PROGRAMME

MONDAY, 30th April, 1973.

8.30 a.m. Attending the proceedings in accordance with official Convention Programme.

12.30 p.m. Luncheon and free afternoon.

6.00 p.m. Civic Reception.

TUESDAY, 1st May, 1973.

Tea with the Mayoress.
Time and place to be announced.
Buses available.

2.15 p.m. Visit to the Howick Falls and Midmar Dam.
Buses available.

WEDNESDAY, 2nd May, 1973.

9.00 a.m. Visit to the Lion Park.
Buses available.
Free afternoon.
Evening Braaivleis.

THURSDAY, 3rd May, 1973.

3.30 p.m. Attending Closing Session.

8.00 p.m. Convention Social at the Imperial Hotel —dress formal.

11.30 vm. Vrae Forum.

12.30 nm. Middagete.

Middagsitting

2.00 nm. Lede Forum.

2.30 nm. Verversings.

4.00 nm. Afsluiting van Konvensie.
Ere-Lidmaatskap.
Bedankings.

8.00 nm. Konvensiefunksie by die Imperial Hotel, Loopstraat, Drag fermeeel of donkerpak.

VRYDAG, 4 MEI 1973.

9.00 vm. Uitvoerende Raadsvergadering in die Imperial Hotel.

PROGRAM VIR DIE DAMES

MAANDAG, 30 April 1973..

8.30 vm. Bywoning van die verrigtinge volgens die amptelike Program van die Konvensie.

12.30 nm. Middagete en vry agtermiddag.

6.00 nm. Burgemeesteronthaal.

DINSDAG, 1 Mei 1973.

Tee met die Burgemeesteres.
Tyd en plek sal bekend gestel word.
Busse beskikbaar.

2.15 nm. Besoek aan die Howickwaterval en die Midmardam.
Busse beskikbaar.

WOENSDAG, 2 Mei 1973.

9.00 vm. Besoek aan die Leeupark.
Busse beskikbaar.
Vry agtermiddag.
Aand Braaivleis.

DONDERDAG, 3 Mei 1973.

3.30 nm. Bywoning van afsluitingsverrigtinge.

8.00 nm. Konvensiefunksie in die Imperial Hotel— drag formeel.

REPORT OF SECRETARIES.

To the President and Members of the Association.

Mr. President and Gentlemen,

It gives me great pleasure to submit to you the Report of your Association for the two-year period ended 28th February, 1973.

OBITUARY

It is with deep regret that we record the death of the following during the period covered by this Report:—

H. Fohren—Engineer, Eshowe.

M. N. Kirberger—Town Electrical Engineer, Bethal.

F. De Wit, Adelaide.

FORTY-SECOND CONVENTION

The forty-second Convention of the Association was held in Cape Town from the 18th to 21st October, 1971. Delegates were welcomed to Cape Town by His Worship, the Mayor of that city, Cllr. R. L. Friedlander, and were welcomed to the Convention by His Worship the Mayor of Springs, Cllr. Dr. F. W. Strydom. The Proceedings were officially opened by the Hon. the Deputy Minister of Economic Affairs, Mr. A. H. du Plessis. On behalf of the President, members of the Association and all others who attended the Cape Town Convention, I wish to record sincere appreciation to His Worship the Mayor and City Councillors for the hospitality extended on the occasion of this visit to the Mother City. To Jules von Ahlften, I wish to place on record the appreciation of all members for the efficient manner in which he carried out his duties as Chairman of the Convention as well as all other duties as President over the past two years.

This Convention saw the adoption of the amended Constitution of the Association which, apart from bringing its administration more in line with present day needs, had the effect of making its scope purely that of representing the interests of Municipal Undertakings in the Republic of South Africa in place of Southern Africa. This fundamental amendment was brought about by factors beyond the control of the Association's membership and provision for links with territories outside the Republic were made.

It is sincerely hoped that in the years to come, the purpose of Clauses 4.7 and 4.8 of the Constitution are not lost sight of by future Executive Councils.

The first paper presented at the Convention was entitled "The Application of Modern Management Principles and Techniques to a Municipal Under-

VERSLAG VAN DIE SEKRETARISSE

Aan die President en Lede van die Vereniging.

Mnr. die President, Menere,

Dit is vir my 'n groot genoeë om die verslag van u Vereniging vir die tweejaartydperk geëindig 28 Februarie 1973, aan u voor te lê.

DOODSBERIG

Dit is met die innigste leed dat ons die afsterwe van die volgende persone gedurende die tydperk wat deur hierdie verslag gedek word, aankondig:

H. Fohren — Ingenieur, Eshowe.

M. N. Kirberger — Stadselektriese-ingenieur, Bethal.

F. de Wit, Adelaide.

TWEE-EN-VEERTIGSTE KONVENSIE

Die twee-en-veertigste Konvensie van die Vereniging is vanaf 18 tot 21 Oktober 1971 in Kaapstad gehou. Die Agbare, die Burgemeester van daardie stad, Stadsraadslid R. L. Friedlander, het die afgevaardigdes in Kaapstad verwelkom en die Agbare, die Burgemeester van Springs, Stadsraadslid Dr. F. W. Strydom, het die verwelkomingsrede by die Konvensie waargeneem. Sy Edele, die Adjunk-Minister van Ekonomiese Sake, mnr. A. H. du Plessis, het die verrigtinge amptelik geopen. Namens die President, lede van die Vereniging en al diegene wat die Kaapstadse Konvensie bygewoon het, wil ek my opregte waardering teenoor die Agbare Burgemeester en die Stadsraadslede uitspreek vir die gasvryheid wat hulle ten tyde van hierdie besoek aan die moederstad Teenoor mnr. Jules von Ahlften uitspreek vir die doeltreffende manier waarop hy sy pligte as Voorsitter van die Konvensie en ook al die ander pligte as President vir die afgelope twee jaar, verrig het.

Ten tyde van hierdie Konvensie is die gewysigde Konstitusie van die Vereniging goedgekeur wat, afgesien daarvan dat dit die administrasie beter aan die hedendaagse behoeftes laat beantwoord het, ook die uitwerking gehad het dat dit nou uitsluitlik die belange van Munisipale Ondernemings in die Republiek van Suid-Afrika verteenwoordig, en nie Suidelike Afrika nie. Hierdie fundamentele wysiging was die gevolg van faktore buite die beheer van die Vereniging se lede, en daar is voorsiening gemaak daarvoor om met buite die Republiek te kan skakel.

Die opregte hoop word uitgespreek dat in die jare wat kom, die toekomstige Bestuursrade nie die doelstellings van Klousules 4.7 en 4.8 van die Konstitusie uit die oog sal verloor nie.

Die titel van die eerste Referaat wat by die Konvensie gelewer is, was "The Application of Modern Management Principles and Techniques to a Muni-

taking" by Mr. J. S. du Toit, B.Com., B.Admin., A.I.A.C. (S.A.), A.I.T.C. (S.A.), S.A.I.O.M. (Town Clerk of Roodepoort). This paper was a valuable contribution to the subject with which it dealt and resulted in interesting discussions. It was followed by a paper by Mr. P. J. Botes, B.Sc(Eng.) Pr.(Eng.), F.S.A.I.E.E. (Town Electrical and Mechanical Engineer, Roodepoort), entitled "Programming and Scheduling as Management Aids with Special Reference to Municipal Electricity Undertakings." As indicated in the title, this paper also dealt essentially with certain aspects of modern management and this well prepared paper and the discussion thereon overlapped largely with that on the paper presented by Mr. du Toit.

Dr. R. L. Straszacker, Chairman of ESCOM addressed the Convention and clarified certain aspects of the inter relation between the Commission and Municipal Electricity Undertakings under the conditions now pertaining.

The next paper to be presented was by Mr. C. T. Carter, Pr. (Eng.), B.Sc.(Eng.), of Cape Town Electricity Department and entitled "Aluminium Cables, Jointing and Accessories." This paper was a valuable contribution to a subject, in some respects, controversial, and led to good discussion.

The Convention next heard an address by Mr. S. Goodall, President of the International Electro Technical Commission. Mr. Goodall spoke on aspects of international standardisation.

The final paper presented to the Convention was by Mr. J. V. Grant, BSc. (Chief Scientist, Electrical Installations for Buildings Division, SABS, Pretoria) and entitled "Wiring Regulations and the implications of Sensitive Earth Leakage Protection," and the discussion which followed its presentantation carried a step further the A.M.E.U.'s discussion over many years on the subject of earth leakage protection, its pros and cons.

1972 TECHNICAL MEETING

The 1972 Technical Meeting of the Association was held over two days, 25th and 26th May at Kempton Park. The sincere appreciation of all concerned is extended to His Worship the Mayor and Town Councillors of Kempton Park for hospitality extended to delegates on this occasion.

Interesting paperettes were read as follows:—

1.—"New Developments in the Field of Insulating Materials," by Mr. A. J. Eriksson, M.Sc.(Eng.), Pr. (Eng.), A.M.I.E.E., Grad. S.A.I.E.E., Senior Research Officer, National Electrical Engineering Research Institute (C.S.I.R.).

cipal Undertaking" deur mnr. J. S. du Toit, B.Com., B.Admin., A.I.A.C.(SA), A.I.T.S.(SA), S.A.I.O.M. (Stadsklerk van Roodepoort). Hierdie referaat het 'n waardevolle bydrae gelewer tot die onderwerp waaroor dit gehandel het en het interessante besprekings tot gevolg gehad Daarna het mnr. P. J. Botes, B.Sc.(Ing.), Pr.(Ing.), F.S.A.I.E.E. (Stadselektriese-en Meganieseingenieur, Roodepoort) sy referaat getitel "Programming and Scheduling as Management Aids with Special Reference to Municipal Electricity Undertakings" gelewer. Soos die titel aandui, het hierdie referaat ook oor sekere wesenlike aspekte van moderne bestuur gehandel en hierdie goed voorbereide referaat en die bespreking wat daarop gevolg het, het in 'n groot mate die referaat wat mnr. du Toit gelewer het, oorvleuel.

Dr. R. L. Straszacker, Voorsitter van EVKOM, het die Konvensie toegespreek en sekere aspekte van die onderlinge betrekkinge tussen die Kommissie en die Munisipale Elektriese Ondernemings onder die heersende toestande toegelig.

Daarna het mnr. C. T. Carter, Pr.(Ing.), B.Sc.(Ing.) van die Elektrisiteitsafdeling van Kaapstad gevolg met sy referaat getitel "Aluminium Cables, Jointing and Accessories." Hierdie referaat het 'n waardevolle bydrae gelewer tot 'n onderwerp wat in sommige opsigte polemies is, en het 'n lewendige bespreking tot gevolg gehad.

Mnr. S. Goodall, President van die Internasionale Elektrotegniese Kommissie, het die Konvensie daarna toegespreek. Mnr. Goodall het oor sekere aspekte van internasionale standaardisasie gepraat. Die laaste referaat wat by die Konvensie gelewer is, was die van mnr. J. C. Grant, B.Sc. (Hoofwetenskaplike, Afdeling Elektriese Installering vir Geboue, SABS, Pretoria) getitel "Wiring Regulations and the implications of Sensitive Earth Leakage Protection," en die bespreking wat daarop gevolg het het die onderwerp, naamlik aardelekbeskerming, die voor- en nadele daarvan, waarmee die Vereniging van Munisipale Elektrisiteitsondernemings van Suid-Afrika hom al jare lank besig hou, 'n stap verder gevoer.

1972 — TEGNIESE VERGADERING

Die 1972- Tegniese Vergadering van die Vereniging is op 25 en 26 Mei in Kempton Park gehou. Ons spreek graag ons opregte waardering uit teenoor die Agbare Burgemeester en die Stadsraadslede van Kempton Park vir die gasvryheid wat hulle aan afgevaardigdes betoon het ten tyde van hierdie geleentheid.

Die volgende interessante kort referate is gelewer :

1.—"New Developments in the Field of Insulating Materials" deur mnr. A. J. Eriksson, M.Sc.(Ing.), Pr. A.M.I.E.E., Grad. S.A.I.E.E., Hoofnavorsingsbeampte, Nasionale Instituut vir Elektriese Ingenieursnavorsing (W.N.N.R.).

2.—"The Responsibilities of the Power Supply Engineer as regards Formulation of Standard Specifications," by A. A. Middlecote, Pr.(Eng.), B.Sc. (Elec. Eng.).

The greater part of the programme of the Technical Meeting was taken up by Forum Sessions with the responsibility for them being taken by the branches of the Association and by the affiliates. The standard of discussion was good, and I feel, proved that the Members' Forum can be a valuable part of the Association's proceedings.

MEMBERSHIP

The following new members were elected during the two years ended 28th February, 1973 :

Honorary Members :

R. M. O. Simpson — Durban.
J. F. Lategan — Stellenbosch.
R. Leishman — Johannesburg.
F. Stevens — Ladysmith.
W. Rossler — Kroonstad.

Past Members :

V. E. O. Barratt — Queenstown.

Council Members :

Volksrust.
King William's Town.
Hennenman.

Engineer Members :

K. H. Bobek (Borough Electrical Engineer, Eshowe.)
J. J. Labuschagne (Town Electrical Engineer, Walvis Bay).
N. S. Botha (Town Electrical Engineer, Vryheid).
R. L. Bleach (Town Electrical Engineer, Stilfontein).
S. N. Hammerschlag (Town Electrical Engineer, Bedforview).
S. T. Collins (City Electrical Engineer, Umtali).

Associates :

F. W. Bamber (Deputy City Electrical Engineer, Bulawayo).
J. D. Weyer (Assistant Electrical Engineer, Randfontein).
C. J. du Plessis (Deputy Town Electrical Engineer, Brakpan).
P. Wrigley (Deputy Electrical Engineer, Salisbury).
C. E. Adams (Deputy Electrical Engineer, Port Elizabeth).

2.—"The Responsibilities of the Power Supply Engineer as regards Formulation of Standard Specications" deur A. A. Middlecote, Pr.(Ing.), B.Sc. (Elek. Ing.).

Die program van Tegniese Vergadering het grotendeels uit forumbesprekings bestaan waarvoor die takke van die Vereniging en die geaffilieerdes verantwoordelikheid geneem het. Die besprekingstandaard was goed, en het na my mening doeltreffend bewys gelewer dat 'n ledeforum 'n waardevolle aandeel van die Vereniging se verrigtinge kan uitmaak.

LIDMAATSKAP

Die volgende nuwe lede is gedurende die twee jaar wat op 28 Februarie 1973 geëindig het, verkies :

Ere-lede :

R. M. O. Simpson — Durban.
J. F. Lategan — Stellenbosch.
R. Leishman — Johannesburg.
F. Stevens — Ladysmith.
W. Rossler — Kroonstad.

Voormalige-lede :

V. E. O. Barratt — Queenstown.

Rade-lede :

Volksrust.
King William's Town.
Hennenman.

Ingenieur-lede :

K. H. Bobek (Stads-Elektrotegniese Ingenieur, Eshowe).
J. J. Labuschagne (Stads-Elektrotegniese Ingenieur Walvisbaai).
N. S. Botha (Stads-Elektrotegniese Ingenieur, Vryheid).
R. L. Bleach (Stads- Elektrotegniese Ingenieur, Stilfontein).
S. N. Hammerschlag (Stads-Elektrotegniese Ingenieur, Bedfordview).
S. T. Collins (Stads- Elektrotegniese Ingenieur, Umtali).

Geassosieerdes :

F. W. Bamber (Adjunk-Stads Elektrotegniese Ingenieur, Bulawayo).
J. D. Weyer (Assistent-Elektrotegniese Ingenieur, Randfontein).
C. J. du Plessis (Adjunk- Stads-Elektrotegniese Ingenieur, Brakpan).
P. Wrigley (Adjunk- Stads-Elektrotegniese Ingenieur, Salisbury).
C. E. Adams (Adjunk- Stads-Elektrotegniese Ingenieur, Port Elizabeth).

Associate Members :

A. G. Zwiegelaar (Chief Electrician, Thabazimbi).
J. T. F. Nel (Town Electrical Engineer, King William's Town).
B. C. B. Greyling (Electrical Engineer, Ermelo).
J. G. Peens (Town Electrical Engineer, Carolina).
E. E. Kobus (Senior Electrician, Postmasburg).
D. M. Bosch (Town Electrical Engineer, Tarkastad).
V. G. Flint (Town Electrical Engineer, Hennenman).
H. D. Claxton (Electrical Engineer, Graaff Reinet).

Affiliates :

Egatube Plastic Conduits (Pty.) Ltd.
G. R. Hain (Pty.) Ltd.
U.S.C.O. Cable Co. (Pty.) Ltd.
Republic Power & Communications Co. (Pty.) Ltd.
C. A. du Toit & Partners.
Max Engineering (Pty.) Ltd.
Phosware (Pty.) Ltd.
Ove Arup & Partners.
D. J. J. Conradie & Partners.
Alucab (Pty.) Ltd.
E.M.A.G. Electrical Engineering (Pty.) Ltd.
Lenning Electrical (Pty.) Ltd.
Process Instruments (Pty.) Ltd.
Cu Al Engineering (Pty.) Ltd.

Transfers : (excluding those arising from adoption of New Constitution)

J. van S. Lochner transferred from Associate member to Engineer Member.
I. F. Boyack transferred from Associate to Engineer Member.
E. A. McWilliam transferred from Engineer Member to Past Member.
E. Trautman transferred from Associate to Engineer Member.
M. P. P. Clarke transferred from Associate Member to Engineer Member.
A. C. T. Frantz transferred from Engineer Member to Honorary Member.
H. T. Turner transferred from Engineer Member to Honorary Member.
I. H. Hess tansferred from Associate to Engineer Member.

The following resignations took place during the period under review:

Past Members :

W. G. Thackwray — Johannesburg.
T. D. Zeederburg — Pretoria.

Council Members :

Bloemhof

Assosiaatlede :

A. G. Zwiegelaar (Hoof Elektrisiën, Thabazimbi).
J. T. F. Nel (Stads-Elektrotegniese Ingenieur, King William's Town).
B. C. B. Greyling (Elektrotegniese Ingenieur, Ermelo).
J. G. Peens (Stads-Ingenieur, Carolina).
E. E. Kobus (Hoof Elektrisiën, Postmasburg).
D. M. Bosch (Stads-Elektrotegniese Ingenieur, Tarkastad).
V. G. Flint (Stads-Elektrotegniese Ingenieur, Hennenman).
H. D. Claxton (Elektrotegniese Ingenieur, Graaff Reinet).

Geaffilieerdes :

Egatube Plastic Conduits (Edms.) Bpk.
G. R. Hain (Edms.) Bpk.
U.S.C.O. Cable Co. (Edms.) Bpk.
Republic Power & Communications Co. (Edms.) Bpk.
C. A. du Toit en Vennote.
Max Engineering (Edms.) Bpk.
Phosware (Edms.) Bpk.
Ove Arup en Vennote.
D. J. J. Conradie en Vennote.
Alucab (Edms.) Bpk.
E.M.A.G. Electrical Engineering (Edms.) Bpk.
Lenning Electrical (Edms.) Bpk.
Process Instruments (Edms.) Bpk.
Cu Al Engineering (Edms.) Bpk.

Oorplasings : (Uitsluitende dié wat deur aanneming van Nuwe Grondwet ontstaan).

J. van S. Lochner vanaf Assosiaat-lid na Ingenieur-lid.
I. F. Boyack vanaf Assosiaat na Ingenieur-lid.
E. A. McWilliam vanaf Ingenieur-lid na Voormalige-lid.
E. Trautman vanaf Geassosieerder na Ingenieur-lid.
M. P. P. Clarke vanaf Assosiaat-lid na Ingenieur-lid.
A. C. T. Frantz vanaf Ingenieur-lid na Erelid.
H. T. Turner vanaf Ingenieur-lid na Erelid.
I. H. Hess vanaf Geassosieerde na Ingenieur-lid.

Die volgende bedankings is gedurende die tydperk waaroor hierdie verslag handel, ontvang :

Voormalige Lede :

W. G. Thackwray — Johannesburg.
T. D. Zeederburg — Pretoria.

Rade-lede :

Bloemhof.

Harrismith
*Bulawayo
*Gwelo
*Salisbury
*Umtali
Makwassie Health Committee.

*Deleted by adoption on new Constitution.

Engineer Members :

R. V. Bailey — Mooi River.
B. Carpenter — Umtata.
J. A. Nieuwenhuis — Wolmaransstad.
J. S. Craig (retired) — Greytown.
P. L. Vergottini (retired) — Warmbaths.
F. J. Phillips (retired) — Mossel Bay.

Associate Member :

J. A. Munro — Bloemhof.

Affiliates :

Pratley Manufacturing & Engineering Co. (Pty.) Ltd.
Davidson & Co (Africa) (Pty.) Ltd.
Amalgamated Power Engineering S.A. (Pty.) Ltd.

Marthinussen & Co. (Pty.) Ltd.
Yarrow (Africa) (Pty.) Ltd.
Simon-Lodge (Pty.) Ltd.
C. A. Parsons & Co. (SA) (Pty.) Ltd.
Babcock & Wilcox Africa Ltd.
W. R. Burnett (Pty.) Ltd.
E. Green & Son (SA) (Pty.) Ltd.

Members Deceased :

F. de Wit — Associate Member.
J. Wilson — Honorary Member.
D. Lees — Honorary Member.
N. M. Kirberger — Engineer Member.
H. Fohrën — Engineer Member.

Comparative Membership figures are as follows:

	as per previous report	Including admissions up to 28.2.73 and excluding those individuals whose present whereabouts are unknown and including adjustments arising from adoption of new Constitution
Past Members	10	23
Honorary Members	18	27
Undertaking Members	136	133
Engineer Members	139	94
Associates	33	30
Associate Members	37	26
Affiliates	95	85

Harrismith.
*Bulawayo.
*Gwelo.
*Salisbury.
*Umtali.
Makwassie Gesondheids Komitee.

* Uitgekrap deur die aanneming van die nuwe Grondwet.

Ingenieurlede :

R. V. Bailey — Mooirivier.
B. Carpenter — Umtata.
J. A. Niewenhuis — Wolmaransstad.
J. S. Craig (afgetree) — Greytown.
P. L. Vergottino (afgetree) — Warmbad.
F. J. Phillips (afgetree) — Mosselbaai.

Assosiaatlid :

J. A. Munro — Bloemhof.

Geaffilieerdes :

Pratley Manufacturing & Engineering Kie (Edms.) Bpk.
Davidson & Kie (Edms.) Bpk.
Amalgamated Power Engineering SA (Edms.) Bpk.
Marthinussen & Kie (Edms.) Bpk.
Yarrow (Afrika) (Edms.) Bpk.
Simon-Lodge (Edms.) Bpk.
C. A. Parsons & Kie (SA) (Edms.) Bpk.
Babcock & Wilcox Afrika Bpk.
W. R. Burnett (Edms.) Bpk.
E. Green & Seun (SA) (Edms.) Bpk.

Afgestorwe lede :

F. de Wit — Assosiaat-lid.
J. Wilson — Erelid.
D. Lees — Erelid.
N. M. Kirberger — Ingenieurlid.
H. Fohrën — Ingenieurlid.

Die vergelykende lidmaatskapsyfers is soos volg :

	volgens vorige verslag	Insluitende uit insluitende toelatings tot 28.2.73 en met uitsluiting van daardie persone wie se huidigeadresse onbekend is en insluitende reëlings wat deur aanneming van nuwe Grondwet ontstaan
Voormalige-lede	10	23
Erelede	18	27
Rade-lede	136	133
Ingenieur-lede	139	94
Geassosieerdes	33	30
Assosiaat-lede	37	26
Geaffilieerdes	95	85

FINANCE

Income and Expenditure Accounts for the years under review, together with the Balance Sheet as at the 29th February, 1972 and 28th February, 1973, will be submitted to the Convention, but in view of it being held somewhat earlier this year and so as not to hold back the publication of Volume 1 of the Proceedings until audit is completed, it will be impractical to issue them with this report.

Considerable attention has been given to the finances of the Association since my last Report in 1971. Following the adoption of the new Constitution in which the assessment of all subscriptions and attendance fees was vested in the Executive Council, new scales were fixed which, it was confidently felt, would meet the requirements of the Association for a considerable period. Provision was made in the budget for the Association to become, as far as possible self-supporting and no longer dependant on host councils for assistance by way of entertainment, etc. At the same time, costs of printing the Proceedings have continued to escalate. At the present time I am unable to forecast the financial position of the Association during the coming two years as the impact of the appointment of new Secretaries, to which I will refer later in this report, and other factors may be material. With regard to the Proceedings, the Executive Council accepted our recommendation that those in respect of the 1972 Technical Meeting were produced in a largely unedited and cheaper form. For a number of years I have personally edited Proceedings, but as a personal "labour of love," the new Secretaries could not be expected to undertake this task.

FINANSIES

Inkomste-en-uitgawerekenings vir die verslagjaar, en ook die balanstaat soos op 29 Februarie 1972 en Februarie sal aan die Konvensie voorgelê word, maar met die oog daarop dat dit vanjaar heelwat vroeër gehou word en om nie die publikasie van Volume 1 van die Verrigtinge te vertraag tot tyd en wyl die oudit afgehandel is nie, sal dit onprakties wees om dit saam met hierdie verslag te publiseer.

Sedert my laaste verslag in 1971, het die finansies van die Vereniging heelwat aandag geniet. Na die goedkeuring van die nuwe Konstitusie waarin die Bestuursraad die mag verleen is om alle bydraes en bywoningsgelde vas te stel, is nuwe skale vasgestel wat seer sekerlik vir 'n geruime tyd in die behoeftes van die Vereniging sal voorsien. In die begroting is daar sover moontlik voorsiening gemaak vir die Vereniging om selfonderhoudend te kan word en nie meer op gasheerrade aangewys te hoef te wees vir hulp, hetsy deur onthale of op enige ander wyse nie. Terselfdertyd het die koste verbonde aan die drukwerk van die Verrigtinge bly styg. Ek is nie tans by magte om die finansiële posisie van die Vereniging vir die komende twee jaar te voorspel nie, aangesien die aanstelling van nuwe Sekretarisse (ek kom later in die verslag terug daarna) en ander faktore 'n wesenlike uitwerking daarop mag hê. Wat die Verrigtinge betref, die volgende: Die Bestuursraad het ons aanbeveling aanvaar dat dié ten opsigte van die 1972- Tegniese Vergadering grotendeels ongeredigeer en goedkoper aangebied is. Vir etlike jare het ek persoonlik die Verringtinge geredigeer, maar as 'n persoonlike „liefdesdiens" kan daar nie van die nuwe Sekretarisse verwag word om die taak te verrig nie.

REGIONAL BRANCHES

No new Regional Branches have been established during the period under review.

STREEKTAKKE

Gedurende die tydperk wat deur hierdie verslag gedek word, is daar geen nuwe Streektakke gestig nie.

MID YEAR EXECUTIVE MEETING AND MEETING WITH STANDING COMMITTEE

The 'Mid-Year' meeting of the Executive Council was held in Kempton Park during November, 1972, and the Standing Committee has now become operative as far as its own programme of meetings is concerned.

TUSSENTYDSE BESTUURSVERGADERING EN VERGADERING SAAM MET DIE DAGBESTUUR

Die tussentydse Vergadering van die Bestuursraad is gedurende November 1972 in Kempton Park gehou, en die Dagbestuur het nou, sover dit sy eie program vir vergaderings betref, in werking getree.

SUB-COMMITTEES AND REPRESENTATIVES

Once again, on behalf of members of the Association, appreciation must be recorded for the great volume of work undertaken by the minority of members of the Association on the various technical committees thereof as well as representatives on other organisations.

SUBKOMITEES EN VERTEENWOORDIGERS

Hier ook moet daar namens die lede van die Vereniging waardering uitgespreek word vir die magdom werk wat 'n klein aantal lede van die Vereniging in die verskillende tegniese komitees, en ook as verteenwoordigers in ander organisasies, verrig het.

The Association was represented at the 1972 meeting of the IEC in Athens by Messrs. J. K. von Ahlften and E. E. de Villiers. We are grateful to their respective town councils for granting them the necessary facilities to enable them to represent the Association at this most important international gathering.

CONCLUSION

It is with regret that I now take this opportunity of saying "totsiens" to the many friends in the Association whom we as a firm, and myself and my wife personally, have made over our many years of association with the A.M.E.U. Unfortunately, circumstances within the Association have made it impossible for us to continue our connection therewith and we reluctantly took the step of tendering our resignation as Secretaries. Our connection with the Association over the years has been a very happy one and we wish success to all concerned with the future administration of the Association. At the last meeting of the Executive Council it was resolved to recommend to the Pietermarizburg Convention that I be granted an Honorary Membership of the Association. I take this opportunity of conveying to all concerned, my sincere appreciation for this honour.

R. G. EWING,

for Davidson & Ewing (Pty.) Limited.
Secretaries.

20th February, 1973.

Mnre. J. K. von Ahlften en E. E. de Villiers het ten tyde van die IEC-vergadering wat in 1972 in Athene gehou is, die Vereniging verteenwoordig. Ons is dankbaar dat hul onderskeie Stadsrade hul die nodige fasiliteite verleen het om hulle in staat te stel om die Vereniging by hierdie uiters belangrike internasionale vergadering te verteenwoordig.

TEN SLOTTE

Met die innigste spyt wil ek nou van hierdie geleentheid gebruik maak om aan die talle vriende in die Vereniging wat ons, as firma, en my vrou en ek persoonlik, tydens ons jarelange verbintenis met die V.M.E.O. gemaak het, ons uittrede bekend te maak. Ongelukkig het omstandighede binne die Vereniging dit vir ons onmoontlik gemaak om ons verbintenis daarmee voort te sit, en ons het met teensin daartoe oorgegaan om as Sekretarisse van die Vereniging te bedank. Ons verbintenis met die Vereniging oor baie jare was uiters gelukkig en one wens al diegene wat in die toekoms aan die administrasie van die Vereniging verbonde gaan wees, sukses toe. Ten tyde van die laaste vergadering van die Bestuursraad is daar besluit om by die Pietermaritzburg-konvensie aan te beveel dat 'n Erelidmaatskap van die Vereniging aan my toegeken word. Ek wil graag van hierdie geleentheid gebruik maak om aan al diegene wat daarby betrokke was my opregte waardering vir hierdie eer oor te dra.

R. G. EWING,

vir Davidson & Ewing (Edms.) Beperk
Sekretarisse

20th Februarie 1973.

GENERATION AND TRANSMISSION IN THE ESCOM SYSTEM

By Mr. H. B. Norman

SUMMARY

This paper gives details of the generation and transmission capability of the Escom system for the next decade and discusses the factors involved in deciding how this should be increased to meet future loads. The reliability of long transmission systems is discussed and performance statistics for Escom lines are given. The standard fault levels and transformer ratings recently adopted by Escom are mentioned and details are given of the firm load that can be supplied from a busbar at various supply voltages using standard equipment.

1. GENERATION.

The present total generation capability of Escom's power stations is 8913 MW and plans already in hand will increase this progressively to 13581 MW during the next decade.

About 96 percent of this generation will be provided from coalfired plant which requires boiler overhauls taking about 2 months every 3 years and turbine generator overhauls taking from 2 to 4 months every 5 to 6 years. On the Escom system the weekly maximum demand is more than 90 percent of the annual peak for about two thirds of the year so that it is not possible to carry out all of the overhaul programme during light load periods and about 7½ percent of the total generating plant has to be out of service for overhaul during the winter peak load period.

Provision must also be made for unscheduled outages arranged at short notice for preventive maintenance or repairs and for forced outages due to faults. The largest set size on the system at present has a rating of 325 MW sent out or just over 3½ percent of the total generation capability so that the provision of 7 percent of total generation capability for unscheduled and forced outages allows for the loss of the largest set when one of the same size is out of service for maintenance or repair.

Thus, allowing for overhauls, unscheduled and forced outages, the firm generation capability of Escom's stations at time of winter peak load can be taken to be 85,5 percent of the total capability.

To supplement the generation available from its own stations Escom has contracted to take power from the Cabora Bassa station in Mocambique over two

KRAGONTWIKKELING EN -TRANSMISSIE IN DIE EVKOMSTELSEL

Deur Mnr. H. B. Norman

OPSOMMING.

Hierdie verhandeling verskaf besonderhede van die ontwikkel- en transmissievermoë van die Evkomstelsel vir die volgende dekade en bespreek die faktore wat gemoeid is met die besluit oor die wyse waarop dit verhoog kan word om in toeskomstige behoeftes te voorsien. Die betroubaarheid van lang transmissiestelsels word bespreek en daar word pretasiestatistiek vir Evkom-kraglyne verskaf. Daar word ook melding gemaak van die standaard-foutpeile en transformatorkenwaardes wat Evkom onlangs aanvaar het en besonderhede gegee van die vaste las wat by verskillende toevoerspannings vanaf 'n geleistam gedra kan word as standaarduitrusting gebruik word.

1. ONTWIKKELING.

Evkom se kragstasies het tans 'n totale ontwikkelingsvermoë van 8913 MW en planne wat reeds opgestel word, sal daartoe lei dat dit gedurende die volgende dekade gaandeweg toeneem tot 13581 MW.

Sowat 96 persent van hierdie ontwikkelsvermoë sal voorsien word deur steenkoolgestookte uitrusting wat vereis dat daar elke 3 jaar ongeveer 2 maande aan ketelopknapping en elke 5 tot 6 jaar van 2 tot 4 maande aan turbinegeneratoropknapping bestee word. By die Evkamstelsel beslaan die weeklikse maksimumaanvraag vir omtrent twee derdes van die jaar meer as 90 persent van die jaarlikse spitsaanvraag; gevolglik is dit nie moontlik om die hele opknappingsprogram gedurende tye van geringe belasting uit te voer nie en moet sowat 7½ persent van die totale ontwikkelingsmasjinerie gedurende die winterspitslastydperk vir opknapping uit diens onttrek word.

Daar moet ook voorsiening gemaak word vir onbeplande buitebedryfstelling wat op kort kennisgewing vir voorkomende onderhoud of herstelwerk gereël word en vir gedwonge onderbrekings as gevolg van foute. Tans het die grootste stel in die stelsel 'n kenvermoë van 325 MW, of net meer as 3½ persent van die totale ontwikkelingsvermoë; dus maak die toelating van 7 persent vir onbeplande en gedwonge onderbrekings voorsiening vir die uitval van die grootste stel wanneer een met dieselfde grootte uit diens is vir onderhoud of herstelwerk.

Indien daar voorsiening gemaak word vir opknapping, onbeplande en gedwonge onderbreking kan die vaste ontwikkelvermoë van Evkom se kragstasies ten tye van winterspitslaste beskou word as 85,3 persent van die totale vermoë.

Om die beskikbare vermoë van sy eie stasies aan te vul, het Evkom 'n kontrak aangegaan om krag deur twee monopolêre hsgs-lyne van die Cabora Bassa-

monopolar hvdc lines. Supplies from this source can be considered to be firm since the contractual power figures allow for the loss of a set at Cabora Bassa or the loss of one of the monopolar lines.

Adding the firm power from Cabora Bassa to that from Escom's stations, the total firm generation capability available to the Escom system during the next 10 years will be as shown in column 1 of Table 1. The anticipated annual maximum demand on the system is given in column 2 and the excess of firm generation over anticipated demand is given in column 3. Allowing 14,5 percent for overhaul and outages the shortfall in total generating capability in later years is indicated in column 4.

It will be seen from column 3 that in the years from 1975 to 1979 the planned programme for installation of generating plant provides an excess of generation over that needed to meet the anticipated load with an adequate reserve for overhauls and outages.

This extra margin of safety is considered desirable to allow for the possibility of delays in completion of the various stages of the Cabora Bassa project and to allow for "teething troubles" with the first 500 MW sets at Kriel since it is general experience that the initial availability of large sets is usually poor.

By 1890 additional generating plant will be needed to meet the anticipated demand and the question of what type of plant should be added is under active investigation.

Various types of plant could be added including conventional steam, nuclear, hydro, pumped storage and gas turbine. The economics of each of these types of plant involve consideration of the capital costs, which depend mainly on the power rating, and operating costs which depend mainly on the annual energy output needed. In general, plant with a low capital cost has a high operating cost and vice versa, so that the most economic plant to provide a given amount of power will depend on the annual energy involved, i.e. the annual load factor at which it will operate.

Once plant has been installed economics dictate that the plant with the lowest operating costs should be used to provide the maximum energy it can produce, while that with the highest cost should be used as little as possible. Thus the plant with lowest operating costs should be used, as far as possible, for load duty and the remaining plant should be chosen in merit order to meet the peaking duty, on the basis that the higher its operating cost the less energy it should produce.

stasie in Mosambiek te neem. Toevoere uit hierdie bron kan as bestendig beskou word aangesien die kontraktuele kragsyfers voorsiening maak vir die verlies van 'n stel by Cabora Bassa of die verlies van een van die monopolêre lyne.

As die bestendige krag van Cabora Bassa af by dié van Evkom se stasies bygevoeg word, sal die totale vaste ontwikkelvermoë wat in kolom 1 van Tabel 1 getoon word, gedurende die volgende 10 jaar uit die Evkom-stelsel beskikbaar wees. Die verwagte jaarlikse maksimum aanvraag teen die stelsel word in kolom 2 getoon en die oorskot van die bestendige kragontwikkeling bo die verwagte aanvraag word in kolom 3 aangegee. In kolom 4 word die tekort aan totale ontwikkelvermoë in daaropvolgende jare aangedui nadat 14,5 persent vir opknapping en buitebedryfstyd afgetrek is.

Dit sal uit kolom 3 blyk dat die program vir die installering van ontwikkeluitrusting met betrekking tot die jare vanaf 1975 to 1979 voorsiening maak vir 'n ontwikkelingsoorskot bo die eise van verwagte belasting en daar bly 'n toereikende reserwevermoë oor vir opknapping en onderbrekings. Hierdie bykomende veiligheidsgrens word wenslik geag om voorsiening te maak vir die moontlikheid van vertragings in die voltooiing van die verskillende stadia van die Cabora Bassa-projek en om rekening te hou met aanvangsprobleme met die eerste 500-MW-stelle by Kriel aangesien die algemene ondervinding getoon het dat groot stelle aanvanlik 'n swakker beskikbaarheid het.

Teen 1980 sal bykomende ontwikkeluitrusting nodig wees om in die verwagte vraag te voorsien en daar word daadwerklik ondersoek ingestel na die tipe uitrusting wat bygevoeg moet word.

Verskeie tipes uitrusting kan bygevoeg word. Dit omvat die konvensionele stoom-, kern-, pompwateropgaar- en gasturbineuitrusting.. Die ekonomie van hierdie soorte installasies behels oorweging van die kapitaalkoste wat hoofsaaklik van die kragkenvermoë afhang en van die bedryfskoste wat in die eerste plek van die jaarlikse benodigde energielewering afhang. Uitrusting met 'n lae kapitaalkoste het in die algemeen 'n hoë bedryfskoste en omgekeerd; dus sal die mees ekonomiese uitrusting om 'n gegewe hoeveelheid krag te verskaf, afhang van die jaarlikse energie wat betrokke is, d.w.s. die jaarlikse lasfaktor waarteen dit sal werk.

As uitrusting eers geïnstalleer is, vereis besuiniging dat die uitrusting met die laagste bedryfskoste gebruik moet word om die maksimum hoeveelheid energie waartoe dit in staat is, te verskaf, terwyl dié met die hoogste bedryfskoste so min as moontlik gebruik moet word. Die uitrusting met die laagste bedryfskoste moet aldus sover as moontlik gebruik word om die basiese las te dra en die oorblywende uitrusting moet in volgorde van verdienstelikheid ingespan word om die spitslas die hoof te bied op die grondslag van

As the load increases the required amounts of base load power and peaking power at various load factors increases in proportion so that the load factor on existing plant will vary depending on what type of plant is added to meet the increased load. If new base load plant is added the existing base plant of lowest merit order will become lower. This will result in lower total generating costs. For all plant of lower merit order than the new plant added. Conversely if new peaking plant is added it will be operated according to its merit order and all existing peaking plant of higher merit order will have to generate more energy while all plant of lower merit order will have to generate less energy.

It will be clear from this brief discussion that a simple comparison of costs of generating plant is insufficient to establish the most economic plan, and the only way to arrive at an optimum programme for adding new plant is to determine the total costs of the system with different types of plant added to meet the shortfall of power from year to year.

The aspect of transmission costs also enters the picture as certain types of plant such as steam, hydro and pumped storage can only be placed in certain locations and the cost of the tranmission system needed to convey the power generated at these locations to appropriate centres will vary.

A further aspect that has a bearing on how a plant can be operated is the question of fuel storage If fuel can be stored, as, for example, in a hydro installation, it is possible to use this fuel to produce a constant power, such that the fuel is used at the rate it is stored, or to produce a greater amount of power for a shorter time. Since the cost of the dam in a hydro installation in South Africa is generally very high while the average annual energy that can be generated is relatively low, it is usually economic to install a station of high power rating and use this plant at a low load factor for peaking duty. In this way the cost per kW of the installation can be reduced to low figure.

In view of the high cost of railing coal it is generally uneconomic to build coal-fired stations anywhere except on the coal fields and, in general, only limited coal storage facilities are provided. Since the capital cost of developing the colliery forms a large percentage

hoe hoër die bedryfskoste hoe minder die energie wat dit moet lewer.

Namate die las toeneem, neem die vereiste hoeveelhede basislaskrag en spitslaskrag in verhouding toe teen verskillende lasfaktore; derhalwe sal die lasfaktor by bestaande uitrusting varieer na gelang van die tipe uitrusting wat bygevoeg word om die verhoogde las te dra. Indien nuwe basislasuitrusting bygevoeg word, sal die bestaande basislasuitrusting met die kleinste verdienstelikheid spitslasuitrusting word en die lasfaktor vir alle bestaande spitslasuitrusting sal kleiner word. Dit sal lei tot laer totale ontwikkelingskoste vir alle uitrusting wat laer in die volgorde van verdienstelikheid is as die nuwe bygevoegde uitrusting. Indien nuwe spitslasuitrusting bygevoeg word, sal dit aan die ander kant ooreenkomstig die verdienstelikheidsrang daarvan gebruik word en sal alle spitslasuitrusting met groter verdienstelikheid meer energie moet ontwikkel terwyl alle uitrusting met 'n geringer verdienstelikheid minder energie sal moet ontwikkel.

Dit sal uit hierdie kort bespreking blyk dat 'n eenvoudige vergelyking van die koste van ontwikkeluitrusting onvoldoende is vir die bepaling van die mees ekonomiese plan en die enigste wyse waarop die voordeligste program vir die byvoeging van nuwe uitrusting uitgewerk kan word, is deur die totale koste van die stelsel te bepaal as verskillende tipes uitrusting bygevoeg word om die tekort aan krag van jaar tot jaar die hoof te bied.

Die aspek van transmissiekoste kom ook in aanmerking aangesien sekere tipes uitrusting soos stoomhidro- en pompwateropgaaruitrusting op slegs sekere plekke geplaas kan word en omdat die koste van die transmissiestelsels om die krag van hierdie plekke af na die betrokke lassentra toe oor te bring, sal verskil.

'n Verdere aspek wat 'n invloed het op die wyse waarop installasies bestuur kan word, is die kwessie van brandstofberging. Indien energie geberg kan word, soos byvoorbeeld in 'n hidro-installasie, is dit moontlik om hierdie energie te gebruik vir die lewering van konstante krag, op so 'n wyse dat die energie gebruik word teen die tempo waarteen dit geberg word, of om 'n groter hoeveelheid krag vir n korter tyd te ontwikkel. Aangesien die koste van 'n dam vir 'n hidro-installasie in Suid-Afrika in die reël baie hoog is terwyl die gemiddelde jaarlikse energie wat ontwikkel kan word betreklik laag is, is dit gewoonlik ekonomies om 'n stasie van hoë kragvermoë op te rig en om hierdie installasie teen 'n lae lasfaktor slegs vir toplasdiens te gebruik. Op hierdie wyse kan die installasie se koste per kW tot 'n lae syfer verminder word.

In die lig van die hoë koste om steenkool te verspoor, is dit gewoonlik onekonomies om steenkoolgestookte kragstasies op ander plekke as steenkoolvelde op te rig, en in die algemeen word slegs vir beperkte steenkoolbergingsfasiliteite voorsiening ge-

of the total fuel cost a pit-head coal station will be most economic if the coal facility can be used at maximum output, and, for this reason, existing pit-head stations are used, as far as possible, for base load duty.

Since the majority of Escom's present stations are of the pit-head, coal-fired type it is obvious that they cannot all run as base load and those of lower merit order must be used for peaking duty. This means that the collieries at these stations are capable of producing, at a low cost, more coal than is required. This coal could be used either by adding a pump-storage installation or by adding coal-storage facilities and additional generating plant at the station in question. In either alternative the energy not needed by the system at time of light load can be stored, either in the form of water pumped up to a reservoir or in the form of coal, and this energy can be used at time of peak load.

Nuclear stations and gas turbine installations are most economic when located at the coast because cooling water is readily available for the nuclear plant and gas turbines can produce maximum output at sea level. In comparing the costs of these types of plant with others the cost of transmission plays a large part. For example, in comparing a coal-fired station on the Eastern Transvaal coal fields with a nuclear or gas turbine station in the Western Cape a transmission system of about 1500 km would be involved in the first alternative.

Space does not permit further discussion of generation economics but the above comments will give some idea of the factors involved. The final decision regarding the type of plant to be added to meet the shortfall of generation in 1980 and subsequent years will be based on long-term studies taking all these factors into account and will be made on the basis of providing a system having the lowest possible generating cost consistent with an acceptable degree of reliability of supply.

2. TRANSMISSION.

In the space available it is not feasible to discuss the transmission systems in Escom's various Undertakings throughout the country, and it is intended to confine discussion to the 400kV system.

As is well known the 400kV system has been created to link all of Escom's Undertakings to form an integrated national supply system throughout the country. The creation of a national system is of benefit to

maak. Aangesien die kapitaalkoste om die steenkoolmyn te ontwikkel 'n groot persentasie van die totale brandstofkoste uitmaak, sal 'n skagkragstasie meer ekonomies wees indien die steenkoolfasiliteite teen maksimum lewering gebruik kan word, en om hierdie rede word die bestaande skagkragstasies sover moontlik gebruik om die basislas te verskaf.

Aangesien die meerderheid van Evkom se huidige stasies die skagbek-steenkoolgestookte tipe is, is dit duidelik dat nie almal as basislasstasies gebruik kan word nie en dié wat minder geskik is, moet vir spitslasdiens gebruik word. Dit beteken dat die steenkoolmyne by hierdie stasies meer steenkool as wat nodig is teen 'n lae koste kan lewer. Hierdie steenkool kan gebruik word deur óf 'n pompwaterinstallasie óf steenkoolbergingsgeriewe en bykomende ontwikkeluitrusting by die betrokke stasie by te voeg.By elke alternatief kan die energie wat die stelsel ten tye van geringe belasting nie nodig het nie, geberg word, óf in die vorm van water wat na 'n opgaardam gepomp word of in die vorm van steenkool, en hierdie energie kan gedurende spitslastye gebruik word.

Kernkragstasies en gasturbine-installasies is meer ekonomies wanneer hulle aan die kus opgerig word omdat koel water geredelik beskikbaar is vir die kernkraginstallasies terwyl gasturbines op seevlak die hoogste lewering het. Wanneer die koste van hierdie tipes uitrusting met ander vergelyk word, speel transmissiekoste 'n groot rol. Wanneer 'n steenkoolgestookte stasie op die Oos-Transvaalse steenkoolvelde byvoorbeeld met 'n kernkrag- of gastuurbinestasie in Wes-Kaapland vergelyk word, sal eersgenoemde 'n transmissiestelsel van nagenoeg 1500 km verg.

Daar is te min ruimte vir verdere bespreking van kragontwikkelingsekonomie : tog sal die kommentaar hierbo 'n redelike begrip verskaf van die faktore wat 'n rol speel. Die finale besluit in verband met die tipe installasie wat bygevoeg moet word om die tekort aan kragontwikkelingsuitrusting in 1980 en die daaropvolgende jare aan te vul, sal gegrond wees op langtermynondersoeke waarin al hierdie faktore in ag geneem is, en sal geneem word op die basis dat 'n stelsel met die laagste moontlike ontwikkelkoste en met 'n aanvaarbare graad van betroubare kragvoorsiening in die vooruitsig gestel word.

2. TRANSMISSIE.

In die beskikbare ruimte is dit nie doenlik om die transmissiestelsels in Evkom se onderskeie ondernemings oor die hele land te bespreek nie; die bedoeling is om die bespreking tot die 400kV-stelsel te beperk.

Dit is bekend dat die 400kV-stelsel geskep is om al Evkom se ondernemings te koppel sodat 'n geïntegreerde landswyse toevoerstelsel tot stand gebring kan word. Die skepping van 'n landswye stelsel strek tot

all consumers in the country since it allows Escom to make maximum use of its most economic generating plant. It also makes it possible to use sets of the largest possible ratings at any location throughout the country. This point is particularly important in connection with the possible use of nuclear power since this becomes progressively more economic as the size of set increases. Another benefit of interconnecting the various Undertakings is that reserves provided to cover unscheduled and forced outages can be pooled and thus the total reserve needed is kept to a minimum.

The extent to which advantage can be taken of all these aspects depends on the power transfer capability of the 400kV system. This system was originally designed on the assumption that by the time its power transfer capability was reached it would be economic to add nuclear stations in the coastal areas. This assumption was based on economic studies using the best cost estimates available at that time. Since the initial studies prices of nuclear plant have escalated very rapidly and, unless very large set sizes are used, the economic case for nuclear power has become very marginal.

Considering the coastal areas fed from the 400kV system the dates by which some action must be taken to provide more power can be determined from Table II which lists the anticipated maximum demands in the areas concerned.

As regards Cape Western Undertakings (CWU) the capability of the local Escom stations at Salt River and Hex River amounts to a maximum of 335 MW sent out. In view of the very high cost of coal it will pay to operate this plant to produce the minimum possible amount of energy. The intention, therefore, is to use it as reserve plant to cover unscheduled outages and, to ensure that it is in good working order when needed at short notice, it is proposed to operate each set in rotation every third day during the peak hour shift. On this basis one third of the plant would be in operation during the peak shift under normal conditions so that the local stations could generate up to about 110 MW to assist in meeting the peak load.

With the planned duplication of the 400kV lines and the addition of series capacitors, studies show that the system will be capable of delivering about 1000 MW to the Western Cape with any one line section out of service, provided loads at intermediate stations grow as anticipated. It is therefore possible to meet a load of 1110 MV before further action is needed and it can be seen from Table II that this load will be nearly reached in 1980 and will be exceeded

die voordeel van alle verbruikers in die land aangesien Evkom daardeur sy mees ekonomiese ontwikkeluitrusting ten beste kan benut. Dit maak ook die gebruik van stelle met die grootste moontlike kenvermoëns op enige plek in die land moontlik. Hierdie punt is veral belangrik in verband met die moontlike gebruik van kernkrag aangesien dit progressief meer ekonomies word na mate die stelgrootte toeneem. Nog 'n voordeel van die onderlinge koppeling van die onderskeie ondernemings is dat reserwes ter dekking van onbeplande en gedwonge onderbrekings saamgevoeg kan word, derhalwe word die totale benodigde reserwe tot 'n minimum beperk.

Die ma'e waarin al hierdie aspekte benut kan word, hang af van die kragoordravermoë van die 400kV-stelsel. Hierdie stelsel is oorspronklik ontwerp met die veronderstelling dat dit ekonomies sou wees om kernkragstasies in die kusgebiede by te voeg wanneer die stelsel se kragoordravermoë bereik word. Hierdie veronderstelling is gegrond op ekonomiestudies waarin van die beste kosteramings op daardie tydstip gebruik gemaak is. Sedert die eerste studies het die pryse van kernuitrusting baie skerp gestyg en tensy baie groot stelle gebruik word, is dit twyfelagtig of kernkrag ekonomies is.

Met inagneming van die kusgebiede wat vanaf die 400kV-stelsel gevoer word, kan die datum wanneer stappe gedoen moet word om meer krag te voorsien, bepaal word uit Tabel II waarin die verwagte maksimum aanvrae in die betrokke gebiede verstrek word.

Wat die Wes-Kaaplandse Onderneming (WKO) betref, kom die vermoë van die plaaslike Evkomstasies by Soutrivier en Hexrivier te staan op hoogstens 335 MW wat uitgestuur kan word. In die lig van die hoë koste van steenkool sal dit lonend wees om hierdie installasies so te laat werk dat hulle die minimum energie lewer. Die voorneme is dus om hulle as reserwe-installasies te gebruik om onbeplande onderbrekings te dek, en ten einde te verseker dat hulle in goeie werkende toestand is wanneer hulle op kort kennisgewing benodig sou word, word dit beoog om elke stel om die beurt elke derde dag gedurende spitstye te laat werk. Op hierdie basis sal een derde van die installasies gedurende die spitstyd onder normale toestande in bedryf wees sodat die plaaslike stasies tot ongeveer 110 MW kan ontwikkel ten einde die spitslas die hoof te bied.

Ondersoeke toon dat die stelsel, met die beplande verdubbeling van die 400kV-lyne en die toevoeging van seriekapasitors, nagenoeg 1000 MW aan Wes-Kaapland sal kan oorbring met enige lynseksie uit bedryf, mits die las by tussenstasies net na verwagting toeneem. Dit is dus moontlik om in 'n aanvraag van 1110 MW te voorsien voordat verdere optrede nodig is, en dit blyk uit Tabel II dat hierdie aanvraag teen 1980 byna bereik sal wees en in 1981 oorskry sal word.

in 1981. It would be possible to run all the local plant in CWU and thus meet a peak load of 1385 MW and Table II shows that this load would be exceeded in 1982. While pumped storage and gas turbine plant will be considered, the size of any installation of this type would be limited and the most attractive possibilities for a relatively large increase in power supply would be to add a local nuclear station or to add inland generation and strengthen the transmission system.

The addition of a third 400kV line from the inland area would increase the power transfer capability by about 650 MW if loads on the 400kV system grow in proportion, and this would be sufficient to meet the anticipated CWU load until about 1985. If this is done the nuclear station originally proposed could be deferred until this date, by which time a large set could be used without increasing the reserves needed, and better information would be available regarding costs and experience with this type of installation. It is anticipated that the cost of nuclear fuel may escalate at a lower rate than that of coal and, from this point of view, the later a nuclear station is installed the more economical it should become, particularly if larger set sizes can be used at later dates with the consequent reduction in capital cost per kW.

Studies to decide what measures should be taken in the early 1980's to strengthen supplies to the Cape Western Undertaking are nearing completion and a final decision in this connection will be taken in the near future.

For Natal Undertaking (NU) the local generation amounts to 465 MW at Ingagane and about 320 MW in the remaining stations after Congella and the old sets at Colenso are decommissioned. As in the CWU, Umgeni and Colenso are likely to be used as reserve plant and one third of their output, amounting to 110 MW, is likely to be available during peak shifts. Thus the maximum local generation at time of peak load is likely to be about 575 MW and if necessary this could be raised to about 785 MW. Over the relatively short distance to Natal the duplicate 400kV system will be capable of transmitting about 1500 MW with one line out of service, this limit being set by the thermal limit of one line. Thus the planned system will be able to meet a load of about 2075 MW if the expensive stations are run for reserve only and this could be raised to 2285 MW if use is made of all local generation.

Reference to Table II shows that the lower figure will be exceeded in 1979 while the higher figure will be exceeded in 1980.

Dit sou moontlik wees om al die plaaslike installasies in die WKO te laat werk en sodoende in 'n spitsaanvraag van 1385 MW te voorsien, en Tabel II toon dat hierdie aanvraag in 1982 oorskry sal word. Ofskoon pompwater- en gasturbine-installasies oorweging sal geniet, sal die grootte van enige installasies van hierdie tipe beperk wees en die aantreklikste moontlikhede vir 'n betreklike groot vermeerdering van die kragtoevoer is die toevoeging van 'n kernkragstasie, of die toevoeging van binnelandse kragstasies en versterking van die tranmissiestelsel.

Die toevoeging van 'n derde 400kV-lyn uit die binnelandse gebied sal die kragoordravermoë met nagenoeg 650 MW opstoot indien die belasting van die 400kV-stelsel na verhouding styg, en dit sou voldoende wees om tot ongeveer 1985 in die verwagte WKO-aanvraag te voorsien. Indien dit gedoen sou word, kan die kernkragstasie wat oorspronklik beoog is tot op hierdie datum uitgestel word. Teen hierdie tyd kan groter stelle gebruik word sonder om groter reserwes nodig te maak, en beter inligting oor die koste en ondervinding in verband met hierdie tipe installasie sal beskikbaar wees. Die verwagting is dat die koste van kerkragbrandstof teen 'n laer tempo as dié van steenkool sal styg, en in die lig hiervan sal kernkragstasies met verloop van tyd al meer ekonomies word, veral as groter stelle op later datums gebruik kan word, met die gevolglike vermindering in kapitaalkoste per kV.

Ondersoeke oor die maatreëls wat in die vroeë tagtigs ter versterking van toevoere na die Wes-Kaaplandse Onderneming getref moet word, nader voltooiing en 'n finale besluit in hierdie verband sal in die nabye toekoms geneem word.

Wat die Natalse Onderneming (NO) betref, beloop die plaaslike ontwikkelvermoë 465 MW by Ingagane en ongeveer 320 MW in die oorblywende stasies nadat Congella en die ouer stelle by Colenso uit bedryf geneem is. Soos in die WKO sal Colenso en Umgeni waarskynlik as reserwe-installasies gebruik word en een derde van hulle lewering, wat op 110 MW te staan kom, sal waarskynlik gedurende spitslastye beskikbaar wees. Dus sal die maksimum plaaslike kragontwikkeling gedurende spitstye nagenoeg 575 MW beloop en indien nodig kan dit tot sowat 785 MW verhoog word. Oor die betreklike kort afstand na Natal sal die dubbele 400kV-stelsel, met een lyn buite gebruik, ongeveer 1500 MW kan oorbring. Hierdie grens word gestel deur die termiese perk van een lyn. Derhalwe sal die beplande stelsel in 'n kragaanvraag van 2075 MW kan voorsien die duur stasies net vir reserwedoeleindes gebruik word en dit kan tot 2285 MW verhoog word indien al die plaaslike kragontwikkeluitrusting benut word.

Tabel II toon dat die laagste syfer in 1970 oorskry sal word en die hoogste syfer in 1980.

For Natal, in view of the relatively short transmission distance, it is less likely that an economic case can be made for a nuclear station than it is for CWU and the most economic measures for strengthening Natal are likely to be to add inland generation plus transmission or to provide hydro power from the Tugela river.

These possibilities are being studied and a final decision will be taken in the near future.

The power transfer capability of the 400kV system which will supply Border Undertaking and Port Elizabeth will depend to some extent on what is decided regarding the strengthening of CWU. The system from Hydra will, however, have ample capability to meet the anticipated loads of Border and Port Elizabeth for the next 10 years and it is premature to consider the next step required to strengthen these areas at this stage.

In comparing the merits of local generation with supplies from long transmission systems fears are often expressed regarding the reliability of supplies from the latter. While the final position can only be judged by experience Escom is firmly of the opinion that the reliability of a high-voltage transmission system can be made as good or better than that of a local power station.

This view is supported by a published report [1] giving details of the performance of the Swedish 400kV system, which is somewhat similar to our own. It is stated in this report that over a 17-year period some 200 000 GWh were transmitted and, in this time, the interrupted energy, i.e. the energy that was not supplied due to faults, amounted to about 3 GWh or 0,0015 percent of the energy transmitted. For comparison it is shown that the corresponding figure if the energy had been supplied from a power station having an 8 percent failure rate and an installed capacity of three times the total power requirement, would have been about 0,005 percent or more than three times that for the transmission system.

Escom's own experience with 400kV is rather limited but experience with a 275kV supply to the Eastern Transvaal over a single line with single-pole reclosing has been very good. Over a 6-year period this 275kV line experienced 34 faults of which 31 did not cause outages, two caused outages of 1 minute each and 1 permanent fault caused an outage of 2 hours and 12 minutes.

This means that the system was out of service due to faults for about 0,005 percent of the time which is considered to represent good performance on any standards. With duplicate lines, as will be provided to

Wat Natal betref, is dit vanweë die betreklike kort transmissieafstand minder waarskynlik dat kernkragstasie ekonomies geregverdig sal kan word as vir die WKO. Die mees ekonomiese toekomstige maatreëls vir die versterking in Natal is waarskynlik die byvoeging van binnelandse kragontwikkeling plus transmissie of die voorsiening van hidrokrag uit die Tugela.

Hierdie moontlikhede word ondersoek en 'n besluit sal in die nabye toekoms geneem word.

Die oorbringvermoë van die 400kV-stelsel wat krag aan die Grensonderneming en Port Elizabeth sal voorsien, sal in 'n mate afhang van wat ter versterking van die WKO besluit word. Die stelsel vanaf Hydra sal egter oor voldoende vermoë beskik om die volgende 10 jaar in die verwagte aanvrat van Grens en Port Elizabeth te voorsien en dit is te vroeg om in hierdie staduim oor die volgende stap ter versterking van die voorsiening in hierdie gebiede te besluit.

Wanneer die voordele van plaaslike kragontwikkeling teen dié vankragvoorsiening oor lang transmissiestel els opgeweeg word, word daar dikwels bedenkinge uitgespreek oor die betroubaarheid van laasgenoemde toevoere. Alhoewel die finale stand van sake slegs aan die ondervinding getoets kan word, is Evkom daarvan oortuig dat 'n hoërspanningstransmissiestelsel net so betroubaar of selfs betroubaarder as 'n plaaslike kragstasie gemaak kan word.

Hierdie mening word gestaaf deur 'n gepubliseerde [1] verslag met besonderhede van die prestasie van die Sweedse 400kV-stelsel wat naasteby met ons stelsel ooreenstem. Hierdie verslag verklaar dat daar oor 'n tydperk van 17 jaar ongeveer 200 000 GWh oorgebring is en dat die onderbroke krag, d.w.s. die krag wat weens stelselfoute nie voorsien is nie, gedurende hierdie tydperk ongeveer 3 GWh of 0,0015 persent van die oorgebringde krag beloop het. Vergelykenderwys word daarop gewys dat die ooreenstemmende syfer sowat 0,005 persent of meer as drie maal so hoog as dié vir die tranmissiestelsel sou wees indien die krag deur 'n kragstasie met 'n 8 persentonderbrekingsyfer en 'n geïnstalleerde vermoë van drie maal die totale kragaanvraag, voorsien was.

Evkom se ondervinding van 400kV-kragoorbrenging is ietwat beperk, maar die werking van 'n 275kV-toevoer na Oos-Transvaal oor 'n enkellyn met enkelpaalhersluiting was baie belowend. Oor 'n tydperk van ses jaar het daar 34 foute op hierdie lyn voorgekom, waarvan 31 nie onderbrekings veroorsaak het nie, twee onderbrekings van 1 minuut elk veroorsaak het en een permanente fout 'n onderbreking van twee uur en twaalf minute veroorsaak het.

Dit beteken dat die stelsel vir ongeveer 0,005 persent van die tyd weens foute buite diens was, wat volgens enige standaarde as 'n goeie prestasie beskou kan word. Met duplikaatlyne, soos dié wat na Wes-

the Western Cape and Natal, the performance should be even better than this since the system will be capable of delivering rated power even if there is a permanent fault on one line section.

Naturally, in the early stages of operating a long transmission system faults will occur due to initial defects in the equipment and from operating errors due to inexperience. Escom have had their full share of troubles from these causes on the first 400kV line to the Western Cape but it is believed that, with the correction of defects that have been found, the increased operating experience that has been gained and, above all, with the completion of the duplicate line, the reliability of supplies will improve dramatically. The actual record of single-line 400kV system to the Western Cape since it was first commisioned on 7th October, 1969 until the end of 1972, as indicated by the total time during which supply over the system was interrupted, is indicated in Table III.

Table III.

Performance of the single line—400 kV system from October 1960 to December 1970

Kaapland en Natal voorsien gaan word, sal die prestasie nog beter wees, aangesien die stelsel die kenvermoë sal kan lewer selfs wanneer daar 'n permanente defek in een gedeelte van die lyn voorkom.

Vanselfsprekend sal daar aanvanklik, in die bediening van 'n nuwe lang transmissiestelsel, foute voorkom weens aanvangsdefekte in die uitrusting, asook bedryfsfoute as gevolg van 'n gebrek aan ondervinding. Met die eerste 400kV-lyn na Wes-Kaapland is Evkom in hierdie opsig terdeë beproef, maar daar word vertrou dat die regstelling van die defekte wat ontdek is, die bedryfsondervinding wat opgedoen is en veral die voltooiing van die duplikaatlyn, die betroubaarheid van die toevoer aanmerklik sal verbeter. Die werklike prestasie van die 400kV-enkellynstelsel na Wes-Kaapland vandat dit op 7 Oktober 1969 in werking gestel is, tot aan die einde van 1972, soos dit weerspieël word deur die totale onderbrekingstyd vir die stelsel, word in Tabel III getoon.

Tabel III.

Prestasie van die 400kV-enkellynstelsel van Oktober 1960 tot Desember 1970

Year Jaar	Number of Interruptions Getal Onderbrekings	Outage Time, hrs. Onderbrekingstyd ure	Percentage Output Time Persentasie onderbrekingstyd	Average Outage Time per Interruptions, Hours Gemiddelde onderbrekingstyd per onderbreking, ure
1969	4	3,8	0,19	0,95
1970	19	89,5	1,02	4,72
1971	15	7,8	0,08	0,52
1972	8	2,4	0,03	0,30
TOTAL TOTAAL	46	103,5	0,37	2,25

The major outage time in 1970 resulted from a line jumper pulling out due to a defective joint and this accounted for 76 hours of outage time. Table III shows that, while the performance in the first 15 months was poor, the number of interruptions, percent outage time and outage time per interruption have been steadily decreasing and, at this stage, the figures are reaching acceptable levels. The figures will of course, improve very considerably when the duplicate line is completed later this year and, after this has been done, we confidently expect outages to be a very rare occurence indeed.

The reliability of supplies to Natal should be excellent since the transmission length is small, only a small amount of equipment is involved and the lines have already been duplicated. Supplies to Border and Port Elizabeth will initially be given over a single

Die langste onderbrekingstyd in 1970 is veroorsaak deur 'n lynoorleiding wat weens 'n defekte las losgeraak het, en hierdie fout het 'n onderbreking van 76 uur veroorsaak. Tabel III toon dat, hoewel die prestasie gedurende die eerste 15 maande swak was, die getal onderbrekings, die persentasie onderbrekingstyd en die onderbrekingstyd per onderbreking steeds afgeneem het en dat die syfers in hierdie staduim 'n aanvaarbare vlak bereik. Die syfers sal vanselfsprekend later vanjaar, wanneer die duplikaatlyn voltooi is, aansienlik verbeter en ons vertrou dat onderbrekings dan inderdaad baie seldsaam sal wees.

Die betroubaarheid van die toevoer na Natal behoort uitstekend te wees, aangesien transmissie-afstand kort is, daar slegs 'n klein hoeveelheid uitrusting betrokke is en die lyne reeds verdubbel is. Toevoere na die Grens en Port Elizabeth sal aanvanklik verskaf

400kV line fed from the duplicate 400kV system to Hydra. This single line will, however, be equipped with single-pole reclosing and its performance should be better than that of the 275kV line used to supply the Eastern Transvaal, i.e. the outage time is likely to be less than 0,005 percent or an average of about 20 minutes per year. This performance can, of course, be improved by adding a duplicate line but it is questionable whether the cost of this is justified to cover a contingency which may occur for 20 minutes in a year, particularly in the initial years when loads are low and can be met for a large proportion of the time from local generation.

In a paper of this length it is impossible to cover all the aspects of Escom's transmission system which might be of interest to this Convention. Before closing, however, it is felt that Escom's current practice with regard to fault levels and transformer ratings should be mentioned.

After considerable investigation Escom has decided to adopt certain standard fault current ratings and certain standard transformer MVA ratings for each nominal voltage used on its system.

Full details of the perameters adopted have been published [2] but the point it is wished to stress is that adoption of these standards means that the firm power that can be supplied from one busbar at any given voltage using standard equipment is limited to the values indicated in Table IV.

It is believed that this table may be a useful guide in determining what would be a reasonable supply for any given power requirement, and adoption of these limits will avoid consumers having to use unnecessarily expensive equipment.

If non-firm supplies are considered it would be possible to increase the power limits given in Table IV without exceeding the standard fault levels, but the continuous current rating would be very high and the reliability would be very much reduced.

3. CONCLUSION.

Certain aspects of generation and transmission on the Escom system have been discussed and facts have been given to support the following conclusions :

(a) With the programme already in hand the generation capability of the Escom system will be adequate until 1979 but further generation will be needed in 1980.

(b) The choice of the type of generation to be added to meet the shortfall in 1980 and subsequent years requires consideration of many factors and involves many long-term studies.

word oor 'n enkele 400kV lyn wat uit die 400kV-stelsel by Hydra gevoer sal word. Hierdie enkellyn sal egter van enkelpaalhersluiting voorsien wees, sodat hy beter diens behoort te lewer as die 275kV-lyn na Oos-Transvaal; d.w.s. die onderbrekingstyd sal waarskynlik minder as 0,005 persent of 'n gemiddeld van 20 minute per jaar wees. Hierdie prestasie kan natuurlik verbeter word deur 'n duplikaatlyn te bou, maar dit is te betwyfel of die koste hiervan geregverdig is ten einde 'n gebeurlikheid wat 20 minute per jaar in beslag kan neem, te dek, veral in die beginjare wanneer die laste laag is en meestal deur plaaslike ontwikkeling gedra kan word.

Dit is onmoontlik om al die aspekte van Evkom se transmissiestelsel wat vir hierdie kongres van belang mag wees, binne die bestek van 'n kort referaat te dek. Daar moet egter melding gemaak word van Evkom se huidige praktyk ten opsigte van foutpeile en transformatorkenvermoëns.

Na breedvoerige ondersoeke het Evkom besluit om sekere standaardfoutstroompeile en sekere MVA-transformatorkenvermoëns te aanvaar vir elke nominale spanning wat in sy stelsel gebruik word.

Volledige besonderhede van die goedgekeurde parameters is reeds gepubliseer[2] maar daar moet op gewys word dat die aanvaarding van hierdie standaarde beteken dat die vaste krag wat met standaarduitrusting by enige bepaalde spanning van een geleistam af voorsien kan word, beperk is tot die waardes wat in Tabel IV aangegee word.

Daar word vertrou dat hierdie tabel 'n nuttige gids sal wees by die vasstelling van 'n redelike toevoerspanning vir 'n bepaalde kragaanvraag en dat die aanvaarding van hierdie grense sal voorkom dat verbruikers uitrusting wat onnodig duur is, hoef te gebruik.

In die geval van nie-vaste toevoere sou dit moontlik wees om die kraggrense wat in Tabel IV verskyn te verhoog sonder om die standaardfoutpeile te oorskry, maar dan sou die deurlopende stroomkenwaarde baie hoog en die betroubaarheid baie laer wees.

3. SLOT.

Sekere aspekte van ontwikkeling en transmissie in die Evkom-stelsel is behandel en feite ter stawing van die volgende gevolgtrekkings is genoem :

(a) Met die program wat reeds voorberei word, sal die ontwikkelvermoë van die Evkom-stelsel tot 1979 voldoende wees, maar verdere ontwikkelvermoë sal in 1980 nodig wees.

(b) Die keuse van die soort kragontwikkeling wat moet bykom ten einde die tekort in 1980 en die jare wat daarop volg die hoof te bied, verg oorweging van baie faktore en baie lang-

These studies are nearing completion and final decisions are imminent.

(c) The 400kV system will be adequate until about 1980 and the next step of strengthening will depend considerably on the decisions regarding future generation.

(d) The reliability of a multi-line EHV transmission system is confidently expected to be as good or better than that of local generating stations. The reliability of a single-line EHV system with single-pole reclosing is expected to be sufficiently good to make it unnecessary and uneconomic to provide additional lines, particularly when loads are modest and there is some local generation at the receiving end.

(e) It is generally desirable to limit the load taken from one busbar at a given voltage in order to restrict fault levels and continuous current ratings to economic levels. An indication of maximum power levels at any voltage is given in Table IV.

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1. "Seventeen years experience of service reliability in the Swedish 400kV system" by S. Lalander, L. Gustafsson and B. Mattson; CIGRE Paper 30—02 August 1970.
2. "Proposed parameters for standard power transformers for the Electricity Supply Commission" by H. B. Norman; SAIEE, October 1972.

termynstudies. Hierdie studies is byna voltooi en finale besluite sal eersdaags geneem moet word.

(c) Die 400kV-stelsel sal tot ongeveer 1980 voldoende wees en die volgende stap in die versterking daarvan sal grotendeels van die besluite ten opsigte van toekomstige kragontwikkeling afhang.

(d) Die betroubaarheid van 'n veellynige EHS-transmissiestelsel sal na verwagting net so goed of nog beter as die van plaaslike kragstasies wees. Daar word verwag dat 'n EHS-enkellynstelsel met enkelpaalhersluiting so betroubaar sal wees dat dit onnodig en onekonomies sal wees om bykomende lyne te verskaf, veral waar laste laag is en daar plaaslike ontwikkeling aan die ontvangkant is.

(e) Dit is in die algemeen wenslik om die las wat teen 'n bepaalde spanning van een geleistam geneem word, te beperk ten einde foutpeile en deurlopende stroomkenwaardes tot 'n ekonomiese hoogte te beperk. 'n Aanduiding van maksimum kragpeile teen enige bepaalde spanning word in Tabel IV aangegee.

VERWYSINGS

1. „Seventeen years experience of service reliability in the Swedish 400 kV system" deur S. Lalander, L. Gustafsson en B. Mattson; CIGRE Paper 30—02, Augustus, 1970.
2. „Proposed parameters for standard power transformers for the Electricity Supply Commission" deur H. B. Norman; SAIEE, Oktober 1972.

Table I.

GENERATION AND LOAD MW S.O.

Tabel I.

ONTWIKKELING EN LAS MW UITGESTUUR

Year Jaar	Firm Generation capability available to the Escom System Vaste Ontwikkelvermoë aan Evkom-stelsel beskikbaar (1)	Anticipated system maximum demand Verwagte maksimum stelselaanvraag (2)	Excess of firm generation capability Oorskryding van vaste ontwikkelvermoë (3)	Shortfall in total generation capability Tekort aan totale ontwikkelvermoë (4)
1973	7620	7250	370	—
1974	8042	8009	33	—
1975	9168	8706	462	—
1976	10083	9396	687	—
1977	11031	10162	869	—
1978	11381	11041	340	—
1979	12186	11932	254	—
1980	12421	12947	-526	620
1981	12746	13998	-1252	1480
1982	13081	15133	-2052	2430
1983	13081	16360	-3279	3880

Table II.

MAXIMUM DEMANDS OF AREAS FED FROM 400kV SYSTEM TO CAPE AND NATAL, MW S.O.

Tabel II.

MAKSIMUM AANVRAE VAN GEBIEDE WAT UIT DIE 400kV-STELSEL NA KAAPLAND EN NATAL GEVOER WORD, IN MW UITGESTUUR

Year / Jaar	MAXIMUM DEMAND / MAKSIMUM AANVRAAG				
	Cape Western Undertaking Wes-Kaaplandse Onderneming	Natal	Border Undertaking Grens-onderneming	Port Elizabeth	Border Undertaking and Port Elizabeth Grensonderneming en Port Elizabeth
1973	533	1219	100	30	130
1974	599	1383	116	78	194
1975	669	1514	129	78	207
1976	734	1624	141	78	219
1977	823	1736	155	130	285
1978	911	1961	171	139	310
1979	1004	2133	187	151	338
1980	1105	2373	204	178	382
1981	1213	2579	220	209	429
1982	1372	2756	239	241	480
1983	1534	2969	250	276	536

Table IV

MAXIMUM FIRM LOAD THAT CAN BE SUPPLIED FROM BUSBARS OF STATED VOLTAGE STANDARD EQUIPMENT

Tabel IV

MAKSIMUM LAS MET STANDAARDUIT-RUSTING VANAF GELEISTAMME VAN BEPAALDE SPANNING VOORSIEN KAN WORD

Nominal Voltage kV	11	22	33	44	66	88	132	220	275
Maximum Load MVA	35	70	140	140	300	600	900	2300	2900

THE ELECTRICITY AMENDMENT ACT 1971 AND THE RESULTING CHANGES IN ESCOM'S ORGANISATION

The Electricity Act authorises Escom to establish and maintain separate undertakings and a separate licence is granted by the Electricity Control Board to each undertaking. The licence defines the area within which the particular undertaking is authorised to supply electricity and the charges payable by consumers in that undertaking. The Act requires that separate accounts shall be kept of the expenditure of each undertaking and that the prices charged by an undertaking shall be determined by the costs incurred by that undertaking.

It can be seen as one of the important objectives of the Electricity Act that Escom's charges to consumers shall be determined by the costs incurred in furnishing the supplies concerned, so that as far as practicable a consumer or consumer group neither subsidies nor receives subsidy from any other consumer or consumer group. The achievement of this objective is, of course, fostered by the maintenance of economically separate distribution undertakings in geographically separate regions.

Up to the time of the development of a national transmission system each major region necessarily depended upon power stations in its own area. In this manner the Hex River and Salt River power stations were built specifically for the needs of the Cape Western Undertaking. Similarly, Congella, Colenso, Umgeni and Ingagane were built for the needs of the Natal Undertaking, and the Border Undertaking, centred on East London, is up to the present still wholly dependent upon its own West Bank power station.

The northern power stations evolved in a similar manner. Extensions to the pooled generation system of the Rand and Orange Free State Undertaking, and the Eastern Transvaal Undertakings, up to and including Camden power station, were planned in relation to the needs of the three northern undertakings served by this power station pool (i.e. Eastern Transvaal, Rand and Orange Free State and Cape Northern Undertakings).

Up to 1967 the highest voltage of transmission lines in service in Escom's networks was 275kV. Until the middle nineteen-sixties the considerable distances involved and the relatively modest system loads of the coastal undertakings precluded the general interconnection of Escom's undertakings. The pontential of the Orange River Scheme for hydro-electric generation of electricity however gave the necessary impetus for the decision, announced in 1963, to interconnect

DIE ELEKTRISITEITSWYSIGINGSWET VAN 1971 EN DIE VOORTSPRUITENDE VERANDERINGS IN EVKOM SE ORGANISASIE

Die Elektrisiteitswet magtig Evkom om afsonderlike ondernemings te stig en in stand te hou. Die Elektrisiteitsbeheerraad reik aan elkeen van hierdie ondernemings 'n afsonderlike lisensie uit, wat ondermeer die gebied omskryf waarin die betrokke onderneming elektrisiteit mag voorsien, en die tariewe vasstel waarteen elektrisiteit aan verbruikers in hierdie gebied voorsien moet word. Die Wet vereis dat afsonderlike rekeninge van die uitgawes van elke onderneming gehou word en dat die pryse waarteen elektrisiteit aan verbruikers voorsien word, vasgestel moet word in ooreenstemming met die koste wat die betrokke onder neming aangegaan het.

Een van die oogmerke van die Elektrisiteitswet is dat Evkom se tariefvorderings bepaal moet word deur die koste wat aangegaan word om die betrokke toevoere te lewer sodat 'n verbruikersgroep sover moontlik nie 'n ander verbruikersgroep subsidieer, of deur so 'n ander groep gesubsidieer word nie. Hierdie doelstelling word natuurlik bevorder deur die instandhouding van ekonomies selfstandige distribusie-ondernemings in ekonomies afsonderlike geografiese streke.

Voor die ontwikkeling van 'n landswye transmissiestelsel was elke groot streek noodwendig afhanklik van die kragstasies in sy eie gebied. Op hierdie wyse is die Hexrivier- en Soutrivierkragstasie spesifiek vir die behoeftes van die Wes-Kaaplandse Onderneming opgerig. Net so ook is Congella, Colenso, Umgeni en Ingagane opgerig vir die behoeftes van die Natalse Onderneming terwyl die Grensonderneming, met sy hoofkwartier in Oos-Londen, tot op die huidige tydstip nog heeltemal van sy eie West Bank-kragstasie afhanklik is.

Die noordelike kragstasies is op 'n soortgelyke wyse ontwikkel. Uitbreidings aan die gepoelde kragstasies van die Randse en Oranje-Vrystaatse Onderneming en die Oos-Transvaalse Onderneming, is tot en met Camden-kragstasie beplan met inagneming van die behoeftes van die drie noordelike ondernemings wat deur hierdie kragstasies bedien word (d.w.s. Oos-Transvaal, Rand en Oranje-Vrystaat en Noord-Kaapland.

Tot 1967 was die hoogste spanning van kraglyne in Evkom se netwerke 275kV. Tot die middel van die sestigerjare het die lang afstande, en die betreklike matige stelsellaste van die kusondernemings die algemene verbinding van Evkom se ondernemings verhinder. Die potensiaal van die Oranjeriviersskema vir die ontwikkeling van hidroëlektrisiteit het egter die nodige aanmoediging gegee vir die besluit, in 1963 aangekondig, om die Wes-Kaaplandse Onderneming deur middel

the Cape Western Undertaking with the pithead power stations in the northern provinces by means of a 400 kV transmission system. The decision also to build 400 kV lines linking Transvaal and Natal, and to extend a branch of the Cape Western 400kV system towards the Eastern Cape, with 220 kV spurs from Cookhouse to Port Elizabeth and East London followed soon afterwards. The agreements which have been concluded between Escom and the Municipalities of Cape Town and Port Elizabeth for partial bulk supplies from Escom to augment the output of the municipal power stations influenced the planned timing of the completion of the different sections of the transmission system linking the Transvaal coalfields with Escom's coastal undertakings. The establishment of the Alusaf Aluminium Works at Richards Bay, with an initial (1971) load of some 100 MW also advanced the need for the interconnection of the Natal system with the national system.

After the completion of Salt River power station in 1967 and West Bank and Ingagane power stations in 1969 no further coal-fired power stations were constructed or planned in the coastal undertakings and the new Escom power stations were now designed to meet the total needs of the interconnected Escom system rather than the requirements of any specific undertakings. These new stations include the Hendrik Verwoerd hydro-electric station and the proposed Vanderkloof hydro-station on the P. K. le Roux dam, as well as a series of large new coal-fired stations. Grootvlei, Hendrina and Arnot power stations are already in service and are being extended. Construction of Kriel power station is well advanced and the first of six 500 MW sets in this station will be in operation in 1975.

Imports of power from the Cabora Bassa hydroelectric project in the Portuguese territory of Mocambique will also commence in 1975. This power resource together with the power stations now under construction will meet the growth in Escom's total power needs until the end of the nineteen-seventies. The national transmission system and the interconnection of the distribution undertakings permit greater freedom in the choice of power station types and in the siting of power stations. New power stations can now be selected and designed to meet the specific need to be fulfilled in the expected future load duration curve of the interconnected Escom system, and it is expected that there will, in the nineteen-eighties, be a considerable increase in the diversity of types of power stations serving the Escom network. Escom's first nuclear power station, to be situated in the Western Cape, is being planned for completion in the nineteen-eighties. The base load resources will be further augmented by the major new coal-fired stations in the northern provinces, but interesting possibilities are also being investigated in respect of plant limited

van 'n 400kV-transmissiestelsel aan die skagkragstasies in die noordelike provinsies te koppel. Kort daarna is daar ook besluit om 400kV-lyne ter verbinding van Transvaal en Natal op te rig en om 'n vertakking van Wes-Kaapland se 400kV-stelsel na Oos-Kaapland uit te brei met 220kV-taklyne vanaf Cookhouse tot in Port Elizabeth en Oos-Londen. Die ooreenkomstige tussen Evkom en die munisipaliteite van Kaapstad en Port Elizabeth en Oos-Londen. Die ooreenkomste deur Evkom om die lewering van die munisipale kragstasies aan te vul, het die beplande voltooiingsdatum van die transmissiestelsel tussen Kaapland en die Transvaalse steenkoolvelde bespoedig. Die oprigting van die Alusaf-aluminiumwerke by Richardsbaai, met 'n aanvanklike aanvraag (1971) van nagenoeg 100 MW, het ook daartoe bygedra dat die Natalse stelsel gouer met die landswye stelsel verbind moes word.

Na die voltooiing van die Soutrivierkragstasie in 1967 en West Bank- en Ingagane-kragstasie in 1969 is geen verdere steenkoolgestookte kragstasies in die kusondernemings opgerig of beplan nie, en Evkom se nuwe kragstasies sou voortaan beplan word om in die totale behoeftes van die onderling gekoppelde Evkomstelsel eerder as dié van enige bepaalde onderneming of groep ondernemings te voorsien. Hierdie nuwe stasies sluit in die Hendrik Verwoerd-hidrokragstasie en die beoogde Vanderkloof-hidrostasie by die P. K. le Roux-dam sowel as 'n reeks groot nuwe steenkoolgestrookte stasies. Grootvlei, Hendrina en Arnot is reeds deels in gebruik. Die oprigting van Kriel-kragstasie verloop volgens plan en die eerste van ses 500 MW-stelle sal in 1975 in werking wees.

In 1975 sal daar ook begin word om krag vanaf die Cabora Bassa-hidroëlektriese projek in die Portugese gebied van Mosambiek in te voer. Hierdie kragbron tesame met die kragstasies wat nou opgerig word, sal tot aan die einde van die sewentigerjare in Evkom se totale kragbehoeftes voorsien. Die landswye transmissiestelsel en die koppeling van die distribusie-ondernemings bring meer vryheid in die keuse van kragstasietipes en die plasing van kragstasies mee. Nuwe kragstasies kan nou gekies en ontwerp word om in die bepaalde behoefte van die verwagte toekomstige aanvraagduurkromme van die onderling gekoppelde Evkom-stelsel te voorsien, en daar sal na verwagting in die tagtigerjare 'n aansienlike toename wees in die diversiteit van tipes kragstasies wat die Evkom-net bedien. Evkom se eerste kernkragstasie, wat in Wes-Kaapland geleë sal wees, word beplan vir voltooiing in die tagtigerjare. Die basislaskragbronne sal verder aangevul word deur groot nuwe steenkool-gestookte stasies in die noordelike provinsies, maar daar word ook ondersoek ingestel na interessante moontlikhede in verband met uitrusting wat beperk word tot bedryf

to peak load operation and capable of meeting this restricted duty at lower costs. The development of the hydro-electric potential of the Tugela and other rivers is being studied in collaboration with the Department of Water Affairs. Pumped storage schemes and gas turbine installations strategically placed in the national network are also amongst the possibilities being investigated.

The older generation of power stations originally constructed to serve the needs of particular undertakings represents a rapidly dwindling fraction of Escom's total power resources. For the winter of 1973 the aggregate installed capacity in Escom power stations will be some 9 600 MW more than one-third of this present total capacity is already in the new generation of power stations planned and designed, not for any particular distribution undertaking, but for the intergrated load on the national system.

A change in the legislation was required to permit the distribution undertakings to share proportionally in the costs and advantages of the new generation of power stations established to serve the national system, and the 1971 amendment of the Electricity Act included the necessary provision to make this possible. Clause 23(5) of the Amended Electricity Act authorises the Electricity Control Board to grant a permit for the establishment of an undertaking devoted exclusively to the generation of electricity and its supply in bulk to the Commission's undertakings responsible for distribution of electricty to consumers. The permit for the establishment of the Central Generating Undertaking was granted with effect from 1st January 1972, and in terms of this permit the power stations of the Rand and Orange Free State, Eastern Transvaal Cape Western and Natal Undertakings were as from that date transferred to the Central Generating Undertaking. The Central Generating Undertaking supplies the electricity needs of all Escom's distribution undertakings with the exception of the Border and Cape Eastern Undertakings which are not as yet electrically interconnected with the national system. This interconnection will be effected during 1973 and the assets and liabilities of the West Bank power station of the Border Undertaking will then also be taken over by the Central Generating Undertaking.

The Electricity Act stipulates that the expenditure incurred in the transmission of electricity from the power resources of the Central Generating Undertaking to the distribution undertakings served by it "shall be allocated to the undertaking to which the electricity is transmitted." This again is in accordance with the central theme of the legislation that costs must be apportioned in a manner which will as far as practicable ensure that any one consumer group neither subsidises nor receives subsidy from any other group.

in spitslastye en wat daartoe in staat is om hierdie beperkte taak teen 'n laer koste te verrig. Die ontwikkeling van die hidroëlektriese potensiaal van die Tugela- en ander riviere word in samewerking met die Departement van Waterwese ondersoek. Hidroskemas met gepompte water en gasturbine-installasies wat strategies in die landswye net geplaas is, tel onder die moontlikhede wat ondersoek word.

Die ouer kragstasies wat ontwerp is om in die behoeftes van bepaalde ondernemings te voorsien, verteenwoordig 'n vinnig krimpende breukdeel van Evkom se totale kragbronne. Vir die winter van 1973 sal die gesamentlike installasievermoë van Evkom se kragstasies sowat 9 600 MW wees en meer as een derde van hierdie huidige totale vermoë is gesetel in die nuwe kragstasies wat nie vir 'n bepaalde distribusieonderneming beplan en ontwerp is nie, maar vir die geïntegreerde las op die landswye stelsel.

'n Verandering in wetgewing was nodig om dit vir die distribusie-ondernemings moontlik te maak om na verhouding te deel in die koste voordele van nuwe kragstasies, wat opgerig is om die landswye net te bedien. Die Wysigingswet op Elektrisiteit van 1971 verleen die nodige magtiging hiervoor. Klousule 23(5) van die Gewysigde Elektrisiteitswet gee aan die Elektrisiteitsbeheerraad die bevoegdheid om 'n permit uit te reik vir die oprigting van 'n onderneming wat hom uitsluitend toelê op die ontwikkeling van elektrisiteit en die grootskaalse voorsiening aan die Kommissie se ondernemings wat verantwoordelik is vir die verspre'ding daarvan aan verbruikers. Die permit vir die stigting van die Sentrale Kragontwikkelingsonderneming is met ingang van 1 Januarie 1972 toegestaan, en kragtens hierdie permit is die kragstasies van die Randse en Oranje-Vrystaatse, Oos-Tranvaalse, Wes-Kaaplandse en Natalse Ondernemings vanaf dié datum aan die Sentrale Kragontwikkelingsonderneming oorgedra. Die Sentrale Kragontwikkelsonderneming voorsien in die elektrisiteitsbehoeftes van al Evkom se distribusie-ondernemings met uitsondering van die Grens- en Oos-Kaaplandse Ondernemings wat nog nie elektries aan die landswye stelsel gekoppel is nie. Die koppeling sal in die loop van 1973 bewerkstellig word en die bates en laste van die West Bank-kragstasie van die Grens-onderneming sal dan ook deur die Sentrale Kragontwikkelingsonderneming oorgeneem word.

Ingevolge die Elektrisiteitswet word die uitgawes in verband met die transmissie van elektrisiteit vanaf die kragbronne van die Sentrale Kragontwikkelingsondernemings na die distribusie-ondernemings „toegewys aan die onderneming waarna die elektrisiteit oorgebring word." Ook dit is in ooreenstemming met die sentrale tema van die wetgewing, nl. dat koste verdeel moet word op 'n wyse wat, sover as wat dit uitvoerbaar is, sal verseker dat geen verbruikersgroep 'n ander groep sal subsidieer of 'n subsidie van so 'n ander groep sal ontvang nie.

Clause 5 of the permit issued to the Central Generating Undertaking by the Electricity Control Board establishes the important principle that the Central Generating Undertaking shall operate "in the manner calculated to be the most efficient and economical manner of producing electricity from all the sources of supply available to it." The Central Generating Undertaking is therefore freed of parochial economic interests of different regions. It strives to optimise its mode of operation towards the lowest overall cost in the generation of electricity and its bulk delivery to distribution undertakings. The allocation, to the distribution undertakings, of the expenditures incurred by the Central Generating Undertaking is a task in cost accounting. With the correct performance of this task, conflicting regional interests do in fact not arise. The minimising of total generation and transmission costs is the optimum policy, not only for Escom as a whole, but also from the point of view of the individual distribution undertakings.

The interconnection and integration of Power resources lead to a number of opportunities for improved control of costs. The larger power stations built to serve the needs of the national systems bring about economies of scale in capital — and operating costs. Possibly of equal importance is the relative saving in manpower. The power station operating and maintenance staff required per megawatt of installed capacity of per gigawatt hour of output is significantly reduced with increase in the size of sets. This is a very valuable factor in the present circumstances where the load growth of some 9% per annum being experienced by Escom is straining the available resources of technical personnel.

The measure of diversity between the loads in different regions results in a total system maximum demand which is lower than the aggregate of the individual maximum demands of the separate and previously isolated regions. The capacity of reserve plant now required for the large interconnection system is lower than the aggregate capacity of reserve plant which would be needed for the separate regions in isolation. The most important advantage of the national system however arises from the fact that regional differences in the natural endowment of resources for the generation of electricity will in future play a lesser role. This natural endowment includes the coal reserves of the Eastern Transvaal, the hydro-electric potential of the Tugela and other rivers, the availability of sea water for cooling at future nuclear power stations and the possibilities of advantageous import of power from neighbouring countries. The optimised large scale exploitation of these assets which is made possible by the country-wide interconnection of power resources and load centres will be accompanied by an evolution-

Klousule 5 van die permit wat deur die Elektrisiteitsbeheerraad aan die Sentrale Kragontwikkelingsonderneming uitgereik is, lê die belangrike beginsel neer dat die SKO moet fungeer „op die wyse wat daarop bereken is om die doeltreffendste en mees ekonomiese wyse te wees waarvolgens elektrisiteit uit al die beskikbare bronne gelewer kan word." Die SKO staan dus los van enige ekonomiese oorwegings wat teenstrydige ekonomiese belange van verskillende streke kan verteenwoordig. Dit streef daarna om sy bedryfstelsel so te optimiseer dat elektrisiteit teen die laagste totale koste ontwikkel en by die groot maat aan die distribusie-ondernemings voorsien word. Die toewysing aan die distribusie-ondernemings van die uitgawes wat die SKO aangegaan het, is 'n kwessie van kosteberekening. Wanneer hierdie taak korrek uitgevoer word, duik daar geen teenstrydige streeksbelange op nie. Die minimalisering van die totale ontwikkel- en transmissiekoste is die gunstigste beleid nie alleen vir Evkom in sy geheel nie, maar ook uit die gesigspunt van die afsonderlike distribusie-ondernemings.

Die onderlinge koppeling en integrasie van kragbronne lei tot 'n aantal moontlikhede om kostebeheer te verbeter. Die groter kragstasies wat opgerig is om in die behoeftes van die landswye stelsel te voorsien, bewerkstellig aansienlike besparings in kapitaal- en bedryfskoste. Moontlik van net soveel belang is die relatiewe besparing in mannekrag. Die kragstasiebedryfs- en onderhoudspersoneel wat per megawatt van die geïnstalleerdevermoë of, per gigawattuur van lewering geverg word, word aanmerklik verminder namate die grootte van die stelle toeneem. Dit is 'n baie betekenisvolle faktor in die huidige omstandighede waar die lastoename van sowat 9% per jaar wat Evkom tans ondervind, groot eise aan die beskikbare tegniese personeel stel.

Die mate van diversiteit tussen die laste in verskillende streke het tot gevolg 'n totale stelselmaksimumaanvraag wat laer is as die gesamentlike maksimumaanvrae van die afsonderlike en voorheen afgesonderde streke. Die vermoë van die reserwe-uitrusting wat nou deur die groot onderling gekoppelde stelsel geverg word, is laer as die gesamentlike vermoë van reserwe-uitrusting wat vir die afsonderlike streke nodig sou wees. Die belangrikste voordeel van die landswye stelsel spruit egter uit die feit dat streeksverskille in die natuurlike hulpbronne vir die ontwikkeling van elektrisiteit voortaan 'n kleiner rol sal speel. Hierdie hulpbronne is onder meer die steenkoolreserwes van Oos-Transvaal, die hidroëlektriese potensiaal van die Tugelarivier en ander riviere, die beskikbaarheid van seewater vir koeling by toekomstige kernkragstasies en die moontlikhede van voordelige kraginvoer uit buurstate. Die grootskaalse optimale benutting van hierdie bates wat moontlik gemaak word deur die landswye koppeling van kragbronne en lassentrums sal gepaard gaan met

ary decrease in the regional differences in the cost of electricity.

Before the recent increase in railage rates the cost of coal burnt in Escom's Cape Western power stations had already risen to R7,40 per ton as compared with an average of some R1,80 for coal consumed in the Transvaal and Orange Free State coal-fired stations. The effect of this fourfold difference in coal cost is minimised by limiting as far as is practicable the output from the Cape Western stations, and transmitting as much as possible of the Cape Western power needs from the northern power stations by means of the 400kV system which links the Cape with the power resources of the north. The Cape Western stations continue to play a valuable role in contributing to the peaking plant and generating plant reserves of the interconnected system.

The reduction in the load factor of the coastal power stations in the Cape and Natal is accompanied by an increase in the load factor of the inland power stations and this brings direct benefit also to the inland undertakings. A colliery dedicated to the supply of coal to a pithead power station must be equipped to meet the highest coal demand likely to be made by the power station. Its costs are determined only partly by the output of coal and in considerable measure also by the designed capacity of the colliery. With increased load factor on an inland power station the average output of the associated "tied" colliery is raised without commensurate increase in the "fixed" element of colliery costs which is determined by the equipped capacity of the colliery rather than its output. This has a favourable influence on the average cost of coal delivered.

The economies in the cost of generation are, of course, partly offset by the costs associated with the extensive transmission system which is required to interconnect the power resources. To cushion the effect of the high capital cost of this transmission system, it is being built in stages. The duplication of the first 400kV circuit from the Transvaal to the Western Cape will only be completed towards the middle of 1973 and the interconnection of the Port Elizabeth and East London areas with the national system, which is to be effected shortly, will initially be by means of single circuits. Despite the limitations imposed by single circuit operation over part of the transmission system two-thirds of the electricity needs of the Cape Western Undertaking and more than one-third of the electricity needs of the Natal Undertaking were in 1972 transmitted from the north. With the completion of the duplicate circuit transmission systems these fractions will, from 1973 onwards, be higher.

The recent increases in railage rates have high-

'n evolusionêre afname in die streeksverskille wat daar in die koste van elektrisiteit bestaan.

Voor die jongste verhoging in spoortariewe het die koste van steenkool wat in Evkom se Wes-Kaaplandse kragstasies verbrand is, reeds tot by R7,40 per ton gestyg, in vergelyking met die gemiddelde koste van ongeveer R1,80 vir steenkool wat in die Transvaalse en Oranje-Vrystaatse steenkoolkragstasies verbruik is. Die uitwerking van hierdie viervoudige verskil in steenkoolkoste word tot die minimum beperk deur die lewering van die Wes-Kaaplandse stasies so ver doenlik te beperk en soveel as moontlik in Wes-Kaapland se kragbehoeftes te voorsien deur middel van die 400kV-stelsel wat die Kaap met die kragbronne van die noorde verbind. Die Wes-Kaaplandse stasies vervul steeds 'n belangrike funksie gedurende spitsverbruikstye en as reserwe-ontwikkeluitrusting vir die gekoppelde stelsel.

Die verlaging van die lasfaktor van die kuskragstasies in die Kaap en Natal gaan gepaard met 'n toename in die lasfaktor van die binnelandse kragstasies, wat op sy beurt regstreeks tot die voordeel van die binnelandse ondernemings strek. 'n Steenkoolmyn wat uitsluitlik 'n skagkragstasie voorsien, moet toegerus word om in die hoogste moontlike aanvraag van die kragstasie te voorsien. Die koste hiervan word gedeeltelik deur die steenkoollewering bepaal, en in 'n groot mate ook deur die ontwerpvermoë van die koolmyn. Met 'n verhoogde lasfaktor op 'n binnelandse kragstasie, styg die gemiddelde lewering van die verwante „gekoppelde" koolmyn sonder 'n eweredige styging in die „vaste" element van koolmynkoste wat deur die toegeruste vermoë eerder as die lewering van die myn bepaal word. Hierdie faktor het 'n gunstige invloed op die gemiddelde koste van die steenkool wat gelewer word.

Die besparing aan die koste van kragontwikkeling word natuurlik ten dele geneutraliseer deur die koste van die uitgebreide transmissiestelsel wat nodig is om die kragbronne onderling te verbind. Ten einde die uitwerking van hierdie hoë kapitaalonkoste te verminder, word die transmissiestelsel in stadiums gehou. Die tweede 400kV-kraglyn van Transvaal na Wes-Kaapland sal slegs teen die middel van 1973 voltooi word en die onderlinge verbindinge van die Port Elizabethse en Oos-Londense gebiede met die nasionale stelsel, wat binnekort gaan geskied, sal aanvanklik deur middel van enkellyne bewerkstellig word. Ten spyte van die beperkings van enkellynwerking op 'n gedeelte van die transmissiestelsel, is twee derdes van die elektrisiteitsbehoeftes van die Wes-Kaaplandse Onderneming en meer as een derde dié van die Natalse Onderneming in 1972 uit die noorde verskaf. Met die voltooiing van die tweede lyne sal hierdie breuksyfers van 1973 af styg.

Die jongste styging in spoortariewe het 'n belang-

lighted another important factor in the comparison between the costs of long distance transmission of electricity and the alternative of long distance rail transport of coal for the generation of electricity. The annual costs associated with a transmission system are largely determined by its initial capital costs and are thereafter not significantly influenced by inflation. The transmission cost per unit of electricity can in fact be relied upon to decrease as the loading on the transmission system progressively increases to approach the stable capacity limit of the system. In a time of generally increasing price levels railage rates must however be increased from time to time.

The railway tariff increases which came into effect on 1st January, 1973, will increase the railage cost on coal from the Witbank area to Salt River power station from R5,57 per (metric) ton to some R7,17 per (metric) ton, so that the delivered price of coal at this coastal station will in 1973 be in the region of R9.00 per ton, or roughly five times the coal cost at the pithead stations in the Eastern Transvaal. The increase in the Salt River power station coal costs per metric ton from R4,13 in 1953 to R5,91 in 1963 and R9,00 in 1973 reflects an average yearly escalation of 3,65% in the first decade, 4,30% in the second decade and an average of 3,97% per year for the 20-year period.

The 1973 increase of R1,60 per ton in railage charges for coal to Salt River power station, coupled with coal consumption of some 0,52kg per unit sent out, results in an additional cost of 0,083 cents per unit sent out. If this increase had applied to the total energy needs of the Cape Western Undertaking, estimated at 3 350 GWh for 1973, the additional expenditure resulting from the 1973 change in railage rates alone would have been some 2,8 million Rand, equivalent to more than 8% of the total budgeted expenditure for this year.

By virtue of the 400kV interconnection with the national system the impact of the 1973 increases in railage rates on Escom's undertakings, including the coastal undertakings, will however be small. The bulk of the energy needs of the Cape Western Undertaking will be derived from the northern pithead power stations and will be unaffected by railage rates. The major effect of the national transmission system has thus been to shield the coastal undertakings from large increases in unit related costs which would otherwise have been unavoidable. It can be readily shown that these savings have already grown to a level which exceeds the additional demand related transmission cost incurred as a result of the interconnection. The nett benefit will, of course, show further increase as the loading of the different branches of the transmission systems increases from the present modest levels approaching the designed stability limits. The cost advantages achieved are understandably larger for those

rike faktor in die vergelyking tussen die koste van langafstandtransmissie van elektrisiteit en die alternatiewe langafstandversporing van steenkool vir die ontwikkeling van elektrisiteit, na vore gebring. Die jaarlikse onkoste van 'n transmissiestelsel word grotendeels deur sy aanvanklike kapitaalkoste bepaal en word daarna nie veel deur inflasie beïnvloed nie. Die transmissiekoste per eenheid elektrisiteit sal inderdaad afneem namate die belasting van die transmissiestelsel toeneem totdat dit die bestendige vermoëgrens van die stelsel bereik. In 'n tydperk van algemeen stygende koste sal spoortariewe egter van tyd tot tyd verhoog moet word.

Die nuwe spoortariewe wat op 1 Januarie 1973 in werking getree het, het die spoorkoste van steenkool van die Witbank-gebied na Soutrivierkragstasie van R5,57 per metrieke ton na ongeveer R7,17 per metrieke ton verhoog, sodat die prys van afgelewerde steenkool by hierdie kuskragstasie in 1973 in die omgewing van R9.00 per ton is, of naastenby vyf maal die steenkoolkoste by die skagkragstasies in Oos-Transvaal. Die toename in die steenkoolkoste per metrieke ton van R4,13 in 1953 tot R5,91 in1963 en R9,00 in 1973 weerspieël 'n gemiddelde jaarlikse styging van 3,65% in die eerste dekade, 4,30% in die tweede dekade en 'n gemiddelde styging van 3,97% per jaar vir die tydperk van 20 jaar.

Die toename in 1973 van R1,60 per ton aan spoorkoste vir die vervoer van steenkool na Soutrivierkragstasie, gepaard met 'n steenkoolverbruik van sowat 0,52kg per eenheid uitgestuur, lewer 'n bykomende koste van 0,083 sent per eenheid uitgestuur. Indien hierdie toename op die totale kragbehoeftes van Wes-Kaaplandse Onderneming van toespassing was, geskat op 3 350 GWh vir 1973, sou die bykomende spoorkoste ongeveer R2,8 miljoen bedra het, wat gelykstaande is met meer as 8% van die totale begrote uitgawe vir die Wes-Kaaplandse Onderneming.

Danksy die 400kV-verbinding met die nasionale stelsel sal die uitwerking van die 1973-styging in spoortariewe op Evkom se ondernemings, insluitende die kusondernemings, egter gering wees. Die merendeel van die kragbehoeftes van die Wes-Kaaplandse Onderneming sal uit die noordelike skagkragstasies verkry word en sal nie deur spoortariewe beïnvloed word nie. Die vernaamste uitwerking van die nasionale transmissiestelsel is dus die beskerming van die kusondernemings teen groot stygings in eenheidverbonde koste wat andersins onvermydelik sou gewees het. Daar kan geredelik bewys word dat hierdie besparings reeds gegroei het tot 'n vlak waar dit maklik die bykomende aanvraagverbonde transmissiekoste oorskry wat in verband met die onderlinge verbinding aangegaan is. Die netto voordele sal natuurlik verder toeneem namate die belasting van die verskillende vertakkings van die transmissiestelsel verhoog word van die huidige redelik lae vlak tot nader aan die ontwerpte stabiliteitsgrense.

undertakings where the local fuel costs are highest, but all undertakings benefit.

The Central Generating Undertaking has no published electricity tariffs but the costs it incurs are apportioned to the distribution undertakings in accordance with a set of rules prescribed by the Electricity Control Board in the permit granted for the establishment of the Central Generating Undertaking. These rules again underline the central theme in the Electricity Act that the prices paid by a given consumer group should be determined by the costs incurred in supplying electricity to this group. The establishment of the Central Generating Undertaking will lead to a reduction of the regional differences in electricity costs, but the change will be evolutionary rather than revolutionary. The progressive closing of the gap between inland and coastal electricity costs will arise, not from a less precise allocation of generating costs or from an arbitrary averaging of transmission cost which favours one undertaking at the expense of another, but from actual savings which will benefit especially those undertakings where generating costs are at present high.

The Central Generating Undertaking permit distinguishes between the "completed" power stations—that is, the first generation of power stations originally built to serve the needs of a specific undertaking or group of undertakings—and the new generation of power stations and other power sources intended from their beginning to serve the needs of the interconnected national system. The Central Generating Undertaking permit stipulates that any excess or saving in the cost of electricity sent out from the stations taken over by the Central Generating Undertaking from the Cape Western and Natal Undertakings in comparison with the cost of electricity sent out from the similar "first generation" power stations taken over from the Eastern Transvaal and the Rand and Orange Free State Undertakings shall be for the account of the Cape Western and Natal Undertakings respectively.

As a result of the higher coal costs, the unit related costs of generation in the coastal power stations are considerably higher than those incurred in the inland coal-fired power stations and in terms of the Central Generating Undertaking permit this excess in unit related generating cost over the comparable cost of the older inland stations is debited to the coastal undertakings concerned. The amount of this special direct debit is however minimised by curtailing the output of the coastal power stations as far as circumstances permit.

The capacity related costs of generation in the present coastal power stations are also higher than those in the older inland stations which are used as

Die voordele wat koste betref, is natuurlik groter waar die plaaslike brandstofkoste die hoogste is.

Die Sentrale Kragontwikkelingsonderneming het geen afgekondigde elektrisiteitstariewe nie, maar die koste wat hy aangaan, word toegewys aan die distribusie-ondernemings ooreenkomstig die reëls deur die Elektrisiteitsbeheerraad voorgeskryf in die permit vir die stigting van die Sentrale Kragontwikkelingsonderneming. Hierdie reëls beklemtoon weer eens die sentrale tema van die Elektrisiteitswet, naamlik dat die betaling wat van 'n gegewe groep geverg word in ooreenstemming moet wees met die koste wat aangegaan is vir die lewering van elektrisiteit aan die betrokke groep. Die stigting van die SKO sal die verskille in streekselektrisiteitskoste gaandeweg verminder, maar die verandering sal eerder evolusionêr wees as revolusionêr. Die geleidelike vermindering van die gaping tussen binnelandse en kuselektrisiteitskoste sal nie voorspruit uit 'n minder presiese toewysing van ontwikkelkoste of uit 'n arbitrêre berekening van 'n gemiddelde transmissiekoste wat een onderneming ten koste van 'n ander een begunstig nie, maar uit werklike besparings wat veral tot die voordeel sal strek van daardie ondernemings waar die koste van elektrisiteitsopwekking tans hoog is.

Die permit van die SKO maak 'n onderskeid tussen die „voltooide" kragstasies—d.w.s. die eerste geslag van kragstasies wat oorspronklik gebou is om die behoeftes van "n bepaalde onderneming of groep ondernemings te voorsien—en die nuwe geslag van kragstasies en ander kragbronne wat van die begin af bedoel is om in die behoeftes van die onderlinggekoppelde nasionale stelsel te voorsien. Die permit bepaal dat enige oorskryding of besparing in die koste van elektrisiteit wat uitgestuur word vanaf die stasies wat deur die SKO van die Wes-Kaaplandse en Natalse Ondernemings oorgeneem is, in vergelyking met die koste van elektrisiteit wat uitgestuur word deur die soortgelyke "eerste geslag"-kragstasies wat van die Oos-Transvaalse en die Randse en Oranje-Vrystaatse Ondernemings oorgeneem is, onderskeidelik vir die rekeninge van die Wes-Kaaplandse en die Natalse Onderneming sal wees.

As gevolg van die hoër steenkoolkoste is die eenheidverbonde koste van ontwikkeling in die kuskragstasies heelwat hoër as die wat by die binnelandse steenkoolkragstasies aangegaan moet word en ooreenkomstig die SKO-permit word hierdie oorskryding in eenheidverbonde ontwikkelkoste, vergeleke met die koste van die ouer binnelandse stasies, op die rekening van die betrokke kusondernemings gedebiteer. Die bedrag van hierdie spesiale regstreekse debiet word egter so klein moontlik gemaak deur die lewering van die kuskragstasies sover doenlik te beperk.

Die vermoëverbonde ontwikkelkoste in die huidige kuskragstasies is ook hoër as dié van die ouer binnelandse stasies waarmee dit vergelyk word. Hierdie

a basis for comparison. This arises mainly from the fact that the unit sizes of the turba-generator sets in coastal power stations are smaller. The difference in capacity related generating costs again results in a direct debit to the coastal undertakings originally served by their own power stations. The proportional amount of this debit is however rapidly decreasing as progressively more of the power needs of each undertaking is obtained from the new generation of power stations in which all distribution undertakings share proportionately.

After this direct debit, to the undertakings concerned, of excess unit related costs and excess capacity related costs, the remaining generating costs incurred by the Central Generating Undertaking are, in terms of the permit, "allocated to the distribution undertakings pro rata to the maximum demands, expressed in kilowatts and the kilowatt-hours taken in each month of the year by the respective undertakings."

For the purpose of apportioning Central Generating Undertaking costs, unit related costs are considered to be confined to the cost of coal and fuel oil (including railage and handling), and water. All other generating costs are regarded as demand related. Demand related costs are distributed between distribution undertakings proportionately to their individual monthly peak demands regardless of when these occurred.

The important 400kV transmission circuits which link different undertakings are assets of the Central Generating Undertaking and the costs associated with these circuits are, in terms of sub-section 23(b) of the Electricity Act and the corresponding provisions of the Central Generating Undertaking permit, allocated to the distribution undertakings to which electricity is transmitted. The Rand and Orange Free State, Cape Northern, Cape Western, and Orange River Undertakings all make use of certain sections of the transmission system to the Cape and the interconnection of Border Undertaking as from the second half of 1973 will also involve part of this circuit. Where a given circuit serves two or more distribution undertakings the costs are apportioned on the basis of "relative use" measured in terms of the maximum demand of the load taken by each separate undertaking by means of the transmission circuit concerned. The Natal Undertaking is the sole user of the 400kV circuits linking the power stations in the Eastern Transvaal with the Natal system and the whole associated with these circuits is therefore debited to Natal.

The total operating cost incurred by the Central Generating Undertaking in its first year, the calendar year 1972, was some R184 million. The procedure

verskil is hoofsaaklik toe te skryf aan die feit dat die eenheidgroottes van die turbogeneratorstelle in die kuskragstasies kleiner is. Die verskil in vermoëverbonde ontwikkelkoste veroorsaak ook 'n regstreekse debiet teen die kusondernemings wat oorspronklik deur hul eie kragstasies bedien is. Die proporsionele bedrag van hierdie debiet word egter vinnig minder na gelang die kragbehoeftes van elke onderneming in toenemende mate van die nuwe geslag van kragstasies verkry word waarin alle distribusie-ondernemings 'n proporsionele aandeel het.

Nadat hierdie regstrekse debiet, ten opsigte van die oorskot aan eenheidverbonde koste en vermoëverbonde koste aan die betrokke ondernemings toegewys is, word die oorblywende ontwikkelkoste wat deur die Sentrale Kragontwikkelingsonderneming aangegaan word, ooreenkomstig die permit aan die distribusie-ondernemings toegewys „in verhouding tot die maksimum aanvrae uitgedruk in kilowatt en tot die kilowatt-uur wat die onderskeie ondernemings elke maand van die jaar neem."

Vir die doeleindes van die toewysing van SKO-koste, word eenheidverbonde koste tot die koste van steenkool en brandolie (insluitende spoorvrag en hantering), en water, beperk. Alle ander ontwikkelkoste word as aanvraagverbonde beskou. Aanvraagverbonde koste word tussen die distribusie-ondernemings in verhouding tot hul afsonderlike maandelikse spitsaanvraag verdeel.

Die belangrike 400kV-tranmissielyne wat die verskillende ondernemings onderling met mekaar verbind, is bates van die SKO, en die koste aan hierdie kraglyne verbonde, word ooreenkomstig subartikel 23 (b) van die Elektrisiteitswet en die ooreenstemmende bepalings van die SKO-permit, toegewys aan die distribusie-ondernemings waaraan elektrisiteit oorgebring word. Die Randse en Oranje-Vrystaatse, Noord-Kaaplandse, Wes-Kaaplandse en Oranjerivierondernemings maak almal van sekere gedeeltes van die transmissiestelsel na die Kaap gebruik en die onderlinge koppeling van die Grensonderneming vanaf die tweede helfte van 1973 sal ook 'n gedeelte van hierdie kraglyn raak. Waar 'n gegewe kraglyn twee of meer distribusieondernemings bedien, word die koste op die grondslag van „relatiewe gebruik" toegewys, gemeet ooreenkomstig die maksimum aanvraag van die las wat deur elke afsonderlike onderneming deur middel van die betrokke transmissielyn geneem is. Die Natalse Onderneming is die enigste gebruiker van die 400kV-kraglyne wat die kragstasies in Oos-Transvaal met die Natalse stelsel koppel en die totale koste van hierdie kraglyne word dus teen Natal gedebiteer.

Die totale bedryfskoste van die SKO in sy eerste jaar, d.w.s. die kalenderjaar 1972, was ongeveer R184 miljoen. Die voorgeskrewe prosedure vir die verdeling

prescribed for apportioning this total cost amongst the distribution undertakings served by the Central Generating Undertaking requires the subdivision of the total cost into five different categories, as follows :

(a) Costs incurred in the transmission of electricity from the power resources of the Central Generating Undertaking to the distribution undertakings taking bulk supplies of electricity from the Central Generating Undertaking. For the financial year 1972, this expenditure incurred in the transmission of electricity and apportioned to the distribution undertakings in proportion to the "relative use" of different sections of the Central Generating Undertaking transmission system, amounted to some 3,0% of the total Central Generating Undertaking costs for the year;

(b) "Excess" unit related costs determined as the difference between the unit related generating costs incurred in the completed power stations taken over by the Central Generating Undertaking from the coastal undertakings and the corresponding unit related costs for the same output from the defined group of completed inland power stations taken over by the Central Generating Undertaking from the Rand and Orange Free State and Eastern Transvaal Undertakings. These excess unit related costs are, in terms of the Central Generating Undertaking permit debited to the distribution undertakings from which the high cost power stations were taken over and amounted to some 4,8% of the total expenditure incurred by the Central Generating in the financial year 1972;

(c) "Excess' capacity related costs, arising similarly as the unfavourable difference between the capacity related costs incurred in the existing coastal power stations and the corresponding costs for the same capacity in the defined group of inland power stations used as a basis for comparison. This cost, debited to the coastal undertakings for which the higher cost stations were originally constructed, amounted to some 2,8% of the total expenditure incurred by the Central Generating Undertaking in the 1972 financial year;

(d) The remaining unit related generating cost incurred by the Central Generating Undertaking, allocated to distribution undertakings in proportion to the number of units of electricity sent out by the Central Generating Undertaking to each of the respective undertakings. In 1972 the unit related cost so allocated represented roughly 26,6% of the

van hierdie totale koste tussen die distribusie-ondernemings wat deur die SKO bedien word, vereis die onderverdeling van die totale koste in vyf verkillende kategorieë, as volg :

(a) Koste aangegaan in verband met die oorbring van elektrisiteit vanaf die kragbronne van die SKO na die distribusie-ondernemings wat grootmaattoevoere van die SKO ontvang. Vir die boekjaar 1972 het hierdie uitgawe, wat in verband met die oorbring van elektrisiteit aangegaan is en tussen die distribusie-ondernemings in verhouding tot die „relatiewe gebruik" van verskillende gedeeltes van die SKO-transmissiestelsel verdeel is, ongeveer 3,0% van die totale SKO-koste vir die jaar bedra.

(b) Ekstra aan eenheidverbonde koste wat vasgestel is as die verskil tussen die eenheidverbonde ontwikkelkoste aangegaan in die voltooide kragtasies wat deur die SKO by die kusondernemings oorgeneem is en die ooreenstemmende eenheidverbonde koste vir dieselfde lewering deur die omskrewe groep voltooide binnelandse kragstasies wat deur die SKO by die Randse en Oranje-Vrystaatse en Oos-Transvaalse Ondernemings oorgeneem is. Hierdie ekstra eenheidverbonde koste word, in ooreenstemming met die SKO-permit, gedebiteer teen die distribusie-ondernemings van wie die hoëkoste-kragstasies oorgeneem is, en dit het sowat 4,8% beloop van die totale koste wat die SKO gedurende die boekjaar 1972 aangegaan het.

(c) Ekstra vermoëverbonde koste wat ontstaan as gevolg van die ongunstige verskil tussen die vermoëverbonde koste wat in die bestaande kuskragstasies aangegaan word en die ooreenstemmende koste vir dieselfde vermoë in die omskrewe groep binnelandse kragstasies wat as vergelykingsgrondslag gebruik word. Hierdie koste, waarmee die kusondernemings, vir wie die hoëkostestasies oorspronklik gebou is, gedebiteer word, het sowat 2,8% beloop van die totale koste wat die SKO in die boekjaar 1972 aangegaan het.

(d) Die oorblywende eenheidverbonde kragontwikkelingskoste wat die SKO aangegaan het en wat toegewys is aan distribusie-ondernemings in verhouding tot die getal eenhede elektrisiteit wat die SKO aan elk van die onderskeie ondernemings uitgestuur het. In 1972 het die eenheidverbonde koste wat so toegewys is by benadering 26,6% van die

total Central Generating Undertaking expenditure. It, of course, includes the unit related costs incurred in the new generating of power stations which were from the start planned in accordance with the integrated needs of the national Escom system;

(e) The remaining demand related generating costs allocated to distribution undertakings proportionately to their individual monthly system peak demands. These costs in 1972 totalled some 62,8% of the total expenditure incurred by the Central Generating Undertaking.

The apportioning of costs in the first three of the five categories listed is affected by the geographical position of the distribution undertakings relative to the major power resources and by the historical development of power stations before the advent of the national transmission system. It is interesting to note that in the first operating year of the Central Generating Undertaking the costs distributed between distribution undertakings in a manner determined by regional and historical differences in the endowment of natural resources amounted to some 10% only of the total Central Generating Undertaking costs. The remaining costs allocated proportionately to the demands and units taken by the distribution undertakings served, without regard to geographical or historical factors, in 1972 amounted to approximately 90% of the total and will become a progressively increasing fraction of the total Central Generating Undertaking costs in future years.

The impact, on the individual coastal undertakings, of transmission costs and the "excess" costs of generation in the coastal coal-fired power stations is, of course, higher than suggested by the above average of about 10% of total Central Generating Undertaking costs debited to distribution undertakings differed as follows between inland and coastal undertakings:

Average unit related C.G.U. costs in 1972 in cents per unit.

	c/u
Rand and Orange Free State, Eastern Transvaal and Cape Northern Undertakings	0,113
Natal Undertaking	0,187
Cape Western Undertaking	0,219
Overall C.G.U. average	0,133

Average demand related to C.G.U. costs (including transmission costs) in 1972 in Rand per kW of monthly maximum demand of distribution undertakings.

totale uitgawes van die SKO uitgemaak. Daarby ingesluit is natuurlik die eenheidverbonde koste wat aangegaan is by die nuwe geslag kragstasies wat uit die staanspoor beplan is ooreenkomstig die geïntegreerde behoeftes van die nasionale Evkom-stelsel.

(e) Die oorblywende aanvraagverbonde kragontwikkelingskoste wat aan distribusieondernemings in verhouding tot die onderskeie maandelikse spitsaanvrae toegewys word. Hierdie koste het in 1972 sowat 62,8% beloop van die totale uitgawe wat die SKO aangegaan het.

Die toewysing van koste in die eerste drie van die genoemde vyf kategorieë word beïnvloed deur die geografiese ligging van die distribusie-ondernemings met betrekking tot die vernaamste kragbronne en deur die historiese ontwikkeling van kragstasies voor die koms van die nasionale transmissiestelsel. Dit is 'n interessante feit dat die koste wat in die eerste bedryfsjaar van die SKO tussen distribusie-ondernemings verdeel is op 'n wyse wat bepaal is deur streeks- en historiese verskille in die bedeling met natuurlike hulpbronne, slegs sowat 10% van die SKO se totale koste beloop het. Die oorblywende koste, wat sonder inagneming van geografiese of historiese faktore toegewys is aan die distribusieondernemings, in verhouding tot die aanvrae en die eenhede wat geneem is deur die ondernemings wat bedien word, het in 1972 sowat 90% van die totaal bedra en dit sal in die jare wat kom 'n steeds toenemende breuk van die totale SKO-koste word.

Transmissiekoste en die oorskot aan ontwikkelingskoste in die steenkoolgestookte kuskragstasies het natuurlik 'n groter uitwerking op die afsonderlike kusondernemings as wat bogenoemde gemiddelde van 10% van die totale koste van die SKO te kenne gee. Die gemiddelde tariewe vir 1972 ten opsigte van die totale SKO-koste waarmee distribusie-ondernemings gedebiteer is, het tussen binnelandse en kusondernemings soos volg verskil:

Gemiddelde eenheidverbonde koste van die SKO in 1972 in sent per eenheid

	c/e
Randse en Oranje-Vrystaatse, Oos-Transvaalse en Noord Kaaplandse Onderneming	0,113
Natalse Onderneming	0,187
Wes-Kaaplandse Onderneming	0,219
Totale gemiddelde vir SKO	0,133

Gemiddelde aanvraagverbonde SKO-koste (met inbegrip van transmissiekoste) in 1972 in rand per kW van die maandelikse maksimumaanvraag van distribusie-ondernemings.

	R/kW/Month
Eastern Transvaal Undertaking	1,58
Rand and Orange Free State Undertaking	1,58
Cape Northern Undertaking	1,79
Natal Undertaking	1,95
Cape Western Undertaking	2,52
Overall C.G.U. average	1,72

The above average cost rates reflect the average Central Generating Undertaking charges and do not include distribution, reticulation, administrative and other costs incurred by the distribution undertakings.

The average unit related cost debited by the Central Generating Undertaking to the coastal undertakings understandably shows a marked reduction in comparison with the unit related cost of electricity generation in the coastal coal-fired power stations. The 1972 Central Generating Undertaking unit related debit to the Cape Western Undertaking was some 0,219 cents per unit, in comparison with a 1972 unit related cost of 0,415 cents per unit in Escom's Cape Western power stations. This is however counterbalanced to an important extent by a higher average demand related cost resulting from the inclusion of transmission costs in the demand related Central Generating Undertaking debit to the coastal undertakings. In this manner the Central Generating Undertaking is bringing about an important change in the structure of bulk electricity costs as seen by Escom's coastal undertakings. In comparison with the cost structure of the past, a larger fraction of the total cost is demand related, and a smaller fraction is seen as energy related.

The existing tariffs of the Cape Western and Natal Undertakings reflect a balance between demand related and unit related charges which evolved from the past cost structure when the electricity needs of these coastal undertakings were met from power stations in the undertakings concerned. Under the new circumstances now prevailing an academic analysis would indicate that the demand related tariff charges in these undertakings are lower than the actual demand related costs incurred, and that there is in the tariff charges a compensating overstatement of unit related charges. In due course changes will become necessary in the structure of the tariffs of the undertakings which will involve a shift of some part of the present unit related charges to the demand related charges. This should be seen as part of the evolutionary process which is lessening the regional differences, not only the overall costs of electricity, but also in the structure of electricity tariffs.

At the 42nd Convention of this Association, held in Cape Town in 1971, the title of the Presidential Address was "A Glance at the Future of Municipal

	R/kW/Maand
Oos-Transvaalse Onderneming	1,58
Randse en Oranje-Vrystaatse Onderneming	1,58
Noord-Kaaplandse Onderneming	1,79
Natalse Onderneming	1,95
Wes-Kaaplandse Onderneming	2,52
Totale gemiddelde vir SKO	1,72

Bostaande gemiddelde kostetariewe toon slegs die gemiddelde SKO-koste, en distribusie-, retikulasie-, administratiewe en ander koste wat die distribusieonderneming aangegaan het, is nie daarby ingesluit nie.

Die gemiddelde eenheidverbonde koste waarmee die SKO die kusondernemings gedebiteer het, toon 'n aanmerklike afname teenoor die eenheidverbonde koste van elektrisiteitsontwikkeling in die steenkoolgestookte kuskragstasies. In 1972 was die SKO se eenheidverbonde debiet aan die Wes-Kaaplandse Onderneming sowat 0,219 sent per eenheid vergeleke met 'n eenheidverbonde koste van 0,415 sent per eenheid vir 1972 in Evkom se Wes-Kaaplandse kragstasies. Dit word egter ten dele uitgewis deur hoër gemiddelde aanvraagverbonde koste wat voortspruit uit die insluiting van transmissiekoste in die aanvraagverbonde debiet wat die SKO die kusondernemings oplê. Op die manier bring die SKO 'n belangrike verandering in die struktuur van grootmaatelektrisiteitskoste teweeg en Evkom se kusondernemings. Vergeleke met die kostestruktuur van die verlede is 'n groter breuk van die totale koste aanvraagverbonde en word 'n kleiner gedeelte as energieverbonde beskou.

Die bestaande tariewe van die Wes-Kaaplandse en Natalse Onderneming weerspieël 'n ewewig tussen aanvraagverbonde en eenheidverbonde vorderings, wat ontwikkel het uit die eertydse kostestruktuur toe daar in die elektrisiteitsbehoeftes van hierdie kusondernemings voorsien is vanaf kragstasies in die gebiede van die betrokke ondernemings. In die nuwe omstandighede wat nou heers, sal 'n ontleding aandui dat die aanvraagverbonde tariefgelde in hierdie ondernemings laer is as die werklike aanvraagverbonde koste wat aangegaan is en dat daar in die tariefvordering 'n kompenserende ooropgawe van eenheidverbonde vorderings is. Veranderings in die tariefstruktuur van die kusondernemings sal mettertyd nodig word en dit sal 'n verskuiwing van 'n gedeelte van die huidige eenheidverbonde vordering na die evolusieproses wat besig is om die streeksverskille te verminder —nie slegs met betrekking tot die totale elektrisiteitskoste nie maar ook met betrekking tot die struktuur van die elektrisiteitstariewe.

Op die 42ste konvensie van hierdie Genootskap, wat in 1971 in Kaapstad gehou is, was die titel van die Presidentsrede „'n Toekomsblik van Munisipale

Electricity Supply in South Africa". Within the scope of this title Mr. von Ahlften gave a searching analysis of the structure of the electricity supply industry and ably outlined the respective roles to be played by the municipal electricity undertakings, the Escom distribution undertakings, and by the newly established Central Generating Undertaking. The address showed that each of these three groups has an important task to perform and is, in its assigned field, best equipped for this task.

There are, for historical reasons, and due to particular circumstances, areas of overlap between the functions of the municipal electricity departments and Escom's undertakings, but these serve merely to underline the fact that an essential role is played by each of the three different sectors identified in Mr. von Ahlften's Address.

It has perhaps been insufficiently stressed in the past, that each of the sectors has a duty to share knowledge of its plans and projections with the other sectors who are equally involved in different aspects of the same task. For this reason Escom particularly values the opportunity so generously provided to take part in the proceedings of this Convention.

Elektrisiteitsvoorsiening in Suid-Afrika." Mnr. von Ahlften het binne die omvang van hierdie onderwerp 'n deurtastende ontleding van die struktuur van die elektrisiteitsvoorsieningsbedryf gegee en het die onderskeie rolle wat die munisipale elektrisiteitsondernemings, Evkom se distribusie-ondernemings en die pas gestigte Sentrale Kragontwikkelingsonderneming moet speel, op bekwame wyse in breë trekke beskryf. Die referaat het daarop gewys dat elk van die drie groepe'n belangrike taak het om te vervul en dat elk op sy aangewese gebied die beste toegerus is vir hierdie taak.

Daar is, om historiese redes en weens bepaalde omstandighede, gebiede waar die funksies van die munisipale elektrisiteitsdepartemente en Evkom se ondernemings oorvleuel, maar hulle dien bloot om die feit te beklemtoon dat elk van die drie sektore wat in mnr. von Ahlften se rede geïdentifiseer word, 'n onmisbare rol speel.

Dit is in die verlede miskien nie genoeg benadruk nie dat daar op elk van die sektore die plig rus om kennis van sy planne en voornemens te deel met die ander sektore wat in gelyke mate met verskillende aspekte van dieselfde taak gemoeid is. Daarom word die aangeleentheid tot deelname aan die verrigtinge van hierdie konvensie, wat so goedgunstiglik aangebied is deur Evkom hoog op prys gestel.

INDUSTRIAL ACCIDENT PREVENTION IN THE REPUBLIC OF SOUTH AFRICA WITH SPECIAL REFERENCE TO ELECTRICITY UNDERTAKINGS

by G. S. STRYDOM, B.Sc.(Eng.),
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National Occupational Safety Association (NOSA)

1.—INTRODUCTION.

Industrial accident prevention in the Republic goes back to 1913 when the South African gold mining industry launched a campaign for safety in mines. It created a committee called the Prevention of Accidents Committee which has directed the safety campaign ever since on mines which are members of the South African Chamber of Mines.

The need for organised accident prevention in secondary industry was realised when the first figures of injuries were extracted by the office of the Workmen's Compensation Commissioner in 1944. These first injury figures amounted to the staggering total of over 100 000 for all races. The next two or three years showed a considerable increase in this figure. Now, simply because for the first time a complete and comprehensive picture was available regarding the human suffering and material losses involved in the heavy toll of industrial accidents, the authorities recognised the need for organised industrial accident prevention.

This awareness culminated in the formation of a non-profit company, the shares of which were taken up by employer organisations in industry and commerce, for the specific purpose of promoting the prevention of accidents in industry. . Thus the National Occupational Safety Association (NOSA) came into being in 1951. Today NOSA provides accident prevention services not only to industry in general, but also to bodies such as local authorities, technical high schools, universities and state departments.

2.—WHY ACCIDENT PREVENTION?

There are three basic reasons why an organised accident prevention programme must as a matter of necessity be integrated into the management control techniques of all organisations. These reasons are :

2.1 **Humanitarian considerations.**

From a national point of view, industrial accidents have taken the following toll in injuries to workmen in the period 1966-1968 :

	1966	1967	1968
Total injuries	270 838	282 946	328 916
Permanent disablement	31 679	31 910	30 856
Fatal	2 098	2 084	2 012

INDUSTRIËLE ONGELUKSVOORKOMING IN DIE REPUBLIEK VAN S.A. MET SPESIALE VERWYSING NA ELEKTRISITEITSONDERNEMINGS

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1.—INLEIDING.

Industriële ongeluksvoorkoming in die Republiek het 'n aanvang geneem in 1913 met 'n veldtog vir veiligheid in myne geloods deur die Suid-Afrikaanse Goudmyn-Industrie. 'n Komitee met die naam „Prevention of Accidents Committee" is geskep en hierdie komitee is nog steeds leidend in die veiligheidsveldtogte op myne wat lede is van die Suid-Afrikaanse Kamer van Mynwese.

Die behoefte aan georganiseerde ongeluksvoorkoming in die sekondêre nywerheid het duidelik geword toe die eerste beseringsyfers deur die Ongevallekommissaris bereken is in 1944. Hierdie eerste beseringsyfers het die skokkende totaal van meer as 100 000 vir alle rasse getoon. Gedurende die daaropvolgende 2 of 3 jaar het die syfer aansienlik gestyg. Op hierdie stadium, eenvoudig as gevolg daarvan dat daar vir die eerste keer 'n volledige en omvattende beeld beskikbaar was van die menslike lyding en geldelike verlies betrokke by die hoë tol van bedryfsongelukke, het die owerhede die behoefte vir georganiseerde industriële ongeluksvoorkoming ingesien.

Hierdie bewustheid het 'n hoogtepunt bereik in die stigting van 'n niewinsgewende maatskappy, die aandele waarvan opgeneem is deur werkgeverorganisasies in die handel en bedryf, vir die spesifieke doel om ongeluksvoorkoming in die nywerheid te bevorder. So het die Nasionale Beroepsveiligheidsvereniging (NOSA) tot stand gekom in 1951. Vandag verskaf NOSA ongeluksvoorkomingdienste nie net alleen aan die nywerheid in die algemeen nie, maar ook aan liggame soos plaaslike owerhede, tegniese hoërskole, universiteite en staatsdepartemente.

2.—WAAROM ONGELUKSVOORKOMING ?

Daar is drie basiese redes waarom 'n georganiseerde ongeluksvoorkomingsprogram 'n integrale deel moet vorm van die bestuurskontrole tegniek van alle organisasies. Hierdie redes is :

2.1 **Humanitêre Oorwegings.**

Uit 'n nasionale oogpunt, het industriële ongelukke in die tydperk 1966-1968 die volgende tol geëis in die besering van werkers.

	1966	1967	1968
Totale beserings	270 838	228 946	328 916
Permanente verminking	31 679	31 910	30 856
Noodlottig	2098	2 084	2 012

Some indication of the human pain and suffering that accompany these injuries may be derived from a look at the number of days the workmen were incapacitated. The man-days lost by workmen due to industrial accidents during the above period were:

(In millions)	1966	1967	1968
Actual man-days lost	3,6	3,5	4,0
Potential man-days lost allowing for fatals and permanency of disablement	25,7	25,6	24,3
Total man-days lost	29,3	29,1	28,3

From the man-days lost it can also be concluded that the Republic loses the work potential of nearly 100 000 men every year. This is a shocking waste of the country's man-power, its most valuable asset.

2.2 **Legal considerations.**

Industrial legislation enforces certain minimum safety standards and defines the legal responsibilities of individuals. Local authorities are subject to the provisions of the Factories, Machinery and Building Work Act, which has as its aims i.a. the following :

* supervision over the use of machinery;
* precautions against accidents in building and excavation work; and
* protection of health and safety of employees.

Under the Act the user (Employer), for example, has been charged with the responsibility to:

* Take all reasonable measures to enforce the requirements of the regulations and to ensure that they are observed by every person working on premises where machinery is used.
* Provide for the safety of persons and enforce proper discipline on premises where machinery is used.
* Cause every inexperienced person who is required or permitted to operate a machine which may cause injury, to be fully conversant with the dangers attached to the operation thereof and the precautionary measures to be taken and to be observed.
* Cause all plant, material and other things necessary for compliance with the requirements of the regulations to be provided and maintained in good order and repair.
* Cause all buildings and structures on premises where machinery is used to be of sound construction and to be maintained in good order and in a safe condition.

Deur te kyk na die aantal dae wat die werkers onbevoeg vir werk was, kan 'n idee gevorm word van die menslike lyding en pyn wat gepaard gaan met hierdie beserings. Die werksdae wat deur werkers verloor is a.g.v. industriële ongelukke gedurende die bogenoemde tydperk was :

(In miljoene)	1966	1967	1968
Werksdae verloor	3,6	3,5	4,0
Potensiële werksdae verloor met noodlottige beserings en permanente onbevoegdheid in aanmerking geneem	25,7	25,6	24,3
Totale velore werksdae	29,3	29,1	28,3

Van die totale werksdae wat verloor is, kan afgelei word dat die Republiek die werkpotensiaal van bykans 100 000 werkers jaarliks verloor. Dit is 'n skokkende vermorsing van die land se werkkrag, sy mees waardevolle bate.

2.2 **Wettige Oorwegings.**

Industriële wetgewing bepaal sekere minimum veiligheidstandaarde en stel die wetlike verantwoordelikhede van individue vas. Plaaslike owerhede is onderworpe aan die bepalings van die Fabriekswet, wat as doelstellinge o.a. die volgende het:

* beheer oor die gebruik van masjinerie,
* voorsorgmaatreëls teen ongelukke in bou- en uitgrawingswerk; en
* beskerming van gesondheid en veiligheid van werkers.

In terme van die Wet moet die gebruiker (werkgewer) die verantwoordelikheid neem om:

* Alle redelike maatreëls tref om die vereistes van hierdie regulasies toe te pas en om te ververseker dat dit nagekom word deur elkeen wat op persele werk waar masjinerie gebruik word.
* Sorg dat elke onervare persoon van wie vereis of wat toegelaat word om 'n masjien te bedien wat beserings kan veroorsaak, ten volle op die hoogte is van die gevare verbonde aan die bediening daarvan en die veiligheidsmaatreëls wat getref en nagekom moet word.
* Sorg dat alle installasies, materiaal en ander dinge wat nodig is vir nakoming van die vereistes van hierdie regulasies, in goeie toestand en heel, verskaf en onderhou word.
* Sorg dat alle geboue en bouwerke op persele waar masjinerie gebruik word, van goeie konstruksie is en in goeie orde en heel en in 'n veilige toestand onderhou word.

* Appoint in writing ,on premises where twenty-five or more persons are employed, at least one person who is thoroughly familiar with the work processes, who shall assist the person charged with the supervision of the machinery and who shall have the special duty of reporting to him in writing.
* Any deficiency in the availability, good condition and proper use of safety measures and appliances;
* Unsafe practices and suggested corrective measures.

2.3 **Financial considerations.**

The cost of Industrial accidents is probably the major source of financial losses attributable to industrial waste. Except for those incidents, approximately 2%, caused by acts of God, all accidents may be classified as avoidable waste, which may be quantified in monetary terms by determining the cost of the accident.. The cost of an accident may be classed under two headings.

2.3.1 **Insured costs.**

Although the insured costs as listed below are covered by the Accident Fund they are in the first instance the employer's liability in terms of the Workmen's Compensation Act :

* Transport to hospital;
* Medical attention;
* Hospitalisation;
* Rehabilitation and
* Compensation.

The Workmen's Compensation Commissioner and the accident funds approved by him pay out approximately R81 800 000 a year by way of compensation, rehabilitation and medical expenses because of injuries. This R81 800 000 comes from the accident funds which are financed by means of assessments by the firms in South Africa according to their injury experience.

Other insured costs are sometimes covered by commercial insurers and could cover for example :

* Damage to property;
* Fire losses;

* Minstens een persoon op 'n perseel waar vyf-en-twintig of meer persone in diens is skriftelik aan te stel wat deeglik vertroud is met die werkprosesse, wat die persoon moet help wat toesig oor die masjinerie het en wat die spesiale plig het om aan hom skriftelik.
* enige gebrek in die beskikbaarheid en goeie toestand en behoorlike gebruik van veiligheidsmaatreëls en -toestelle, asook
* onveilige praktyke en voorgestelde verbeteringsmaatreëls te rapporteer.

Ongeluksvoorkoming is gevolglik in 'n sekere mate nie 'n kwessie van keuse nie, maar 'n wetlike verpligting wat afdwingbaar is in terme van die industriële wetgewing van die Republiek.

2.3 **Finansiële Oorwegings.**

Die koste verbonde aan industriële ongelukke is waarskynlik die hoofbron van finansiële verliese wat toe te skryf is aan industriële verkwisting. Behalwe vir die ongeveer 2% insidente wat aan die deur van die Noodlot gelê kan word kan alle ongelukke as voorkombare verkwisting geklassifiseer word. Hierdie verkwisting kan in geldlike terme uitgedruk word deur die koste van die ongeluk te bepaal. Die koste van 'n ongeluk kan in 2 kategorië verdeel word.

2.3.1 **Versekeringskoste.**

Alhoewel die versekeringskoste, soos hieronder aangetoon, gedek word deur die Ongevallefonds, is dit in die eerste plek die werkgewer se verantwoordelikheid in terme van die Ongevallewet:

* Vervoer na hospitaal
* Mediese aandag
* Hospitalisasie
* Rehabilitasie
* Kompensasie

Die Ongevallekommissaris en die Ongevallefonds deur hom goedgekeur betaal ongeveer R81 800 000 jaarliks aan kompensasie, rehabilitasie en mediese uitgawes as gevolg van beserings. Hierdie R81 800 000 is afkomstig van die ongevallefondse wat gefinansieer word deur middel van aanslae volgens hul eie ongeluksondervinding op die firmas in Suid-Afrika.

Ander versekerde koste word soms gedek deur kommersiële versekeraars en dek bv.:

* Beskadiging van eiendom;
* Brandverlies;

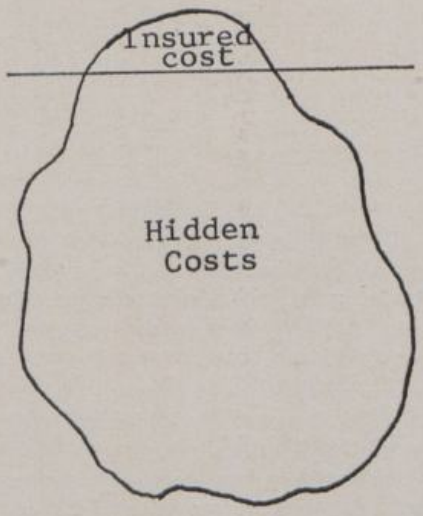
* Loss of profits due to the above;
* Extra compensation (stated benefits)

2.3.2 **Uninsured or Hidden costs.**

The uninsured costs are irrecoverable losses borne by the employer and could take the following forms:

* Damage to property;
* Equipment repairs and replacement of damaged equipment;
* Decreased output by the workman because of this injury;
* Make up salary to bridge the gap between the workman's normal salary and the maximum of R150 a month paid in compensation from the Accident Fund;
* Cost of wages of onlookers;
* Obsolescence of equipment before accepted depreciated time;
* Cost of training of new workers;
* Cost of overtime to make up production losses;
* Cost involved by the supervisory staff in investigating the accident;
* Cost of clerical control of accident claims.

2.3.3 **First iceberg effect.**



Like all icebergs, the mass below the surface is the most dangerous, especially when we consider what these hidden costs could add up to. Some writers maintain that the ratio of insured costs to hidden costs could be 1 : 4.

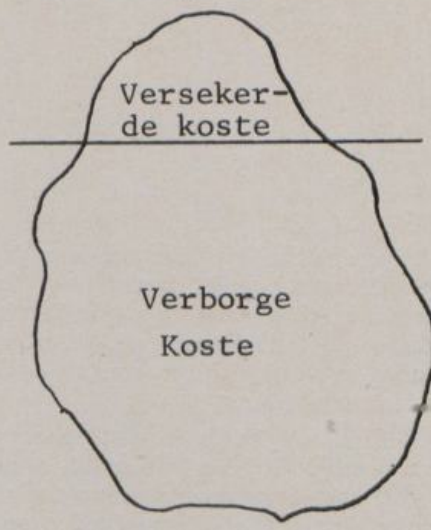
* Profytverlies as gevolg van bogenoemde;
* Bykomende vergoeding.

2.3.2 **Onversekerde of Verborge Koste.**

Die onversekerde koste is onverhaalbare verliese en word in geheel gedra deur die werkgewer en kan die volgende vorms aanneem :

* Beskadiging van eiendom
* Herstel van toerusting en vervanging van beskadigde toerusting;
* Afname in die werkverrigting van die werker as gevolg van sy besering.
* Aanvulling van salaris om die gaping tussen die werker se normale salaris en die maksimum maandelikse kompensasie van R150-00 betaalbaar uit die Ongevallefonds.
* Koste van lone van bystanders
* Vervanging van toerusting vroeër as die aanvaarde tydstip volgens waardevermindering
* Koste van opleiding van nuwe werkers
* Koste van oortyd om produksieverliese op te maak
* Koste betrokke by die ondersoek van die ongeluk deur toesighoudende personeel
* Koste van klerikale kontrole van ongelukseise.

2.3.3 **Eerste Ysberg Effek.**

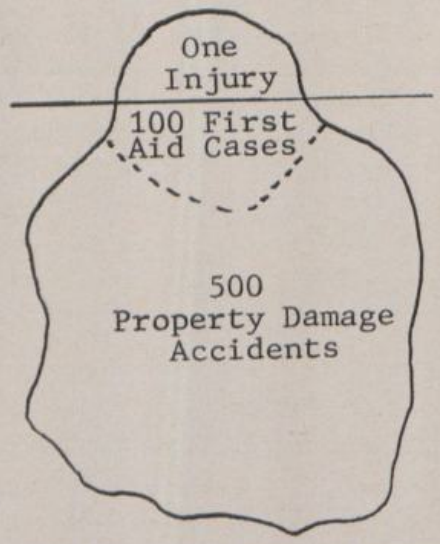


Soos in die geval van alle ysberge, is die massa onder die water die gevaarlikste, veral wanneer ons tot die slotsom kom wat hierdie verborge koste in totaal kan bedra. Sommige skrywers meen dat die verhouding van ver-

Others maintain that no definite ratio can be arrived at. It is suggested that each firm does its own exercise and calculate the total costs of its accidents—if necessary on a sampling basis. This was done recently at a certain firm and it was found that the medical and other insured costs came to about R600,00. The hidden costs in loss of production and contract penalties amounted to more than R6 000,00—a 1 : 10 ratio !

It may be said that because of an accident, no actual difference in production is noticed. It may be true that the output from the plant is the same whether accidents take place or not but what must be very obvious is that if the output is to remain the same it must be produced at a higher cost.

2.3.4 **Second iceberg effect.**



As if one iceberg were not enough to emphasise the terrific amount of avoidable waste which is taking place in South Africa, there is a further iceberg in the form of injuries in relation to the number of accidents which take place.

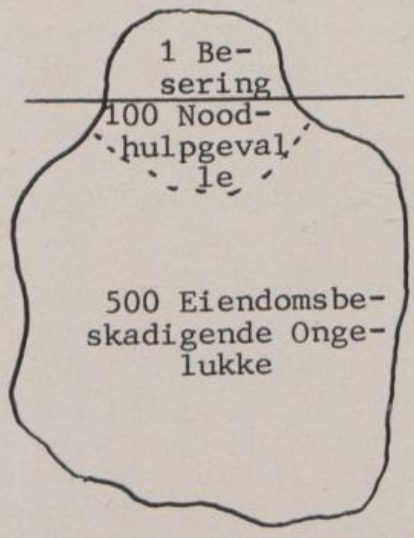
It should be made quite clear what an accident is. It is an unplanned, uncontrolled event that interrupts or interferes with the orderly process of the production activity or process.

In this sense of the word, an accident may cause damage to equipment or material or a production delay without necessarily resulting in an injury. Although an injury may

sekerde koste tot verborge koste 1 : 4 mag beloop. Andere is van mening dat geen definitiewe verhouding bepaal kan word nie. Daar word voorgestel dat elke firma sy eie berekening doen en daarvolgens die totale koste van sy ongelukke bepaal—indien nodig op 'n monsterbasis. Dit is onlangs gedoen in 'n spesifieke firma en daar is gevind dat mediese en ander versekerde koste op naastenby R600-00 te staan gekom het. Die versteekte koste in verlies van produksie en boetes volgens kontrakbepalings het R6000-00 bedra—'n 1 : 10 verhouding.

Daar mag gesê word dat 'n ongeluk geen werklike verskil in produksievermoë maak nie. Dit mag waar wees dat die fabriek se produksie dieselfde bly, ongeag of ongelukke plaasvind of nie, maar wat baie duidelik is, is dat produksie teen 'n hoër koste moet geskied as dit dieselfde peil wil handhaaf.

2.3.4 **Tweede Ysberg Effek.**



Asof een ysberg nie voldoende is om die geweldige hoeveelheid voorkombare verkwisting in Suid-Afrika te beklemtoon nie, is daar nog 'n ysberg in die vorm van die verhouding van beseringstotale tot ongelukke wat plaasvind.

Dit behoort baie duidelik gemaak te word wat 'n ongeluk is. Dit is 'n onbeplande, onbeheerde gebeurtenis wat die ordelikheid van produksieproses onderbreek of daarmee inmeng.

In hierdie sin van die woord mag 'n ongeluk skade berokken aan toerusting of materiaal of 'n produksieproses vertraag sonder om noodwendig 'n besering tot gevolg

or may not result from the given mishap, interference with the smooth flow of production can be expected.

There are two main factors which cause accidents, these being unsafe acts of persons and unsafe physical conditions. Either of these conditions or a combination of them may cause the accident.

In the book " Damage Control " by F. E. Bird and G. L. Germain it is stated that a study of some 30 000 accident cases was made and it was concluded that there is a relationship between an accident and a personal injury. They found that on an average there were 500 accidents causing no inury but damage to property and 100 injury-causing accidents of a minor nature for every lost-time injury. In the Republic, according to statistics published by the office of the Workmen's Compensation Commissioner, more than 224 000 lost-time injuries were suffered in 1968.

Therefore, if one accepts their figures, which we have no reason to believe are not a true reflection of facts, we come to the shocking realisation that there are possibly 224 000 times 600 accidents which are not reflected in our statistics in total and which are not necessarily brought to the attention of management. The shocking total of 134,4 million accidents may vary from very minor machinery damage to serious damage to machinery and only minor personal injury.

If we investigate and eliminate the injury-causing accidents we have only tackled 16% of the problem.

2.3.5 **Merit rebates.**

The Accident Fund is non-profit making and assessment rates are fixed on this principle. Any surplus over and above the requirements of the Fund will, ultimately, be returned to the employers either by means of rate reductions or the payment of merit rebates, or both.

The Commissioner keeps a separate record reflecting the amount paid in assessments and the cost of accidents of each employer. These records reveal that the accident cost experience of individual employers falling within the same class or sub-class varies depending upon various factors, such as extent of mechanisation introduced, existence or otherwise of effective accident prevention measures, etc.

te hê. Afgesien daarvan of die ongeluk 'n besering of nie as gevolg het, kan inmenging in die gladde produksie verloop verwag word.

Daar is twee hoofoorsake van ongelukke d.i. onveilige handelinge van persone en onveilige fisiese toestande. Enige van hierdie faktore of 'n kombinasie daarvan mag 'n ongeluk veroorsaak.

In die boek „Damage Control," deur F. E. Bird en G. L. Germain word beweer dat in 'n ondersoek van sowat 30 000 ongeluksgevalle daar bevind is dat daar 'n verband is tussen 'n ongeluk en 'n persoonlike besering. Hulle het gevind dat daar gemiddeld 500 ongelukke was wat geen besering tot gevolg gehad het nie, maar wel beskadiging van eiendom, en 100 ongelukke met beserings van geringe aard en vir elke tydverliesbesering. In die Republiek, volgens statistiek gepubliseer deur die kantoor van die Ongevallekommissaris, was daar meer as 224 000 tydsverlies ongelukke in 1968.

Gevolglik, as die syfers hierbo aanvaar word en daar is geen rede om te twyfel dat dit 'n getroue weergawe van die feite is nie, kom mens tot die skokkende besef dat daar moontlik 224 000 maal 600 ongelukke is wat nie statisties aangemeld en verwerk word nie, en wat ook nie noodwendig onder die aandag van bestuur kom nie. Die skokkende totaal van 134,4 miljoen ongelukke mag wissel van baie geringe tot ernstige masjienskade en slegs ligte persoonlike beserings.

Die ondersoek en eliminering van ongelukke wat beserings veroorsaak dek slegs 16% van die probleem.

2.3.5 **Merietekortings.**

Die Ongevallefonds is nie-winsgewend en word bereken op hierdie beginsel. Enige oorskot bo en behalwe die benodighede van die Fonds behoort aan die werkgewers wat daartoe bygedra het en sal uiteindelik aan hulle teruggegee word, óf in die vorm van tariefvermindering óf deur die betaling van verdienstelikheidskorting, of albei.

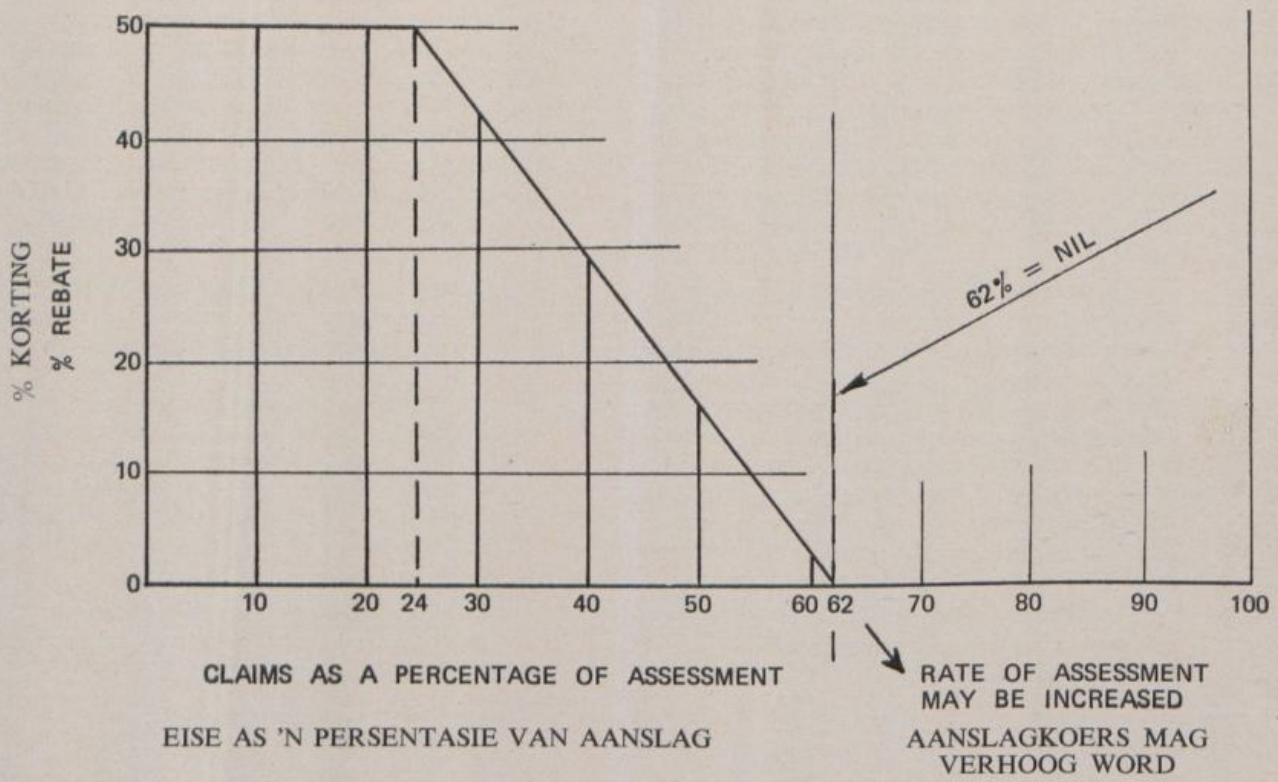
'n Aparte register van die bedrag aan aanslae betaal en die koste van ongevalle vir elke werkgewer, word gehou. Hierdie rekords toon dat die ongevallekostebevinding van indiwiduele werkgewers wat onder dieselfde klas of byklas resorteer, wissel as gevolg van verskeie faktore, soos die omvang van meganisering en die bestaan, of andersins van doeltreffende maatreëls tot voorkomings van ongevalle, ens.

To adjust the position of employers who thus pay substantial amounts in assessments, which are out of proportion to their accident costs, the system of awarding merit rebates every three years was introduced. The rebate percentage is determined by the ratio between an employer's claims cost and the amount of his assessments.

Rebates for the 1965/67 cycle were calculated according to the following scale :

Om die posisie van werkgewers wat dus aansienlike bedrae aan aanslae buite verhouding tot hul ongevallekoste betaal, reg te stel, is 'n stelsel vir die toekenning van verdienstelikheidskortings, elke drie jaar in werking gebring. Die persentasie korting word bereken volgens die verhouding van die persentasie van die werkgewer se ongevallekoste tot die bedrag wat hy aan aanslae betaal het.

Kortings vir die kortingstydperk 1965/67 is volgens onderstaande skaal bereken:



2.3.6 **Variation of rate of assessment.**

Section 71 of the Workmen's Compensation Act, which provides for the payment of merit rebates (described in 2.3.5 above) also provides that if, in the opinion of the Commissioner, the business of an employer is designed, equipped, organised or conducted in a manner which is specially calculated to prevent the occurrence of accidents to workmen and the number or cost of accidents in consequence thereof is, or is likely to be, considerably less than that which usually obtains in other businesses of that class, the Commissioner may, in his discretion, use a lower percentage of annual wages in calculating the annual assessment of such em-

2.3.6 **Veranderings van Aanslagskaal.**

Artikel 71 van die Ongevallewet wat voorsiening maak vir die betaling van verdienstelikheidskortings (soos beskryf in paragraaf 2.3.5 hierbo) bepaal ook dat wanneer die besigheid van 'n werkgewer na die mening van die Kommissaris op 'n wyse ingerig, uitgerus, georganiseer of gedryf word wat besonders daartoe strek om te voorkom dat sy werkmense ongevalle oorkom en die aantal of koste van ongevalle gevolglik aanmerklik minder is, of waarskynlik sal wees, as wat gewoonlik in ander besighede van daardie soort plaasvind, die Kommissaris na goeddunke daardie werkgewer op 'n laer persentasie van die jaarlikse lone van sy werks-

ployer than is used in the assessment of other employers in that class of business.

2.3.7 **Loading of employer with high accident cost.**

On the other hand, Section 71 of the Act also provides for an increased rate of assessment for an employer whose accident experience during any period is less favourable than the average accident experience for employers in his class of business, or whose business is not designed, equipped, organised or conducted in a manner which is specially calculated to prevent the occurrence of accidents.

2.3.8 **Practical application of merit rebate system.**

The practical application of the merit rebate system is adequately illustrated by the following two case studies which refer to two medium-sized local authorities on the Witwatersrand :

mense kan aanslaan as ander werkgewers in 'n dergelike soort besigheid.

2.3.7 **Belading van 'n Werkgewer met 'n Hoë Ongevallekoste.**

Aan die ander kant maak artikel 71 van die Wet ook voorsiening vir 'n hoë aanslagtarief vir 'n werkgewer wie se ongevallebevinding, gedurende enige tydperk, minder gunstig is as die gemiddelde ongevallebevinding van werkgewers van sy soort besigheid of wie se besigheid nie op so 'n wyse ingerig, uitgerus, georganiseer of gedryf word om besonders daartoe te strek om ongevalle te voorkom nie.

2.3.8 **Praktiese Toepassing van die Merieteafslagskema.**

Die praktiese toepassing van die merietekortingskema word voldoende geïllustreer deur die volgende twee gevallestudies wat verwys na twee plaaslike owerhede van gemiddelde grootte op die Witwatersrand.

Local Authority A / **Plaaslike Owerheid A**

Period Tydperk	Total injuries Totale beserings	Assessment Aanslae R	Claims Eise R	Claims Eise % of assessments % van aanslag	Actual Merit Rebate Werklike Meriete Korting R	Actual Merit Rebate Werklike Meriete Korting % of assessments % van aanslag	Possible Merit Rebate Moontlike Meriete Korting
1965/67	279	32 475	15 203	46,8	6 455	20,0	16 137
1968/70	277	39 611	21 224	53,6	4 926	12,5	19 705
	Local Authority B				**Plaaslike Owerheid B**		
1965/67	320	38 297	16 274	42,5	10 477	27,5	19 048
1968/70	421	55 087	67 266	122,1	Nil	—	27 443

Thus, the financial loss to Local Authorities A and B in terms of merit rebates forfeited as a result of accidents came in the six year period to the considerable sums of R24 461 and R36 041 respectively. Furthermore, Local Authority B will more than likely be assessed at a higher rate in terms of paragraph 2.3.7 above.

From a financial point of view the prevention of accidents cannot be anything else but good business.

In die betrokke 6 jaar periode het plaaslike owerhede A en B dus deur die verbeuring van merietkortings as gevolg van ongelukke, finansiële verliese van R24 461 en R36 041 respektiewelik gely. Vervolgens sal plaaslike Owerheid B waarskynlik aangeslaan word op hoër tarief in terme van paragraaf 2.3.7 hierbo.

Uit 'n finansiële oogpunt kan die voorkoming van ongelukke niks anders wees as verstandige besigheid nie.

3.—THE PRINCIPLES OF ACCIDENT PREVENTION.

Accident prevention is basically a control technique

3.—DIE BEGINSELS VAN ONGELUKSVOORKOMING.

Ongeluksvoorkoming is basies 'n BEHEER-

—control of man performance, machine performance and the control of physical environment—with the following fundamental principles:

3.1 **An injury results from a completed sequence of factors.**

The occurrence of an injury invariably results from a completed sequence of factors—the last one of these being the accident itself. The accident in turn is invariably caused or permitted directly by the unsafe act of a person and/or a mechanical or physical hazard.

A preventable accident is one of five factors in a sequence that results in an injury. The injury invariably caused by an accident and the accident in turn is always the result of the factor that immediately precedes it. In accident prevention the major concern is in the middle of the sequence i.e. the unsafe acts of persons or mechanical or physical hazards.

The several factors in the accident occurrence series are given in chronological order in the following list:

Accident factors	Explanation of factors
3.1.1 Ancestry and social environment.	Recklessness, stubbornness, avariciousness and other undesirable traits of character may be passed along through inheritance. Environment may develop undesirable traits of character or may interfere with education. Both inheritance and environment cause faults of person.
3.1.2 Fault of person.	Inherited or acquired faults of person; such as recklessness, violent temper, nervousness, excitability, inconsiderateness, ignorance of, safe practice, etc. constitute proximate reasons for committing unsafe acts or for the existence of mechanical or physical hazards.
3.1.3 Unsafe act and/or mechanical or physical hazard.	Unsafe performance of persons, such as standing under suspended loads, starting machinery without warning, horseplay, and removal of safeguards; and mechanical or physical hazards, such as unguarded gears, unguarded point of operation, absence of

TEGNIEK—die beheer van die werkverrigting van mense en masjinerie en die beheer van die fisiese omgewing.

3.1 **'n Besering is die Gevolg van 'n Voltooide Volgorde van Faktore.**

Die voorkoms van 'n besering is sonder uitsondering die gevolg van 'n voltooide volgorde van faktore—die laaste hiervan is naamlik die ongeluk self. Die ongeluk op sy beurt word sonder uitsondering regstreeks veroorsaak of toegelaat deur die onveilige handeling van 'n persoon en/of 'n meganiese of fisiese gevaar.

'n Voorkombare ongeluk is een van die vyf faktore in 'n volgorde wat 'n besering tot gevolg het.

Die besering word sonder uitsondering deur 'n ongeluk veroorsaak en die ongeluk is weer altyd die gevolg van die faktor wat dit onmiddellik voorafgaan. In ongeluksvoorkoming word daar hoofsaaklik gekonsentreer op die middelste faktor d.i. die onveilige handeling van 'n persoon of die meganiese of fisiese gevaar.

Die verskillende faktors in die ongeluksvoorkomsvolgorde word in die volgende lys chronologies aangegee:

Ongeluksfaktore	Verduideliking van Faktore
3.1.1 Afkoms en sosiale omgewing	Roekeloosheid, koppigheid, gierigheid en ander ongewenste karaktertrekke kan oorerflik wees. . Omgewing kan ongewenste karaktertrekke ontwikkel of kan akademiese opvoeding beïnvloed. Oorerflikheid en omgewing kan tekortkominge in persoon veroorsaak.
3.1.2 Tekortkominge van 'n persoon.	Oorerflike of verworwe tekortkominge in persone; soos roekeloosheid, opvlieënde humeur, senuweeagtigheid, prikkelbaarheid, onbedagsaamheid, onkunde van veilige gewoontes, ens. is onmiddellike redes waarom onveilige handelinge gedoen word of meganiese of fisiese gevare bestaan.
3.1.3 Onveilige handeling en/of meganiese of fisiese gevaar.	Onveilige werkverrigting deur persone, soos om onder 'n hanglas te staan, masjinerie sonder waarskuwing aan die gang te sit gekskeerdery, die verwydering van veiligheidskerms; en meganiese of fisiese gevare, soos onbeskermde ratte, onbeskermde

rail guards, and insufficient light, result directly in accidents.

3.1.4 Accident. Events such as falls of persons, striking of persons by flying objects, etc., are typical accidents that cause injury.

3.1.5 Injury. Fractures, lacerations, etc., are injuries that result directly from accidents.

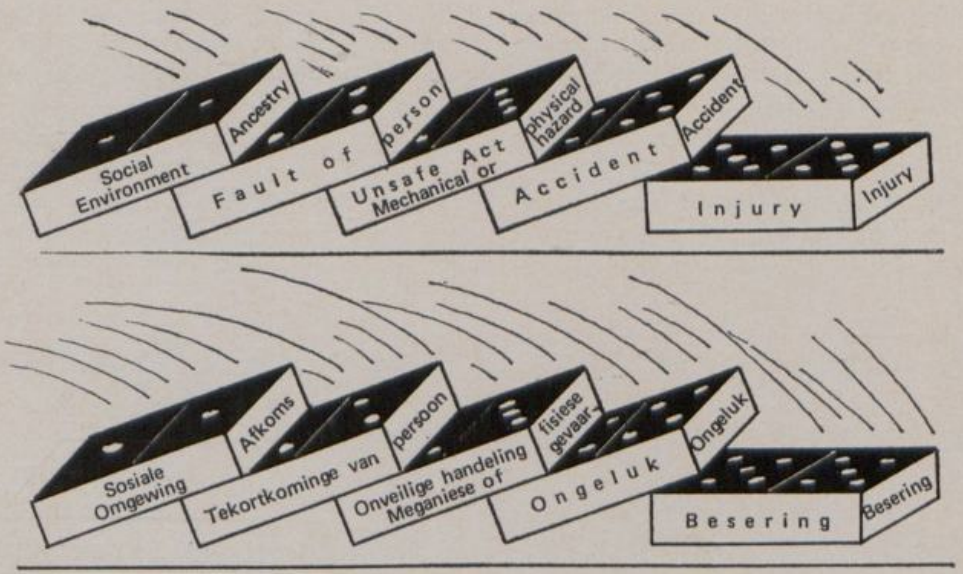
The occurrence of a preventable injury is the natural culmination of a series of events or circumstances, which invariably occur in a fixed and logical order. One is dependent on another and one follows because of another, thus constituting a sequence that may be compared with a row of dominoes placed on end and in such alignment in relation to one another that the fall of the first domino precipitates the fall of the entire row. An accident is merely one factor in the sequence.

werkpunt gebrek aan relingskerms, en onvoldoende lig is die regstreekse oorsaak van ongelukke.

3.1.4 Ongeluk. Gebeurtenisse soos persone wat val of deur voorwerpe wat deur die lug trek, getref word, ens. is tipiese ongelukke wat beserings veroorsaak.

3.1.5 Beserings. Beenbreuke, snywonde, ens. is beserings wat regstreeks deur ongelukke veroorsaak word.

Die voorkoms van 'n voorkombare besering is die natuurlike hoogtepunt van 'n reeks gebeurtenisse of omstandighede wat sonder uitsondering in 'n vaste en logiese orde gebeur. Die een is afhanklik van die ander en die een volg weens die ander sodat dit 'n volgorde uitmaak wat vergelyk kan word met 'n ry dominosteentjies wat op een punt staan en so opgestel is dat die hele ry sal val as die eerstee domino val. 'n Ongeluk is slegs een faktor in die volgorde.



3.2 **The unsafe acts of persons are responsible for a majority of accidents.**

As a result of an analysis of 75 000 cases through study of actuarial records and engineering reports, and with the co-operation of employers, it was found that out of every 100 accidents:

* 88% are caused by unsafe acts.
* 10% are caused by unsafe physical and mechanical conditions.
* 2% are caused by Acts of Providence.

3.2 **Die onveilige handelinge van persone is verantwoordelik vir die meeste ongelukke.**

'n Ontleding van 75 000 gevalle deur middel van aktuariële rekords en ingenieursverslae, en met die samewerking van werkgewers, het aan die lig gebring dat uit elke 100 ongelukke:

* 88% deur onveilige handelinge veroorsaak word.
* 10% deur onveilige fisiese en meganiese toestande veroorsaak word.
* 2% aan die Voorsieningheid te wyte is.

From the above the conclusion can be drawn that 98% of industrial accidents are of a preventable kind.

3.3 **An accident does not necessarily result in personal injury.**

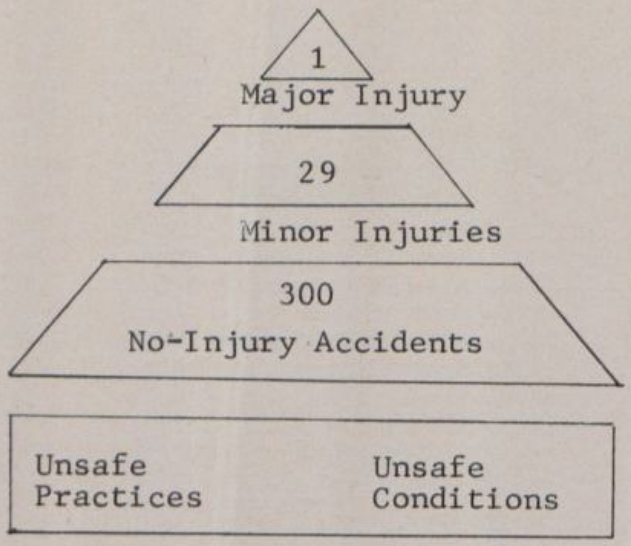
Analysis proves that, in the average case, for every mishap resulting in an injury there are many other similar accidents that cause no injuries whatever. From review of data available concerning the frequency of potential injury accidents, H. W. Heinrich estimated that in a unit group of 330 accidents of the same kind and involving the same person, 300 result in no injuries, 29 in minor injuries, and 1 in a major lost-time injury.

These ratios apply only to the average case. The major injury may result from the very first accident or from any other accident in the group.

Underlying and causing all accidents, including those resulting in no injury or in either minor or major injury, there is an unknown number of unsafe practices or conditions, often running into the thousands.

Moral 1.—Prevent the accidents and there can be no injuries.

Moral 2.—Prevent the unsafe practices and unsafe conditions and there can be neither accidents nor injuries.



Foundation of a major injury.

The "300" shown in the lowest triangular block refers to actual accidents—such as falls, struck by, etc.—which fortunately do not result in either minor or major injury.

Uit bostaande kan die gevolgtrekking gemaak word dat 98% van nywerheidsongelukke voorkombaar is.

3.3 **'n Ongeluk het nie noodwendig 'n besering tot gevolg nie.**

Ontledings het bewys dat daar, in die gemiddelde geval, vir elke ongeluk wat 'n besering tot gevolg net baie ander soortgelyke ongelukke is wat geen beserings hoegenaamd veroorsaak nie. Uit 'n oorsig van beskikbare gegewens met betrekking tot die frekwensie van potensiële beseringsongelukke is bereken dat in 'n eenheidsgroep van 330 ongelukke van dieselfde soort waarby dieselfde persoon betrokke is, 300 geen beserings nie 29 geringe beserings, en 1 'n ernstige verlore tydbesering tot gevolg gehad het.

Hierdie verhouding is slegs op die gemiddelde geval van toepassing. Die ernstige besering kan deur die heel eerste ongeluk of enige ander ongeluk in die groep veroorsaak word.

'n Grondoorsaak van alle ongelukke, met inbegrip van dié wat geen beserings óf geringe of ernstige beserings tot gevolg het, is 'n onbekende aantal onveilige gebruike of toestande wat dikwels duisende beloop.

Les. 1. Voorkom die ongelukke en daar kan geen beserings wees nie.

Les 2. Voorkom die onveilige handelinge en onveilige toestande en daar kan nóg ongelukke nog beserings wees.

Die Grondslag van 'n Ernstige Besering.

Die „300" in die onderste deel van die driehoek verwys na werklike ongelukke—soos persone wat val, deur iets getref word, ens.—wat gelukkig geen geringe of ernstige beserings veroorsaak nie.

The rectangular block at the bottom refers only to unsafe practices and conditions.

The 300-29-1 Ratio Spells Opportunity. Viewed as an aid in accident prevention, this ratio is significant because it vividly emphasises preventive opportunity.

3.4 **The severity of an accident is fortuitous.**

The severity of an injury is largely fortuitous——the occurrence of the accident that results in injury is largely preventable. Imagine a brick, falling from the second floor of a building. The brick hits a man below—the accident has occurred. The severity of the resulting injury, however, is fortuitous, it may strike him in the eye—loss of eye, or on the head—kill him, or it may only graze his little finger!

3.5 **There are four basic motives for unsafe acts.**

The four basic motives or reasons for the occurrence of unsafe acts provide a guide to the selection of appropriate corrective measures. Briefly the reasons for the unsafe acts of persons may be:

3.5.1 Improper attitude.

3.5.2 Lack of knowledge or skill.

3.5.3 Physical unsuitability.

3.5.4 Improper mechanical or physical environment.

3.6 **There are four basic methods of preventing accidents.**

The basic methods available for preventing accidents are as follows:

3.6.1 Engineering revision.

3.6.2 Education, training, persuasion and appeal.

3.6.3 Personnel selection, placement and adjustment.

3.6.4 Enforcement (discipline).

3.7 **Accident prevention is a control technique.**

Methods of most value in accident prevention are analogous with the methods required for the control of the quality, cost and quantity of production.

The control of quality and quantity of product and of the frequency and severity of accident occurrence have much in common. In many cases the same faulty practice is involved and the

Die reghoekige blok onder verwys slegs na onveilige gebruike en toestande.

Die 300-29-1 verhouding beteken „Geleentheid." Wanneer dit as 'n hulpmiddel in ongeluksvoorkoming beskou word, is hierdie verhouding betekenisvol omdat dit voorkomingsgeleentheid duidelik belemtoon.

3.4 **Die Ernstigheid van 'n Besering is Toevallig.**

Die ernstigheid van 'n besering is grotendeels toevallig—die voorkoms van die ongeluk wat 'n besering veroorsaak, is grotendeels voorkombaar. Stel u voor dat 'n steen van die tweede verdieping van 'n gebou val. Die steen tref 'n man—die ongeluk het gebeur. Die ernstigheid van die gevolglike besering is egter toevallig, dit kan hom in die oog tref—hy verloor sy oog, of op die kop—hy sterf. Of dit kan slegs 'n skrapie aan sy pinkie veroorsaak.

3.5 **Daar is Vier Basiese Motiewe vir Onveilige Handelinge.**

Die vier basiese motiewe of redes waarom onveilige handelinge voorkom dien as gids om geskikte korrektiewe maatreëls te kies. Die redes waarom persone onveilig optree kan kortliks die volgende wees:

3.5.1 Verkeerde gesindheid;

3.5.2 Gebrek aan kennis of vaardigheid;

3.5.3 Liggaamlike ongeskiktheid;

3.5.4 Foute in meganiese of fisiese omgewing.

3.6 **Daar is Vier Basiese Ongeluksvoorkomingsmetodes**

Die basiese metodes waarvolgens ongelukke voorkom kan word, is :

3.6.1 Ingenieurshersiening.

3.6.2 Onderrig, opleiding, oorreding en beroepdoening.

3.6.3 Personeelkeuring, -plasing en -aanpassing.

3.6.4 Afdwinging (Dissipline).

3.7 **Ongeluksvoorkoming is 'n Beheertegniek.**

Die waardevolste metodes van ongeluksvoorkoming is gelyksoortig aan die metodes wat benodig word vir die beheer van die hoeveelheid, gehalte en koste van produksie.

Die beheer van die hoeveelheid en gehalte van 'n produk en van die frekwensie en ernstigheid van ongeluksvoorkoms het baie in gemeen. In baie gevalle is dieselfde verkeerde gebruike

reason for existence of the fault is similar, both for accident occurrence and for unsatisfactory production.

If it is known as a result of a correct fact finding job that a particular unsafe practice is chiefly responsible for accident occurrence, it can safely be assumed that the methods best suited to correct that particular practice are identical with managerial and supervisory methods such as would be used if the practice were not unsafe but were one that resulted in impaired or high cost production.

3.8 **All echelons of management are responsible for accident prevention.**

Management has the best opportunity and ability to initiate the work of prevention, therefore it should assume the responsibility. Management has the know-how, the financial backing and the incentive to prevent accidents. Every accident occurring in a manager's department is a reflection on his ability to manage successfully.

He is legally responsible for supplying a safe environment and tools, safe methods of working, as laid down in the Factories Act, the Mines and Works Act and the Workmen's Compensaaion Act.

Morally he is bound, as he is required to maximise the company's profits, minimise the losses and see to it that the company remains in business. If he continually injures people he will have no one to work for him and only through people can he succeed.

The supervisor or foreman is a key-man in industrial accident prevention. His application of the art of supervision to the control of worker performance is the factor of greatest influence in successful accident prevention. It can be expressed and taught as a simple four-step formula.

3.8.1 Identify the problem.

3.8.2 Find and verify the reason for the existence of the problem.

3.8.3 Select the appropriate remedy.

3.8.4 Apply the remedy.

This is the framework of the structure of supervision. It applies to any and all problems. Obviously, it requires implementation which can be done without creating confusion.

4.—PREVENTION PROGRAMMES: THE EVOLUTION OF THE TOTAL LOSS CONTROL PROGRAMME.

daarby betrokke en die rede waarom die fout bestaan, is dieselfde in die geval van ongeluksvoorkoms en onbevredigende produksie.

Indien dit as gevolg van 'n feiteondersoek bekend is dat besondere onveilige gebruik hoofsaaklik die oorsaak van ongelukke is, kan aanvaar word dat die metodes wat die geskikste is om dié besondere gebruik reg te stel dieselfde is as die bestuurs- en toesigmetodes wat aangewend sou word as die gebruik nie onveilig was nie, maar produksie benadeel het of tot hoë produksiekoste gelei het.

3.8 **Alle bestuursvlakke is Verantwoordelik vir Ongeluksvoorkoming.**

Bestuur beskik oor die beste geleenthede en vermoë om voorkomingswerk aan die gang te sit, dus moet hulle verantwoordelikheid aanvaar. Bestuur het die kennis, die finansiële steun en die aansporing om ongelukke te voorkom.

Elke ongeluk wat in 'n bestuurder se afdeling voorkom is 'n beskuldiging teen sy vermoë om suksesvol te bestuur.

Hy is volgens wet verantwoordelik vir die voorsiening van 'n veilige omgewing en gereedskap en veilige werkmetodes soos deur die Fabriekswet, die Wet op Myne en Bedrywe en die Ongevallewet bepaal.

Hy is ook onder 'n morele verpligting, aangesien- van hom verwag word om die maatskappy se winste tot die maksimum op te skuif, die verliese tot die minimum te beperk en te sorg dat die maatskappy aan die gang bly. As deur sy toedoen mense gedurig beseer word sal daar niemend wees om vir hom te werk nie en sy sukses hang van mense af.

Die toesighouer of voorman is 'n sleutelfiguur in nywerheidsongeluksvoorkoming. Sy toepassing van die kuns van toesighouding op die beheer van werkverrigting is die belangrikste faktor in geslaagde ongeluksvoorkoming. Dit kan in 'n eenvoudige vierdelige formule uitgedruk en geleer word.

3.8.1 Identifiseer die probleem.

3.8.2 Vind en kontroleer die rede vir die bestaan van die probleem.

3.8.3 Kies die toepaslike oplossing.

3.8.4 Pas die oplossing toe.

Dit is die raamwerk van die toesigstruktuur. Dit is van toepassing op enige en alle probleme. Dit moet natuurlik moontlik wees om dit uit te voer sonder dat verwarring geskep word.

4.—VOORKOMINGPROGRAMME — DIE EVOLUSIE VAN DIE TOTALE VERLIESBEHEERPROGRAM.

The objective of any prevention programme and especially of the modern total loss control programme is efficient production and greater profit. This is achieved by developing steps in a programme to reduce or eliminate those incidents which downgrade the system i.e. accidents.

Total Loss Control is defined by John A. Fletcher in his book "The Industrial Environment" as: "a concept that the best way to avoid accidents is to reduce or eliminate the breakdown in administrative" processes which cause them or that it is an evolution from injury prevention to the control of all business losses by the application of sound management principles."

Evolution of Total Loss Control.

4.1 **Injury prevention.**

An injury prevention programme is concerned with the humanitarian aspects of employee safety. The programme is primarily designed to protect workers from personal injury while at work and to reduce the cost of workmen's compensation.

4.2 **Damage Control.**

The next step in the evolution came with the introduction of the concept of Damage Control, which included both injury and property damage accidents. The philosophy behind this type of programme was that accidents that resulted in damage to facilities, equipment and materials had the same basic causes as those that resulted in personal injury. The programme is thus designed to prevent all accidents which result in injury and/or damage to facilities, equipment or material.

4.3 **Total Loss Control.**

The concept of damage control was expanded when industrial managements recognised that the prevention programme must be designed to eliminate all sources of business interruption. This gave rise to the Total Loss Control Programme as we know it today, and which introduces control measures to take care of personal injury, damage to property, fire, explosion, theft, industrial security, pollution, industrial sickness or disease and product defect.

The various prevention programmes in the Total Control evolution is illustrated below:

Die doel van enige voorkomingsprogram en spesifiek van die moderne totale verliesbeheerprogram is doeltreffende produksie en verhoogde winste. Dit word verkry deur die ontwikkeling van stappe in 'n program ten einde insidente soos ongelukke wat die skema affekteer te verminder of te elimineer.

Totale Verliesbeheer word gedefiniëer deur John A. Fletcher in sy boek „The Industrial Environment" as 'n beskouing dat „die beste manier om ongelukke te verhoed, is om die bedryfsteurings van administratiewe prosesse te verminder of te elimineer"; of dat dit „'n evolusie is vanaf beseringsbestyding tot die kontrolering van alle besigheidsverliese deur die toepassing van gesonde bestuursbeginsels."

Evolusie van Totale Verliesbeheer.

4.1 **Beseringsvoorkoming.**

'n Beseringsvoorkomingsprogram is gemik op die humanitêre aspekte van werkersveiligheid. Die program is hoofsaaklik gemik om werkers in die werksituasie teen persoonlike besering te beskerm en om die koste van Ongevalleversekering te verminder.

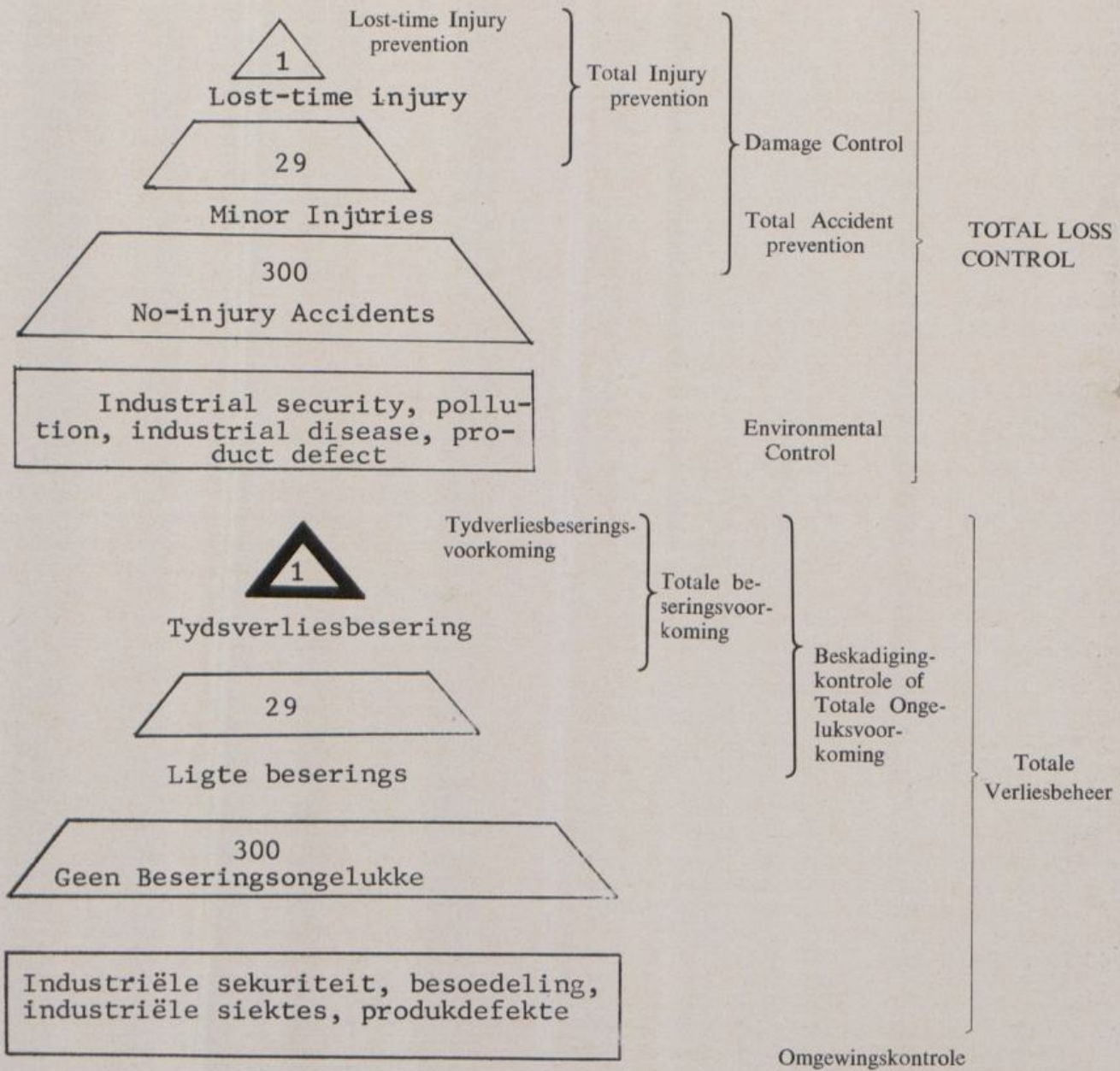
4.2 **Skadebeheer.**

Die volgende stap in die evolusie was die Skadebeheerprogram wat beheer uitoefen oor beide beserings- en eiendombeskadigingsongelukke. Die filosofie hieraan verbonde is dat ongelukke, wat beskadiging van fasiliteite, toerusting en materiaal tot gevolg het, dieselfde basiese oorsake het as dié wat persoonlike besering tot gevolg het. Die program is dus ontwerp om alle ongelukke te voorkom wat besering en/of beskadiging van fasiliteite, toerusting of materiaal tot gevolg het.

4.3 **Totale Verliesbeheer.**

Die idee van skadebeheer is uitgebrei toe nywerheidsowerhede besef het dat 'n voorkomingsprogram ontwerp moet word om alle oorsake van besigheidsonderbrekings uit te skakel. Dit het aanleiding gegee tot die moderne Totale Verliesbeheerprogram wat maatreëls instel vir die beheer van beserings, beskadiging van eiendom, vuur ontploffing, diefstal industriële sekuriteit, besoedeling, industriële siektes en produk defekte.

Die verskillende program in die totale Verlieskontrole evolusie word hieronder geïllustreer:



It is a matter for concern that the majority of industrial managements in the Republic are at this time still mainly concerned with injury prevention. However, some of our major companies and one or two local authorities have taken the initial steps towards introducing prevention programmes schooled on the Total Loss concept.

Die Evolusie van die Totale Verliesbeheerprogram

Dit is onrusbarend dat die meerderheid van nywerhede in die Republiek nog nie verder as die beseringsvoorkomingsprogram gevorder het nie. Tog is daar sekere van ons groter maatskappye en een of twee plaaslike owerhede wat reeds die eerste stappe geneem het om voorkomingsprogramme geskoei op die Totalebeheerbeginsel in werking te stel.

5.—EVALUATION OF THE CONTROL PROGRAMME.

Two yardsticks are used in the Republic to

5.—EVALUASIE VAN 'N BEHEERPROGRAM.

In die Republiek word twee maatstawwe gebruik

evaluate the effectiveness of an accident prevention programme. These are:

* Statistical evaluation; and
* Physical evaluation.

5.1 **Standards of measurement.**

Safety performance is relative. Only when a firm compares its injury experience with that of similar firms, or with that of the category of industry of which it forms a part, or even with its own previous experience can it derive a meaningful evaluation of its accident prevention accomplishments.

To facilitate the making of the aforementioned comparisons the need for a standardised method of measurement was felt and ultimately the following two commonly used rates of measurement were formulated :—

* Injury frequency rate.
* Severity rate.

5.1.1 **Injury frequency rate.**

The injury frequency rate relates the number of lost-time injuries to the number of man-hours worked by any given firm during any given period and expresses this in terms of a million-hour exposure unit.

Formula:

$$\text{Injury frequency rate} = \frac{\text{Number of lost-time injuries} \times 10^6}{\text{Number of man-hours worked}}$$

5.1.2 **Severity rate**

The disabling injury severity rate relates the number of days charged to the man-hours worked during any period and expresses it in terms of a million-hour exposure unit:

Formula:

$$\text{Severity rate} = \frac{\text{Number of days lost} \times 10^6}{\text{Number o fman-hours worked}}$$

5.2 **Physical evaluation.**

South Africa is probably the only country in the world where the physical effort which management puts into its accident prevention programme is quantified in terms of certain specific objectives. These objectives are set for each firm

om die doeltreffendheid van 'n ongeluksvoorkomingprogram te evalueer. Hulle is :

* Statistiese evaluasie; en
* Fisiese evaluasie.

5.1 **Statistiese Evaluasie — Metingsstandaarde.**

Veiligheidservaring is relatief. Slegs wanneer 'n firma sy ongeluksondervinding vergelyk met dié van soortgelyke firmas, of met dié van die nywerheidsklas waarvan dit deel vorm of selfs met sy eie vorige ervaring, kan 'n betekenisvolle evaluasie gemaak word van sy eie prestasie op die gebied van ongeluksvoorkoming.

Om bogenoemde vergelykings te vergemaklik, was dit nodig om 'n gestandaardiseerde metingsmetode te hê en het gelei tot die formulering van die volgende twee algemeen gebruikte metingstandaarde :

* Beseringsfrekwensiekoers
* Hewigheidskoers

5.1.1 **Beseringsfrekwensiekoers.**

Definisie:

Die beseringsfrekwensiekoers bring die aantal verlore-tyd-beserings en die aantal manure wat 'n firma gedurende 'n gegewe tyd werk in verband met mekaar en druk dit uit in terme van 'n miljoen-uur-blootstellingseenheid.

Formule :

$$\text{Beseringsfrekwensiekoers} = \frac{\text{Aantal tydverliesbeserings} \times 10^6}{\text{Aantal man-ure gewerk}}$$

5.1.2 **Hewigheidskoers.**

Die hewigheidskoers vir ongeskiktheidsbeserings bring die aantal mandae verloor as gevolg van die ongeluk in verhouding met die man-ure gewerk gedurende enige periode en druk dit uit in terme van 'n miljoen-ureblootstellingseenheid.

Formule :

$$\text{Hewigheidskoers} = \frac{\text{Aantal dae verloor} \times 10^6}{\text{Aantal man-ure gewerk}}$$

5.2 **Fisiese Evaluasie.**

Suid-Afrika is waarskynlik die enigste land in die wêreld waar die fisiese poging wat bestuur aanwend ten opsigte van sy ongeluksvoorkomingsprogram gemeet word in terme van sekere spesifieke oogmerke. Hierdie oogmerke word deur

by NOSA's technical staff using the criterion:

"How much more could management reasonably be expected to do within the specific plant taking cognisance of the materials, the methods, the men and the money available to the plant."

The evaluation ,called profiling, serves three purposes:

5.2.1 To determine what is being done in the organisation;

5.2.2 To determine how well it is being done; and

5.2.3 To draw up an action plan indicating what needs to be done.

The action plan should contain both short and long term objectives, assign responsibilities, delegate authority and be reviewed at frequent intervals.

NOSA has designed a profile chart for the purpose of assisting managements to introduce and for the subsequent evaluation of a total loss control programme. The profile chart is given in Annexure A.

6.—ACCIDENT PREVENTION BODIES.

In the Republic the two principal bodies concerning themselves with the promotion of accident prevention in industry are:

6.1 The Prevention of Accidents Committee of the South African Chamber of Mines. This committee confines its work to the mining industry and specifically to those mines which are members of the Chamber.

The Prevention of Accidents Committee is made up of representatives of the Chamber of Mines; the mining and financial corporations that are members of the Chamber; the Association of Mine Managers; the Colliery Managers' Association; the Association of Mine Medical Officers; the industry's insurance organisation and government departments of Mines, Labour, Public Health and Bantu Administration.

The committee seeks to outlaw accidents by:

* Helping to organise safety campaigns on individual mines;
* Stimulating and maintaining general interest in safety measures;
* Investigating and promoting ideas and devices for preventing accidents;
* Seeking methods to improve the general health and welfare of workers;

NOSA se tegniese personeel vir elke firma gestel en word gebruik gemaak van die volgende kriterium:

„Hoeveel meer kan redelikerwys van bestuur verwag word om te doen op die gebied van ongeluksvoorkoming in 'n betrokke fabriek of aanleg, met inagneming van die materiaal, die prosesse, die werkers en die fondse beskikbaar.

Die evaluasie, genoem profilering, dien drie doelwitte:

5.2.1 Om vas te stel wat gedoen word binne die Organisasie;

5.2.2 Om vas te stel hoe goed dit gedoen word; en

5.2.3 Om 'n plan op te trek wat aandui wat gedoen behoort te word.

Die plan van aksie behoort sowel kort as langtermyn doelwitte in te sluit, verantwoordelikhede toe te sê, gesag te delegeer en hersien te word met gereelde tussenposes.

NOSA het 'n profileerkaart ontwerp met die doel om bestuur te help om 'n Totale Verliesbeheerprogram in te stel asook vir die daaropvolgende evaluasie van die program. Hierdie profileerkaart word aangegee in Bylae A.

6.—ONGELUKSVOORKOMINGSINSTANSIES.

In die Republiek is daar hoofsaaklik twee instansies wat gemoeid is met die bevordering van ongeluksvoorkoming in die bedryf.

6.1 Die Ongeluksvoorkomingkomitee van die Suid-Afrikaanse kamer van Mynwese. Dié komitee beperk sy werk tot die mynbedryf en spesifiek tot daardie myne wat lede is van die Kamer van Mynwese.

Die Ongeluksvoorkomingkomitee is saamgestel uit verteenwoordigers van die Kamer van Mynwese; die Myn en Finansiële Maatskappye wat lede is van die Kamer van Mynwese; die Mynbestuurdersvereniging; die Steenkoolmyn-Bestuurdersvereniging; die Versekeringsorganisasie en die Departement van Mynwese, Arbeid, Openbare Gesondheid en Bantoe-administrasie.

Die komitee beywer hom om ongelukke uit te skakel deur :

* hulp te verleen aan individuele myne vir die organisering van veiligheidsveldtogte;
* algemene belangstelling in veiligheidsmaatreëls te stimuleer;
* idees en toerusting ter voorkoming van ongelukke te ondersoek en te bevorder;
* metodes te vind om die algemene gesondheid en welstand van werkers te bevorder;

* Encouraging first aid and ambulance work;
* Studying safety campaigns in other countries; and
* Collecting statistics and information about accidents and making this information available to mine managers.

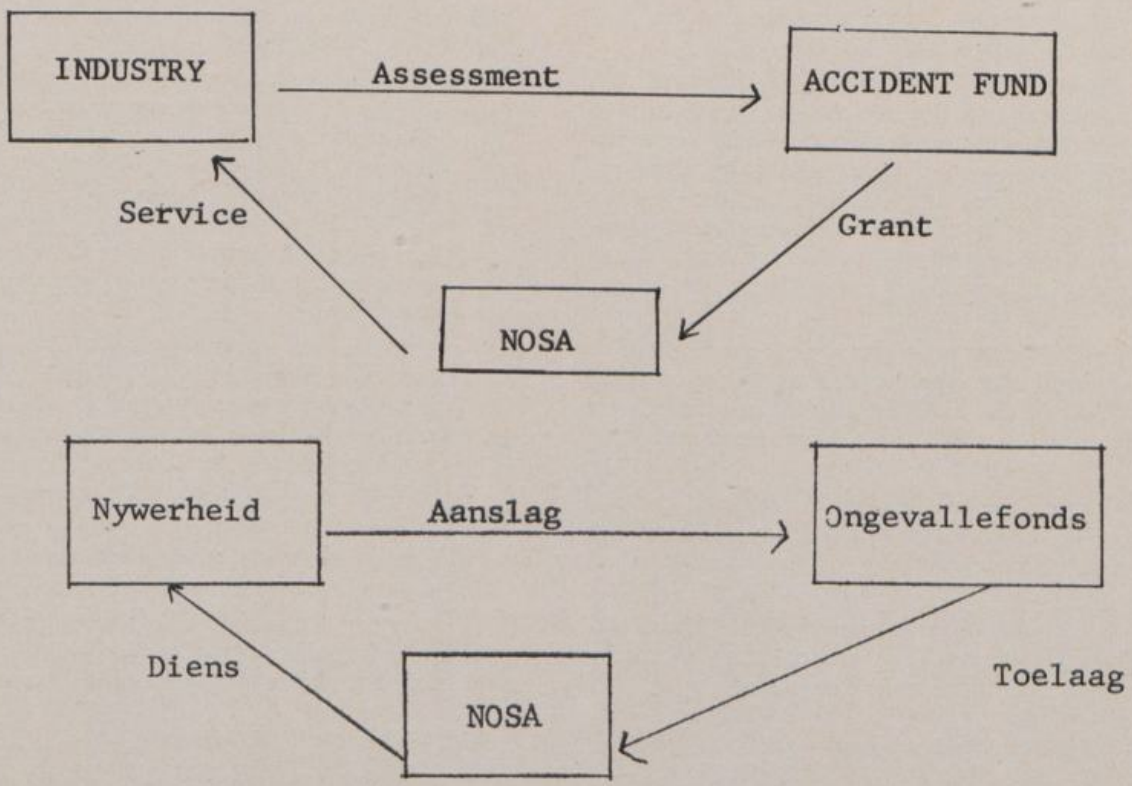
6.2 The National Occupational Safety Association, a public non-profit company floated by the major employer organisations in the Republic in conjunction with the Workmen's Compensation Commissioner in 1951.

The bulk of the Association's finance comes from the Accident Fund which is administered on behalf of Industry and Commerce by the Workmen's Compensation Commissioner.

* eerstehulp en ambulanswerk aan te moedig;
* veiligheidsveldtogte in ander lande te bestudeer; en statistiek en informasie in verband met ongelukke te versamel en die informasie beskikbaar aan mynbestuurders te stel.

6.2 Die Nasionale Beroepsveiligheidsvereniging, 'n openbare niewinsgewende maatskappy, gestig deur die vernaamste werkgewerorganisasies in die Republiek in samewerking met die Ongevallekommissaris in 1951.

Die grootste gedeelte van die Maatskappy se finansies is afkomstig van die Ongevallefonds wat namens die handel en nywerheid deur die Ongevallekommissaris geadministreer word.



Technically this means that Industry and Commerce have already paid for any services from the Association. Consequently ,no charge is made to those firms which pay assessments to the Accident Fund. Non-assessment payers may avail themselves of the Association's services by making a contribution to the Association or by paying a fee in terms of a contract of service.

The Association has its Head Office in Pretoria with Regional Offices in ten major industrial areas viz. Bloemfontein, Cape Town, Durban, East London, Germiston, Johannesburg,

Teoreties beteken dit dat die Handel en Nywerheid alreeds betaal het vir die dienste wat hulle van die Vereniging ontvang. Gevolglik word dienste kosteloos gelewer aan die firmas wat bydra tot die Ongevallefonds. Firmas wat nie bydra tot die Ongevallefonds nie kan van die Vereniging se dienste gebruik maak deur 'n bydrae tot die Vereniging se fondse te maak of 'n fooi te betaal in terme van 'n dienskontrak.

Die Vereniging se hoofkantoor is geleë in Pretoria met streekskantore in die tien vernaamste nywerheidsgebiede naamlik Bloemfontein, Kaapstad, Durban, Oos-Londen, Germiston, Johannes-

Pretoria, Port Elizabeth, Roodepoort and Vereeniging. In these areas the Association's activities are controlled by Regional Safety Groups, made up of representatives of industrial and commercial firms in each region. In addition to the Regional Groups a Mining Council looks after the interest of assessment paying mines.

The Association is controlled by a Board of Directors, the members of which are nominated in one of two ways. Each shareholder organisation appoints one director and each of NOSA's Regional Groups and the Mining Council has a representative on the Board.

NOSA, being a non-profit association, and serving all sectors of the economy, has the following main objectives :

* To promote the prevention of occupational accidents and diseases and to endeavour to eliminate their causes and results in commerce and industry on a national basis by acting as a national body and without limitation by the aforegoing to promote and encourage occupational safety work and to carry on occupational safety propaganda of every kind.

* To deal with all matters and questions of a national character appertaining to occupational safety in South Africa and to act generally as an advisory body on all such matters.

These objectives can best be achieved through the guidance, education and training of the various echelons of management in the techniques of accident prevention.

In practice and pursuant of the above objectives ,the Association's services can be broadly classified into three main categories :

6.2.1 **Technical field service.**

This service is provided by NOSA's technical staff resident in the various regional offices and consists briefly of:

* motivating management to integrate accident measures with normal management functions;
* assessing a firm's needs by means of an evaluation of its physical and organisational conditions;
* designing an accident prevention programme to suit these needs; and

burg, Pretoria, Port Elizabeth, Roodepoort en Vereeniging. In hierdie gebiede word die Vereniging se aktiwiteite gekontroleer deur Streeksveiligheidsgroepe, saamgestel uit verteenwoordigers van handels- en nywerheidsfirmas in die betrokke streek. Behalwe die Streeksgroepe is daar ook die Mynbouraad wat omsien na die belange van aanslagbetalende myne.

NOSA DOELWITTE.

NOSA, synde 'n nie-winsgewende vereniging wat alle sektore van die ekonomie dien, het die volgende doelstellings:

* Om die voorkoming van beroepsongelukke en -siektes te bevorder en om te probeer om hul oorsake en gevolge in die handel en die nywerheid op 'n nasionale grondslag uit te skakel deur as 'n nasionale liggaam op te tree en om, sonder beperking deur die voorafgaande, beroepsveiligheidswerk aan te moedig en om beroepsveiligheidspropaganda van elke soort te onderneem.
* Om alle sake en vraagstukke van 'n nasionale aard wat betrekking het op beroepsveiligheid in Suid-Afrika te hanteer en om in die algemeen as 'n raadgewende liggaam in al sodanige aangeleenthede op te tree..

Hierdie doelstellings kan ten beste bereik word deur leiding aan en opvoeding en onderrig van die verskillende echelons van bestuur in die tegnieke van ongeluksvoorkoming.

In die toepassing en navolging van bogenoemde oogmerke, kan die Vereniging se dienste in drie breë kategorieë geklassifiseer word.

6.2.1 **Tegniese Velddienste.**

Hierdie diens word verskaf deur die tegniese personeel van NOSA, gestasioneer by die verskillende streekskantore en sluit kortliks die volgende in :

* die motivering van bestuur om ongeluksvoorkomingkontrole maatreëls te integreer in hul normale bestuursfunksies;
* die bepaling van 'n firma se ongeluksvoorkomingsbehoeftes deur middel van evaluering van die firma se fisiese en organisatoriese omstandighede;
* die ontwerping van 'n ongeluksvoorkomingsprogram om aan hierdie behoefte te voldoen; en

* advising generally on accident prevention measures.

6.2.2 **Safety education and training.**

NOSA has an Educationa l Section which designs and conducts safety training courses for workers and all levels of supervision.

6.2.3 **Safety promotion and publicity.**

This service includes a.o. the following:

* designing ,printing and issuing of safety posters, pamphlets, booklets, registers and log-books;
* film and book lending facilities;
* organising national symposiums, conventions and awards banquets;
* awards scheme which gives tangible recognition to outstanding achievements in the field of accident prevention; and
* safety competitions on a national and regional scale and also on an industry category basis.

7.—WHAT ACTION SHOULD ELECTRICITY UNDERTAKINGS TAKE ?

There is no doubt that each and every Electricity Undertaking in the Republic is faced with an accident problem. Although there is no quick or easy solution to be offered, the problem may be faced and overcome by the application of certain empiric action steps:

7.1 The Council must formulate and declare under the signature of the Town Clerk, a formal accident prevention policy. An example of such a policy, formulated and adopted by the Town Councils of Krugersdorp, Randfontein and Roodepoort, is given in Annexure B.

7.2 Appoint a full-time Accident Prevention Officer if warranted by the size of the authority (more than 500 employees). Otherwise appoint a part-time officer.

7.3 Appoint a constitutionally formed accident prevention committee. The committee must be representative of all departments. The constitution of the Benoni Municipal Occupational Safety Committee is appended in Annexure C.

7.4 Determine and assign responsibility as far as accident control measures are concerned to all departmental heads.

7.5 Accident and injury statistics must be processed and be used as basis for setting specific objectives to be attained.

* in die algemeen te adviseur oor ongeluksvoorkomingmaatreëls.

6.2.2 **Veiligheidsopleiding en Opvoeding.**

NOSA het 'n Opvoedkundige seksie wat veiligheidskursusse ontwerp en aanbied aan werkers en aan alle vlakke van toesighouding.

6.2.3 **Veiligheidsbevordering en Publisiteit.**

Die dienste sluit onder andere die volgende in:

* ontwerp, druk en uitgee van veiligheidsplakkate, pamflette, boekies, registers en log-boeke;
* films en boekleen fasiliteite;
* organisering van nasiolale simposiums, konvensies en toekenningsplegtighede;
* toekenningsplan wat op tasbare wyse erkenning gee vir uitstaande prestasies op gebied van ongeluksvoorkoming; en
* veiligheidskompetisies op 'n nasionale en streeksbasis en ook volgens nywerheidsklasse.

7.—WAT STAAN 'N ELEKTRISITEITSONDERNEMING TE DOEN ?

Daar bestaan geen twyfel dat elke Elektrisiteitsonderneming in die Republiek te doen het met 'n veiligheidsprobleem. Hoewel daar geen vinnige en maklike oplossing is nie, kan die probleem benader en opgelos word deur die toepassing van sekere empiriese stappe:

7.1 Die Raad moet 'n formele Ongeluksvoorkomingsbeleid formuleer en dit amptelik verklaar onder die handtekening van die Stadsklerk. 'n Voorbeeld van so 'n beleid, formuleer en aangeneem deur die Stadsrade van Krugersdorp, Randfontein en Roodepoort word aangegee in Bylae B.

7.2 Die aanstelling van 'n voltydse Ongeluksvoorkomingbeampte indien gereverdig deur die grootte van die owerheid (meer as 500 werknemers); anders die aanstelling van 'n deeltydse beampte.

7.3 Die daarstelling van 'n konstitusionele gevormde Ongeluksvoorkomingkomitee. Die komitee moet verteenwoordigend wees van alle departemente. As voorbeeld word die konstitusie van die Benoni Munisipale Veiligheidskomitee weergegee in Bylae C.

7.4 Bepaling en delegering van verantwoordelikheid ten opsigte van ongeluksvoorkomingmaatreëls aan alle hoofde van departemente.

7.5 Ongeluks- en beseringstatistiek moet verwerk en gebruik word as 'n basis vir die formulering van spesifieke doelstellings.

7.6 As part of the induction of new employees, give accident prevention instruction.

7.7 Budget for accident prevention.

7.8 Keep the Council informed on progress, also on associated matters such as assessment rates and merit rebates received or forfeited.

8.—EXAMPLES OF ACCIDENT CONTROL MEASURES PRACTISED BY ELECTRICITY UNDERTAKINGS.

Annexures B to F provide some indication of the control measures introduced by various Electricity Undertakings in the interest of promoting safe working conditions and environments. These are :

8.1 **Annexure B—Town Councils of Krugersdorp, Randfontein and Roodepoort.**

A copy of the accident prevention policy formulated by a local authority sub-committee and adopted by the three West Rand Town Councils of Krugersdorp, Randfontein and Roodepoort.

8.2 **Annexure C—Town Council of Benoni.**

A copy of the constitution which regulates the composition and proceedings of the Benoni Municipal Occupational Safety Committee. A constitution of this nature is the first requisite when forming a committee and for the successful functioning of the Committee. An interesting innovation is that this particular committee inspects all working drawings of new municipal buildings before they are finally approved.

8.3 **Annexure D—Electricity Undertaking: City of East London.**

A copy of the Undertakings Management by Objectives Programme. This document read in conjunction with the profile chart (Annexure A) provides all the information necessary for the introduction of an organised accident prevention programme.

8.4 **Annexure E—Electrical Engineer's Department: Town Council of Kempton Park.**

A copy of standing orders of the Electrical Engineers' Department of the Town Council of Kempton Park. These orders do not replace any regulation framed under law; they are, however, a must for the safe and efficient operation of the Department's Electricity Distribution System.

8.5 **Annexure F—Electricity Supply Commission.**

An extract from the Escom publication "Safety Review," which gives a review of the

7.6 Opleiding in ongeluksvoorkoming moet deel vorm van die induksie van nuwe werkers.

7.7 Begroot vir ongeluksvoorkoming.

7.8 Die Raad moet gereeld op hoogte gehou word sover dit die vordering in die program betref asook in verband met verwante aangeleenthede soos aanslagtariewe en merietekortings ontvang of verbeur.

8.—VOORBEELDE VAN ONGELUKSKONTROLE-MAATREËLS BEOEFEN DEUR ELEKTRISITEITSONDERNEMINGS.

Bylae B tot F gee 'n beeld van die kontrolemaatreëls ingestel deur verskeie Elektrisitentsondernemings in die belang van die bevordering van veilige werksomstandighede en omgewing. Hulle is :

8.1 **Bylae B—Stadsrade van Krugersdorp, Randfontein en Roodepoort.**

'n Afskrif van die ongeluksvoorkomingsbeleid geformuleer deur 'n sub-komitee saamgestel uit verteenwoordigers uit plaaslike owerhede deur die drie Wesrandse Stadsrade van Krugersdorp, Randfontein en Roodepoort.

8.2 **Bylae C—Stadsraad van Benoni.**

'n Afskrif van die konstitusie wat die samestelling en werksaamhede van die Benoni Munisipale Beroepsveiligheidskomitee beheer. 'n Konstitusie van hierdie aard is die eerste vereiste vir die vorming van en die suksesvolle funksionering van die komitee. Interessant is dit dat hierdie spesifieke komitee die bouplanne van alle nuwe munisipale geboue inspekteer voor dit finaal goedgekeur word.

8.3 **Bylae D—Elektrisiteitsonderneming—Oos-Londen.**

'n Afskrif van die Bestuursoogmerk van toepassing in die Ongeluksvoorkomingsprogram van die Oos-Londense Elektrisiteitsonderneming. Hierdie dokument, gelees tesame met die profileerkaart (Bylae A) verskaf al die nodige inligting vir die instelling van 'n georganiseerde ongeluksvoorkomingprogram.

8.4 **Bylae E—Departement van die Elektrotegniese Ingenieur Stadsraad van Kempton Park.**

'n Afskrif van die Reglement van Orde van die Elektrotegniese Ingenieursdepartement van die Kempton Parkse Stadsraad. Hierdie reëls vervang geen wetlike regulasies nie; hulle is egter noodsaaklik vir die veilige en doeltreffende werking van die departement se elektriese verspreidingsisteem.

8.5 **Bylae F—Elektrisiteitsvoorsieningskommissie.**

'n Uittreksel uit die Evkom publikasie „Veiligheidsoorsig" wat 'n oorsig gee van die

Commission's accident prevention activities for the year 1971. The review clearly shows, in graphical form, a marked decrease in injury experience after the introduction of an organised accident prevention programme in 1969.

9.—ACKNOWLEDGEMENTS.

I wish to thank the relevant authorities for allowing me to publish the information contained in the Annexures above; for the valuable information and assistance given me by a number of Town and City Electrical Engineers.

ongeluksvoorkomingsaktiwiteite van die Kommissie vir die jaar 1971. Daar word duidelik aangedui in die vorm van 'n grafiek dat 'n merkbare afname ondervind is in hul ongelukservaring ná die instelling van 'n georganiseerde ongeluksvoorkominwsprogram in 1969.

9.—ERKENNINGS.

Ek wil graag die betrokke owerhede bedank vir hulle toestemming om die informasie in bogenoemde bylaes te publiseer; vir die waardevolle inligting en bystand wat ek ontvang het van verskeie Elektrotegniese Ingenieurs verbonde aan Plaaslike Owerhede.

ANNEXURE A

NATIONAL OCCUPATIONAL SAFETY ASSOCIATION

TOTAL LOSS CONTROL

Accidents are one of the common sources of business losses and should, therefore, be controlled by the application of accepted management principles—planning, organising, leading and controlling. To do this effectively management must have the facts and the best way to obtain an accurate picture is to profile total loss control.

HOW DO WE PROFILE ?

There are three basic steps to profiling:

1. Determine what is being done in your organisation.
2. Evaluate how well it is being done, and
3. Draw up an action plan indicating what needs to be done. The action plan should contain both short term and long range objectives, and it is suggested that a period of five years may be required for total implementation of the programme.

The profile chart is based on NOSA's Booklet "Management by Objectives" and it is suggested that you use the profile as follows:

EVALUATION.

1. Place your assessment of each item in the evaluation column using the yardstick — " How much more could management reasonably be expected to do to integrate the item with the normal production organisation so as to promote greater productivity with resultant improved profitability ?"
2. Determine and note the outline of action to be taken to rectify each deficiency and indicate a target date for completion.
3. After all sections of the profile action have been completed, review them carefully and assign priorities.

IMPLEMENTATION.

. Once all the priorities are determined and the outline of the total loss programme for immediate and long term objectives is finalised, assign responsibility, delegate authority and hold staff accountable for reaching the planned objectives. Review at frequent intervals.

BYLAE A

NASIONALE BEROEPSVEILIGHEIDSVERENIGING

TOTALE VERLIESBEHEER

Ongelukke is een van die algemene oorsake van besigheidsverliese en dit moet dus beheer word deur gebruik te maak van erkende besigheidsbeginsels—beplanning, organisering en kontrolering. Om dit doeltreffend toe te pas moet bestuur oor feite beskik en die beste manier om 'n akkurate beeld te bekom is om totale verliesbeheer te profileer.

HOE PROFILEER ONS ?

Hierdie is die drie basiese stappe van profileering:

1. Bepaal wat in jou organisasie gedoen word.
2. Bereken hoe goed dit gedoen word en
3. Trek 'n plan van aksie, wat aandui wat gedoen moet word, op. Die aksieplan moet beide kort sowel as langtermyn doelwitte vervat. Dit word voorgestel dat 'n tydperk van vyf jaar moontlik nodig sal wees vir die totale verwesenliking van die program.

Die profileerkaart is gebaseer op NOSA se Boekie „Mikpunte vir Bestuur in Ongeluksvoorkoming" en dit word voorgestel dat u die profiel as volg gebruik:

WAARDEBEPALING.

1. Plaas u waardering van elke item in die waardebepalingskolom en gebruik die volgende as u maatstaf—„Hoeveel meer kan redelikerwys van bestuur verwag word om te doen om die item die normale produksie-organisasie in te skakel en sodoende verhoogde produktiwiteit met die gepaardegaande verhoging in winste te bevorder?
2. Bepaal en beskrywe in hooftrekke die nodige aksie om elke tekortkoming reg te stel en stel 'n doelwitdatum vir die voltooiing van die werk vas.
3. Na al die afdelings van die profielaksieplan voltooi is, hersien hulle noukeurig en bepaal dan die prioriteite.

UITVOERING.

1. Nadat al die prioriteite bepaal is en die program vir totale verliesbeheer vir onmiddellike sowel as langtermyn doelwitte in hooftrekke voltooi is, moet verantwoordelikheid toegesê word, magtiging gedelegeer word en personeel verantwoordelik gehou word vir die bereiking van die beplande doelwitte. Hersien met kort tussenposes.

SECTION	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
1.00 PREMISES AND HOUSEKEEPING. 300 Housekeeping means a place for everything and everything in its place so that optimum use is made of valuable floor space with commensurate cleanliness and reduced handling time.					
1.10 PREMISES. Are the following under control?					
1.11 CONDITION OF BUILDING AND FLOORS. Are they clean and in good state of repair commensurate with the age of the building? Are all floor openings suitably covered?	40				
1.12 GOOD LIGHTING (NATURAL AND ARTIFICIAL). Are adequate lighting standards maintained? That is, is there optimum natural lighting with minimum glare? Are windows and light fittings cleaned at routine intervals Is emergency lighting fitted?	20				
1.13 VENTILATION. Is ventilation adequate for: The control of toxic or irritating dusts? Fumes? Mists? Organic solvents? Biological agents and occupational infections? Any other item which could cause skin diseases (dermatitis)? Where ventilation cannot control the hazard has engineering revision been used to isolate the process?	30				
1.20 HOUSEKEEPING. Have the following aspects been incorporated?					
1.21 AISLES AND STORAGE AREAS DEMARCATED. Have all aisles, pathways, roadways, storage areas and areas beneath electrical switch-gear been suitably demarcated? Is the demarcation marking renewed when necessary and does the work force obey the demarcation lines, i.e. are the areas, etc. kept clear and free of extraneous material at all times?	30				
1.22 GOOD STACKING PRACTICES. Is maximum use made of floor space and are stacks securely bonded, built up or broken down in accordance with NOSA pamphlet 454?	50				
1.23 FACTORY AND YARD CLEAR OF SUPERFLUOUS MATERIAL. Has all superfluous material and junk been removed from the premises? Is there adequate provision for the stacking of usable scrap?	30				

NOSA PROFILEERKAART

AFDELING	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
1.00 PERSELE EN HUISHOUDING.	300				
Huishouding is 'n plek vir alles en alles op sy plek sodat die optimum gebruik van kosbare vloerspasie verkry kan word en dit gaan gepaard met skoon- en netheid en verminderde hanteringstyd.					
1.10 PERSELE.					
Is die volgende onder beheer ?					
1.11 TOESTAND VAN GEBOUE EN VLOERE ?	40				
Is hulle so skoon en in so 'n goeie toestand as wat verwag kan word met inagneming van die ouderdom van die gebou ?					
Is alle openings in die vloer behoorlik toegemaak?					
1.12 VOLDOENDE BELIGTING (NATUURLIK EN KUNSMATIG).	20				
Is die standard van beligting toereikend ?					
Met ander woorde, is daar optimum natuurlike beligting met minimum weerkaatsing ?					
Word die vensters en ligte met gereelde tussenposes skoon gemaak ?					
Is noodbeligting geïnstalleer ?					
1.13 VENTILASIE.	30				
Is die ventilasie toereikend vir :					
Die beheer van giftige of irriterende stowwe ?					
Dampe ?					
Wasems ?					
Organiese oplosmiddels ?					
Biologiese- en beroepsinfeksies ?					
Enige ander item wat velsiektes (dermatitis) kan verooksaak ?					
Waar ventilasie nie die probleem kan beheer nie, is daar van ingenieurshersiening gebruik gemaak om die proses te isoleer ?					
1.20 HUISHOUDING.					
Is die nodige aandag aan die volgende punte gegee?					
1.21 LOOPPAAIE EN STOORAREAS AFGEMERK.	30				
Is alle deurgange, looppaaie, paaie, stoorareas en areas onder elektriese skakeltoerusting behoorlik afgemerk ?					
Word die afmerkstrepe hernu wanneer nodig en word die afbakening deur personeel gehoorsaam, d.w.s. word die areas, ens. ten alle tye skoon en vry van onnodige materiaal gehou ?					
1.22 GOEIE STAPELMETODES.	50				
Word maksimum gebruik van vloerspasie gemaak en word stapels deeglik gebind, opgebou of afgetakel ooreenkomstig die aanbeveling van NOSA pamflet 454?					
1.23 FABRIEK EN WERF VRY VAN OORTOLLIGE MATERIAAL.	30				
Is alle oortollige materiaal en rommel van die perseel verwyder?					
Is daar toereikende voorsiening gemaak vir die stapeling van bruikbare afvalmateriaal?					

SECTION	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
1.24 SCRAP BINS AND REMOVAL SYSTEM.	30				
Are there sufficient bins for scrap and wastes strategically positioned throughout the plant?					
Are these bins clearly demarcated?					
Are the bins emptied at routine intervals and properly cleaned?					
Are air-tight bins provided for the storage of materials likely to ignite spontaneously?					
Does your company have a written pollution policy?					
Has a comprehensive programme been developed covering the treatment of air pollutants?					
Solid pollutants?					
Liquid pollutants?					
Are the permissible discharge limits known?					
Have critical potential sources of pollution been identified?					
Have procedures for measurement and evaluation of quality and quantity of discharge been set up?					
Have engineering, operation and maintenance controls been established?					
Is there an emergency procedure to meet serious pollution situations?					
Is liaison maintained with regulatory agencies?					
Is liability coverage provided?					
1.25 COLOUR CODING.	40				
Are standard colour codes as specified by the South African Bureau of Standards used and maintained. See NOSA pamphlet 451.					
2.00 ELECTRICAL, MECHANICAL AND PERSONAL SAFEGUARDING. 650	150				
2.10 MECHANICAL EQUIPMENT.					
2.11 MACHINE GUARDING.					
Has a detailed survey been made of every machine and moving mechanism in the factory to determine requirements for total safe operation? The simple test is, what would happen if someone were to fall with hands outstretched—could he be caught up in the moving parts?					
Do specifications for all new equipment specify detailed safety requirements?					
Have adequate guards been designed, fabricated and installed on all machines originally purchased without suitable guards?					
Are clearances for adjustable guards clearly laid down and are these adhered to?					
Does supervision ensure that guards are always replaced after adjustments or maintenance?					
Is suitable sound-proof partitioning used to isolate excessively noisy areas?					
Are adequate shields provided to protect workers from excessive heat and other forms of harmful radiation?					
2.12 LOCK-OUT SYSTEM AND USAGE.	40				
Has your company got a written lock-out system policy?					
Are all switches locked out with a lock-out device and padlock before employees work on the equipment?					

AFDELING	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
1.24 VUILGOEDBLIKKE EN VERWYDERINGSISTEEM. Is daar genoeg vuilgoedblikke vir afval en rommel op strategiese plekke in die aanleg aangebring? Is die plek vir hierdie vuilgoedblikke duidelik afgemerk? Word die vuilgoedblikke gereeld leeg en behoorlik skoongemaak? Word lugdigte houers voorsien vir die berging van materiaal wat tot selfontbranding geneig is? Het u maatskappy 'n geskrewe besoedlingsbeleid? Is daar 'n omvattende program vi rdie bekaming van Besoedeling deur vastestowwe? Besoedeling deur vastestowwe? Besoedeling deur vloeistowwe? Is die toegelate uitskeidingsperke bekend? Is moontlike kritieke bronne van besoedeling uitgeken? Is prosedures vir die meet en bepaling van die kwaliteit en kwantiteit van uitskeiding vasgestel? Is daar ingenieurs-, werks- en instandhouding kontroles in werking gestel? Is daar 'n noodprosedure om ernstige gevalle van besoedeling te kan beheer? Word skakeling met die wetgewende instansies behou? Is die nodige voorsiening vir assuransiedekking gemaak?	30				
1.25 KLEURKODE. Word standaard kleurkodes soos deur die Suid-Afrikaanse Buro van Standaarde gespesifiseer, gebruik en in stand gehou? Sien NOSA pamflet 451.	40				
2.00 ELEKTRIESE, MEGANIESE EN PERSOONLIKE BESKERMING. 650 2.10 MEGANIESE TOERUSTING. 2.11 MASJIENSKERMS. Is 'n gedetaileerde opname van elke masjien en bewegende meganisme in die fabriek gemaak om die vereistes vir totaal veilige werking te bepaal? 'n Eenvoudige toets is, wat sal gebeur as iemand met uitgestrekte hande sou val—kan hy moontlik in die bewegende dele vasgevang word? Word gedetaileerde veiligheidsvereistes en spesifikasies vir alle nuwe toerusting gespesifiseer? Is toereikende skerms ontwerp, gemaak en op alle masjiene wat oorspronklik sonder toereikende skerms aangekoop is, aangebring? Is die vryruimte van verstelbare skerms duidelik neergelê, en word die skerms daarvolgens gestel? Verseker toesighouding wel dat skerms terug geplaas word na verstellings of instandhoudingswerk gedoen is? Word toepaslike klankdigte afskortings gebruik om buitensporig raserige gebiede af te kamp? Word toereikende skerms voorsien om werksmense van uitermatige hitte en ander vorms van nadelige bestraling te beskerm?	150				
2.12 AFSLUITSTELSEL EN GEBRUIK.. Het u maatskappy 'n geskrewe beleid vir 'n afsluitstelsel? Word alle skakelaars met 'n afsluitmeganisme en slot afgesluit voordat wernemers op die toerusting werk?	40				

SECTION	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
2.13 LABELLING OF SHUT-OFF VALVES, SWITCHES AND ISOLATORS. Are all valves, switches and isolators suitably labelled to ensure that the correct switch is operated?	30				
2.14 LADDERS AND HANDRAILS, ETC. Are all ladders numbered and checked at routine intervals? Are the results entered in the NOSA Ladder Register? Are hazardous areas fenced off? Are handrails and toeboards used to prevent persons or objects falling from working areas?	40				
2.15 LIFTING GEAR AND RECORDS. Is all lifting gear checked and tested at routine intervals and are the results entered in NOSA logbooks designed for this purpose? See NOSA pamphlet 568.	40				
2.16 COMPRESSED GASES. Are compressed gas cylinders always secured in a vertical position either on a suitable trolley or against a firm support? Is the use of copper connections for acetylene piping prohibited?	30				
2.20 ELECTRICAL EQUIPMENT. 2.21 MONTHLY CHECKING OF PORTABLE ELECTRICAL EQUIPMENT.. Has a qualified person been delegated to check all electrical equipment including domestic appliances, drawing power from a wall socket? Does this check include earth continuity and polarity testing. Are these inspections conducted at routine intervals and are the results entered in the NOSA Portable Electrical Register?	40				
2.22 EARTH LEAKAGE RELAYS. Are approved type earth leakage relays or alternative safety devices acceptable to the Chief Inspector of Factories, utilised on all portable electrical hand tools?	30				
2.23 GENERAL ELECTRICAL INSTALLATION. Is the general electrical installation of the factory checked at routine intervals by a qualified person to ensure that the equipment is in a safe condition? Do these inspections include a check for earth continuity and polarity of wall sockets?	50				
2.30 HAND TOOLS—HAMMERS, CHISELS: CONDITION, STORAGE AND USE OF. Is there a routine tool box check of all hand tools —including private tools—by the relevant supervisors? Do these inspections ensure that broken and cracked handles, mushroomed chisels, hardened hammer heads and similar defective hand tools are scrapped or suitably repaired? Are explosive powered tools examined by a person competent to do so?	50				

AFDELING	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
2.13 MERK VAN AFSLUITKLEPPE, SKAKELAARS EN ISOLATORE. Is alle kleppe, skakelaars en isolatore behoorlik gemerk om te verseker dat die regte skakelaar gebruik word?	30				
2.14 LERE, HANDRELINGS, ENS. Is alle lere genommer en word hulle met gereelde tussenposes ondersoek? Word die resultate in die NOSA Register vir Lere aangeteken? Is gevaarlike gebiede afgekamp? Word handrelings en toonborde gebruik om te voorkom dat persone of voorwerpe van werksgebiede afval?	40				
2.15 HYSGEREEDSKAP EN VERSLAE. Word alle hysgereedskap met gereelde tussenposes nagegaan en getoets en word die resultate in die NOSA Logboek wat vir die doel ontwerp is, aangeteken? Sien NOSA pamflet 568.	40				
2.16 DRUKGASSE. Word alle gassilinders altyd in 'n vertikale posisie, hetsy op 'n geskikte trollie of teen 'n stewige steunstuk, gevestig? Word die gebruik van koperkonneksies vir die koppeling van asetileenpype verbied?	30				
2.20 ELEKTRIESE TOERUSTING. 2.21 MAANDELIKSE NAGAAN VAN DRAAGBARE ELEKTRIESE TOERUSTING. Is 'n bevoegde persoon verantwoordelik gemaak om alle elektriese toerusting insluitende huishoudelike toestelle, wat krag van 'n muurprop trek, na te gaan? Sluit hierdie toets aardkontinuiteit en polarteit in? Word hierdie inspeksies met gereelde tussenposes uitgevoer en word die resultate in die NOSA Register vir Draagbare Elektriese Toerusting aangeteken?	40				
2..22 BESKERMING TEEN AARDLEKKASIE. Word beskermingstoestelle teen aardlekkasie of soortgelyke veiligheidstoestelle wat die goedkeuring van die Hooffabrieks inspekteur wegdra, met alle draagbare elektriese handgereedskap gebruik?	30				
2.23 ELEKTRIESE INSTALLASIES OOR DIE ALGEMEEN. Word die algemeen elektriese installasie van die fakriek met gereelde tussenposes deur 'n bekwame persoon nagegaan om te verseker dat die toerusting in 'n veilige toestand verkeer? Sluit hierdie inspeksies 'n toets vir aardkontinuiteit en polariteit van muurproppe in?	50				
2.30 HANDGEREEDSKAP—HAMERS, BYTELS: TOESTAND, BERGING EN GEBRUIK. Voer die betrokke toesighouers gereeld 'n gereedskapinspeksie van alle handgereedskap — insluitende persoonlike gereedskap—uit? Verseker hierdie inspeksies dat gebreekte en gekraakte handvatsels, bytels met braamkoppe, verharde hamerkoppe en desgelyke defektiewe handgereedskap óf uitgegooi óf herstel word? Word skiethamers deur 'n bevoegte persoon ondersoek?	50				

AFDELING	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
2.40 PERSONAL PROTECTIVE EQUIPMENT. Are all areas of the organisation surveyed to determine the type of personal protective equipment to be used? Do personal protective equipment items purchased comply with SABS specifications or approved overseas safety specifications? Are employees adequately instructed on the correct use of the equipment? Has the necessary personal protective equipment been issued to the respective employees? Is the wearing of personal protection equipment enforced?	Applicable to items 2.41, 2.42, 2.43, 2.44, 2.45 and 2.46.				
2.41 HARD HATS. Are these worn where a hazard of falling or flying objects exists?	20				
2.42 EYE PROTECTION. Is eye protection worn where there is a danger of flying particles e.g. when working with cold chisels, grinding, lathe work on brass and cast iron, etc.? Has suitable protective eye equipment been supplied to those workers who have to wear prescription lenses? Is the cost of these special spectacles subsidised by the firm?	20				
2.43 FOOT PROTECTION. Are suitable safety boots or shoes carrying the SABS mark issued to staff at cost?	20				
2.44 PROTECTIVE CLOTHING. Are items such as overalls supplied at cost to workers at say six-monthly intervals? Are the correct gloves supplied for the operations being carried out?	20				
2.45 BREATHING APPARATUS. Are the correct types of breathing apparatus to suit the particular job in hand supplied and used? Does supervision ensure that dust respirators are not issued to spray painters?	20				
2.46 MAINTENANCE. Are supervisory staff held responsible for the checking of all personal protective equipment on a regularised basis. Are the results of these checks included in a suitable register? Is there provision to replace or repair damaged equipment expeditiously? Are employees held responsible for missing protective equipment?	20				
2.50 NOTICES ELECTRICAL, MECHANICAL, PROTECTIVE EQUIPMENT, ETC. Are the notices required by the relevant statutory requirements displayed? See NOSA pamphlets 967 and 968.	30				

SECTION	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
2.40 TOERUSTING VIR PERSOONSBESKERMING. Is opnames van al die afdelings van die organisasie gemaak om te bepaal watter tipes van toerusting vir persoonsbeskerming vereis word? Voldoen die items wat vir persoonsbeskerming aangekoop is aan die S.A.B.S. of goedgekeurde oorsese veiligheidsspesifikasies? Het die werknemers toereikende instruksies vir die regte gebruik van die toerusting gekry? Is die nodige toerusting vir persoonsbeskerming aan die besondere werknemers uitgereik? Word die dra van toerusting vir persoonbeskerming afgedwing?	Van toepassing op items 2.41, 2.42, 2.43, 2.44, 2.45 en 2.46.				
2.41 HARDEHOEDE. Word hardehoede gedra waar die gevaar van vallende of swaaiende voorwerpe bestaan?	20				
2.42 OOGBESKERMING.. Word oogbeskerming gedra waar die gevaar van skietende deeltjies bestaan, bv. wanneer met 'n bytel gekap, met 'n slypsteen geskuur word, of wanneer geelkoper of gietyster in 'n draaibank afgedraai word ,ens? Is toereikende oogbeskermingstoerusting aan werknemers wat voorgeskrewe brille moet dra, voorsien? Word die koste van hierdie spesiale brille deur die firma gesubsidieer?	20				
2.43 VOETSBESKERMING. Word toereikende stewels en skoene met die S.A.B.S. merk daarop aan personeel teen kosprys beskikbaar gestel?	20				
2.44 BESKERMENDE KLEREDRAG. Word items soos oorpakke met tussenposes van ongeveer ses maande aan werknemers teen kosprys beskikbaar gestel? Word die regte handskoene vir die werk wat gedoen word vorsien?	20				
2.45 ASEMHALINGSAPPARAAT. Word geskikte asemhalingsapparaat vir spesifieke werk voorsien en gebruik? Verseker die toesighoudingsmetodes dat stofmaskers nie aan spuitverwers uitgereik word nie?	20				
2.46 INSTANDHOUDING. Word toesighoudende personeel verantwoordelik gehou vir die gereelde ondersoek van toerusting vir persoonsbeskerming? Word die resultate van hierdie ondersoeke in 'n gepaste register aangeteken? Is daar voorsiening gemaak om beskadigde toerusting sonder verwyl te vervang of te herstel? Word werknemers verantwoordelik gehou vir beskermende toerusting wat verlore geraak het?	20				
2.50 KENNISGEWING: ELEKTRIES, MEGANIESE, BESKERMENDE TOERUSTING, ENS. Is die kennisgewings wat ingevolge die betrokke statutêre vereistes vertoon moet word aangebring? Sien NOSA pamflette 967 en 968.	30				

SECTION	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
3.00 FIRE PREVENTION AND CONTROL. 250 Is fire prevention and control investigated at the design stage of all new plant and for expansion and re-layout?					
3.01 CORRECT TYPES OF EXTINGUISHERS Are sufficient quantities of the correct types of extinguishers provided to deal with the various types of fire hazards in the plant? Are these extinguishers located close to likely fire hazards but not so close as to be damaged or cut off from use by fire? See NOSA poster E4/71	40				
3.02—AREAS DEMARCATED AND CLEAR, EXTINGUISHERS ACCESSIBLE. Is all extinguishing equipment located in easily accessible positions where they will not be damaged by moving vehicles or corroded by chemical processes? Is the area at the base of all equipment suitably demarcated with a no parking space? Is this area kept clear at all times? See NOSA poster SP 5/71.	20				
3.03 LOCATIONS MARKED. Is the position of all fire extinguishing equipment suitably indicated by means of a conspicuous red arrow or similar mark positioned as high as possible above the equipment? See NOSA poster SP 27.	20				
3.04 MAINTENANCE OF EQUIPMENT. Have persons been delegated to be responsible for maintaining and inspecting fire-fighting equipment at routine intervals? Are the results of these inspections and tests suitably recorded in the NOSA register prepared for this purpose? Are the dates of inspection and maintenance also indicated on the extinguishing equipment?	30				
3.05 STORAGE OF INFLAMMABLE MATERIAL. Is all inflammable material stored in specific areas designed for this purpose? Do these storage areas comply with the local municipal by-laws? Are electrical fittings flameproof where required? See NOSA pamphlet 356.	30				
3.06 SIGNS TO EXITS, STAIRS: ALARM SYSTEM. Are all emergency exits and stairs suitably marked? Is there a suitable alarm system independent of the electrical supply installed? Is this alarm system clearly understood by all staff? Are the telephone numbers of the local Fire Brigade, Ambulance, Police and Management prominently displayed at the telephones?	30				
3.07 FIRE FIGHTING DRILL AND INSTRUCTIONS ON FIRE EXTINGUISHERS. Is there a fire fighting team in the organisation that can deal with any outbreak of fire? Has this team been adequately trained and does it practise at routine intervals?	80				

NOSA PROFILEERKAART

AFDELING	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
3.00 BRANDVOORKOMING EN -BEHEER. Word brandvoorkoming en -beheer tydens die ontwerp van nuwe aanlegte, uitbreidings en heruitlegte ondersoek?	250				
3.01 GESKIKTE BRANDBLUSSERS. Is daar genoeg en van die regte soort van brandblussers voorsien om die verskillende tipes van brandgevare wat in die aanleg bestaan die hoof te kan bied? Is hierdie brandblussers naby die punte van brandgevaar geleë maar nie so naby dat hulle deur die vuur beskadig of afgesny kan word nie? Sien NOSA plakkaat E4/71.	40				
3.02 AREAS VOOR BRANDBLUSSERS AFGEMERK EN SKOON. Is alle brandblustoerusting geleë op plekke wat maklik bekombaar is en waar hulle nie deur bewegende voertuie beskadig of deur chemiese prosesse verweer kan word nie? Is die areas onder alle brandblustoerusting behoorlik as geen parkering gebiede afgemerk? Word hierdie areas ten alle tye skoon gehou? Sien NOSA plakkaat SP 5/71.	20				
3.03 LIGGING AANGEDUI. Is die ligging van alle brandblustoerusting toereikend aangedui d.m.v. 'n waarneembare rooi pyl of dergelyke merk wat so hoog moontlik bo die toerusting aangebring is? Sien NOSA plakkaat SP 27.	20				
3.04 INSTNADHOUDING VAN TOERUSTING. Is die verantwoordelikheid vir die gereelde ondersoek en instandhouding van brandbestrydingstoerusting aan sekere persone opgedra? Word die resultate van die ondersoeke in die NOSA Register wat vir die doel voorberei is, aangeteken? Word die datums van ondersoeke en instandhouding ook op die brandblustoerusting aangedui?	30				
3.05 BERGING VAN VLAMBARE STOWWE. Word alle vlambare stowwe in spesifieke ruimtes wat spesiaal vir die doel ontwerp is, geberg? Voldoen hierdie ruimtes aan die betrokke plaaslike munisipale by-wette? Is die elektriese toebehore, waar nodig, van die vlamdigte tipe? Sien NOSA pamflet 356.	20				
3.06 WEGWYSERS NA UITGANGE, TRAPPE, ALARMSTELSEL. Is daar toereikende wegwysers na alle nooduitgange en trappe? Is daar 'n toereikende alarmstelsel wat onafhanklik is van die normale elektriese kragtoevoer? Verstaan al die personeellede hoe die alarmstelsel werk? Word die telefoonnommers van die plaaslike Brandweer, Ambulans, Polisie en die Bestuur van die Firma opsigtelik by die telefoons aangedui?	30				
3.07 BRANDOEFENINGE EN GEBRUIKSAANWYSINGS OP BRANDBLUSSERS. Is daar 'n brandbestrydingspan in die organisasie wat enige uitbraak van brand sal kan hanteer? Is die span behoorlik opgelei en oefen hulle gereeld?	80				

SECTION	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
Does this practise ever include a "live" drill, that is, extinguishment of an actual fire under controlled conditions?					
Have instructions been issued on fire evacuation drill and has this drill ever been practised?					
4.00 ACCIDENT RECORDING & INVESTIGATION.					
4.11 ADEQUATE ACCIDENT RECORDING (REGISTER AND DRESSING BOOK).	150 30				
Is an accident register kept in terms of applicable legislation?					
Are all lost-time injuries and those which require W.C.A. claim forms to be submitted, recorded?					
Are the necessary details such as description of the accident and its causes together with the date injured and the date resumed duty completed?					
Is a first aid dressings book kept?					
Are all first aid dressings recorded in this book? Is a non-injury accident or property damaged register kept?					
Are property damage accidents recorded in this book?					
Are details marked on the work orders?					
4.12 INTERNAL REPORT FORMS SIGNED BY SUPERVISORY STAFF.	30				
Is an internal report form completed whenever a man needs first aid?					
Is an internal report form completed for all property damage accidents including non-injury ones?					
Does the foreman complete the portion of the form where he has to suggest ways of preventing a recurrence of the particular accident?					
Does this form find its way to top managerial levels?					
Is there an effective follow-up procedure for the recommendations?					
4.13 ADEQUATE ACCIDENT STATISTICS KEPT IN AN ACCESSIBLE PLACE AND NOSA INFORMED.	30				
Is Management kept informed of the current and progressive statistics covering all injury and non-injury accidents in the plant?					
Do these statistics include the estimated financial losses?					
Are injury frequency and property damage graphs displayed as prominently as production graphs? Is a synopsis of the accident statistics sent to NOSA at monthly intervals?					
4.20—INVESTIGATION OF ACCIDENTS AND REMEDIAL MEASURES TAKEN TO PREVENT RECURRENCE.	60				
Are ALL accidents investigated by supervisory staff?					
Is a detailed analysis made to determine how a recurrence can be prevented and is this followed up?					
Are these recommendations utilised for the prevention of similar accidents elsewhere in the plant and in sister companies?					

AFDELING	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
Sluit hierdie oefening „werklike" gevalle, d.w.s. die blus van 'n regte vuur onder beheerde toestande, in?					
Is instruksies oor 'n brandontruimingsprosedure uitgevaardig en is hierdie prosedure al ooit geoefen?					
4.00 ONGELUKSVERSLAGGEWING EN ONDERSOEKE.	150				
4.11 VOLLEDIGE NOTERING VAN ONGEVALLE (ONGEVALLEREGISTER EN VERBANDBOEK).	30				
Word 'n ongevalleregister ingevolge die toepaslike wetgewing gehou? Word alle verlore-tyd beserings en dié wat lei tot Ongevalle-eise, daarin aangeteken? Word die vereiste besonderhede soos 'n beskrywing van die ongeluk en die oorsaak daarvan saam met die datum van besering en die datum waarop dienste hervat is, daarin aangeteken? Word 'n verbandboek van noodhulpbediening gehou? Word alle noodhulpverbande in hierdie boek aangeteken? Word 'n register vir nie-beseringsongelukke en gevalle van beskadiging van eiendom, gehou? Word die ongelukke wat lei tot beskadiging van eiendom in hierdie register aangeteken? Word besonderhede op die werksorders aangestip?					
4.12 INTERNE VERSLAGVORM DEUR TOESIGHOUDENDE PERSONEEL ONDERTEKEN.	30				
Word 'n interne verslagvorm elke keer voltooi wanneer 'n persoon noodhulpbediening ontvang? Word 'n interne verslagsvorm vir alle ongelukke wat beskadiging van eiendom meebring asook niebeseringsongelukke, voltooi? Voltooi die voorman die gedeelte van die vorm waarin hy aanbevelings vir die voorkoming van 'n herhaling van die besondere ongeluk moet maak? Gaan hierdie vorm deur tot by die hoofbestuursvlakke? Is daar 'n doeltreffende opvolgprosedure vir die aanbevelings wat gemaak is?					
4.13 VOLDOENDE ONGELUKSTATISTIEKE BYDERHAND EN OOK AAN NOSA VOORSIEN.	30				
Word Bestuur op hoogte gehou van die huidige en progressiewe statistieke van alle beserings- sowel as nie-beseringsongelukke in die aanleg? Word die geskatte finansiële verliese by hierdie statistieke ingesluit? Word grafieke van beseringsfrekwensie en beskadiging van eiendom net so ooglopend as produksiegrafieke vertoon? Word 'n samevatting van die ongelukstatistieke elke maand aan NOSA gestuur?					
4.20 ONGELUKSONDERSOEKE EN VOORKOMENDE STAPPE TEEN 'N HERHALING.	60				
Word ALLE ongelukke deur die toesighoudende personeel ondersoek?					
Word 'n gedetaileerde analiese gemaak om te bepaal hoe 'n herhaling voorkom kan word en word dit opgevolg?					
Word hierdie aanbevelings gebruik om dergelyke ongelukke op ander plekke in die aanleg of by sustermaatskappye te voorkom?					

SECTION	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
5.00 SAFETY ORGANISATION	650				
5.10 SAFETY PERSONNEL.					
5.11 ONE PERSON MADE RESPONSIBLE FOR SAFETY CO-ORDINATION BY MANAGEMENT IN WRITING, e.g. SAFETY OFFICER, PERMANENT/PART TIME..	30				
Is someone appointed in writing to direct the plant safety programme?					
5.12 APPOINTMENT AND ACCEPTANCE OF APPOINTMENT IN TERMS OF FACTORY REGULATION C7 2(a) AND (b) OR D3 OR MINES AND WORKS REGULATION 2.9.2.	30				
Are all supervisory staff down to charge-hand level appointed in writing to be responsible for accident prevention, using one of the above applicable forms?					
Are these forms completed in duplicate and is one copy retained by the supervisor and the other by management? See NOSA pamphlets 951, 957 and 958.					
5.13—EUROPEAN SAFETY COMMITTEES.	80				
Are the following committees set up and effectively active?					
Management.					
Supervisory.					
Departmental.					
Workers.					
Are the members of the above committees formally appointed?					
Is a record of the proceedings in the form of minutes kept?					
Do these minutes specifically state who should institute remedial action and is the completion date given?					
5.14 NON-EUROPEAN SAFETY COMMITTEE OR ANY OTHER SIMILAR SYSTEM.	40				
Where a high percentage of non-European labour is employed, have NOSA safety training courses been organised for group leaders or for other Bantu specifically selected for safety duties?					
Do these trained Bantu act as observers and report back to the person responsible for safety in the plant?					
Do these men wear safety badges as a sign of authority?					
Do they form a non-European safety committee?					
Are the committee meetings attended by a responsible person who will forward the results of the deliberations to the European safety committee?					
5.15 FIRST AIDER AND EQUIPMENT.	20				
Are qualified, responsible persons holding valid first aid certificates in charge of the first aid boxes?					
Are the certificates valid i.e. have they been renewed within the last three years?					
If more than 100 workers are employed, is a properly equipped first aid room available on the premises? See NOSA pamphlets 260 and 261.					

AFDELING	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
5.00 VEILIGHEIDSORGANISASIE.	650				
5.10 VEILIGHEIDSPERSONEEL.					
5.11 EEN PERSOON DEUR BESTUUR SKRIFTELIK VERANTWOORDELIK GEMAAK VIR VEILIGHEIDSORGANISASIE, BV. VEILIGHEIDSBEAMPTE, VOL- OF DEELTYDS. Is iemand skriftelik aangestel om die aanleg se veiligheidsprogram te beheer?	30				
5.12 AANSTELLING EN AANVAARDING INGEVOLGE FABRIEKSREGULASIE C7.2(a) EN (b) OF D3 OF MYNE EN BEDRYWE REGULASIE 2.9.2 Is alle toesighoudende personeel, af tot by die leierhandvlak, skriftelik en d.m.v. bovermelde vorms, aangestel om verantwoordelik te wees vir ongeluksvoorkoming? Word hierdie vorms in duplikaat voltooi en word afskrif deur die toesighouer en die ander deur die bestuur behou? Sien NOSA pamflette 951, 957 en 958.	30				
5.13 BLANKE VEILIGHEIDSKOMITEES. Is die volgende komitees saamgestel en lewer hulle doeltreffende werk? Bestuur. Toesighoudend. Departementeel. Werkers. Is die lede van bovermelde komitees amptelik aangestel? Word aantekeninge van die verrigtinge in die vorm van notules gehou? Dui hierdie notules spesifiek aan wie die verbeteringswerk moet verrig en word die datum van voltooiing aangedui?	80				
5.14 NIE-BLANKE VEILIGHEIDSKOMITEE OF SOORTGELYKE SISTEEM. Waar 'n groot aantal Bantoes in diens is, is daar al van NOSA se veiligheidskursusse vir hul groepleiers of ander Bantoes wat spesiaal vir veiligheidspligte gekies is, gereël? Tree hierdie opgeleide Bantoes as waarnemers op en doen hulle dan aan die persoon wat vir veiligheid in die aanleg verantwoordelik is, verslag? Dra hierdie Bantoes 'n veiligheidswapen as 'n teken van hul status? Is hulle lede van 'n Nie-blanke veiligheids komitee? Word die komitee se vergaderings deur 'n verantwoordelike persoon bygewoon wat hul bevindings aan die Blanke komitee sal oordra?	40				
5.15 EERSTEHULPBEAMPTE EN TOERUSTING. Is verantwoordelike persone met geldige eerstehulpsertifikate in beheer van eerstehulpkissies? Is die sertifikate geldig, d.w.s. is hulle binne die laaste drie jaar hernu? As daar meer as 'n 100 persone in diens is, is 'n behoorlik toe geruste eerstehulpkamer op die perseel beskikbaar? Sien NOSA pamflette 260 en 261.	20				

SECTION	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
5.16 FIRST AID TRAINING. Are persons trained in first aid each year?	30				
5.20 SAFETY PROPAGANDA.					
5.21 POSTER PROGRAMME, BULLETINS, NEWSLETTERS, USE OF SAFETY FILMS AND INTERNAL SAFETY COMPETITIONS. Is there an organised and effective programme of selection and display of posters? Is the poster display programme an integral part of the overall safety policy? Are banners, signs, jumbo posters, notices, used for loss control promotion? Are separate boards used for display of specific promotion material and are they maintained in good condition and well lighted? Are the posters rotated at weekly intervals? Are house magazines, bulletins or newsletters used to spread the safety message? To what degree are the following audio-visual aids being used? **Projected visuals.** Are films, slides, strip films, overhead transparencies, etc. being used? **Easel Graphics.** Are flip charts, flannel boards, hook and loop boards, magnetic boards, blackboards, cards, etc. used? **Audio Aids.** Are tape recordings, disc recordings, public address systems, radio, etc. used? **Demonstrations.** Are exhibits, working models and special displays utilised in the plant? **Other Visuals.** Are sign boards, continuous message boards, photography, etc.. used? **Safety Competitions.** Are internal safety competitions between various sections of the company or between different branches of the same company used in the programme? Are suitable floating trophies or prizes awarded to the winning departments? Are plaques, certificates, letters of commendation and similar personalised awards presented to staff members. Is there a formal off-the-job programme in effect? Are off-the-job accident records kept? Are costs recorded for off-the-job accidents?	130				
5.22 NOTICE BOARD INDICATING SAFETY EXPERIENCE. Is a large safety notice board strategically positioned for all to see? Does this safety board indicate to employees how they are progressing each day towards the objectives set?	20				
5 23 SUGGESTION SCHEME. Has the company got a management-backed suggestion scheme? Is this scheme promoted vigorously throughout the year, and do award winners receive maximum publicity?	20				

AFDELING	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
5.16 OPLEIDING IN EERSTEHULP. Word persone elke jaar in eerstehulp opgelei?	30				
5.20 VEILIGHEIDSPROPAGANDA. 5.21 PLAKKATE PROGRAM, BULLETINS, NUUSBRIEWE GEBRUIK VAN VEILIGHEIDSROLPRENTE EN INTERNE VEILIGHEIDSKOMPETISIES. Is daar 'n georganiseerde en doeltreffende program vir die kies en vertoon van plakkate? Is die vertoonprogram van plakkate 'n integrale deel van die veiligheidsbeleid as 'n geheel? Word baniere, reklametekens, reuse plakkate en kennisgewings vir die bevordering van verliesbeheer gebruik? Word aparte kennisgewingborde vir die vertoon van spesifieke reklame materiaal gebruik en word hulle goed verlig en in stand gehou? Word die plakkate weekliks omgeruil? Word firmatydskrifte, bulletins of nuusbriewe gebruik vir die verspreiding van veiligheidsreklame? In watter mate word die volgende audiovisuele hulpmiddels gebruik? **Geprojekteerde Hulpmiddels.** Word rolprente, skyfies, strokiesfilms, oorhoofse skyfies, ens. gebruik? **Drievoet Hulpmiddels.** Word omvoukaarte, flennieborde, nylonborde, magnetieseborde swartborde, kaarte, ens., gebruik? **Gehoor Hulpmiddels.** Word bandopnames, opnames op plate, openbare luidsprekerstelsels, radio, ens., gebruik? **Demonstrasies.** Word uitstallings, werkende modelle en spesiale vertonings in die aanleg gebruik? **Ander Visuele Hulpmiddels.** Word kennisgewingborde, aaneenlopende reklameborde, fotografie, ens., gebruik? **Veiligheidskompetisies.** Word interne veiligheidskompetisies tussen verskeie afdelings van die maatskappy of tussen verskillende takke van dieselfde maatskappy in die program gebruik? Word geskikte wisseltrofeë of pryse aan die departemente wat wen, toegeken? Word plakette, sertifikate, briewe van aanprysing en dergelyke persoonlike toekennings aan lede van die personeel toegeken? Is daar 'n amptelike program vir weg-van werk ongelukke in gebruik? Word aantekenings van weg-van-werk ongelukke gemaak en gehou? Word die koste van weg-van-werk ongelukke aangeteken?	130				
5.22 KENNISGEWINGBORD OM ONGELUKSONDERVINDING AAN TE DUI. Is 'n groot veiligheidskennisgewingbord so strategies geleë dat dit vir almal sigbaar is? Dui die veiligheidsbord vir die werknemers aan hoe hulle dag vir dag vorder in hul poging om die doelwit wat gestel is, te bereik.	20				
5.23 VOORSTELSKEMA. Het die maatskappy 'n voorstelskema wat deur bestuur gerugsteun word? Word daar dwarsdeur die jaar sterk reklame vir die skema gemaak en ontvang die pryswenners die maksimum hoeveelheid publisiteit?	20				

SECTION	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
5.30 INDUCTION TRAINING AND JOB INSTRUCTION, CONTINUOUS TRAINING, e.g. POSTER APPRECIATION LECTURES, RULE BOOK.	50				
Are aptitude tests and other selection and placement techniques used?					
Are formal training programmes well planned and carried out on a continuing basis for all supervisors?					
Do these training programmes include the NOSA Supervisor's Safety Training Course?					
Do successful candidates of the Supervisor's Safety Training Course attend NOSA's Advanced Safety Training Course?					
Is total loss control training conducted on a continuing basis?					
Does the training programme include sending members of supervision to conferences, seminars and conventions on loss control?					
Is a loss control manual containing approved procedures issued to all supervisory staff?					
Is there an effective procedure for providing loss control literature to supervisors?					
Is loss control training conducted for higher management levels?					
Is specialised technical training given with loss control emphasis?					
Is there an effective induction programme for NEW EMPLOYEES, e.g. Poster Appreciation Lectures for Bantu workers?					
Does supervision discuss loss control methods with individual workers?					
5.40 PLANT INSPECTION SYSTEM OF REPORTING TO MANAGEMENT ON SPECIFIC ITEMS, e.g. GUARDS, HAND TOOLS, HOUSEKEEPING.	50				
Are regular and detailed inspections made of facilities and equipment to determine deviations from standard conditions established?					
Do plant supervisors have to report on specific items such as guards, handtools and housekeeping? Is a supervisor's check list similar to NOSA pamphlet 965 used?					
Do the safety committee members ever conduct observation tours to determine the total loss control climate?					
Are random sampling techniques used and how effective are they?					
Is there a procedure for reporting results of inspections?					
How effective are controls and follow-up of this feed-back system to ensure correction of faults?					
5.50 WRITTEN SAFE OPERATING PRACTICES AND PROCEDURES.	50				
Have rules been formulated and issued in printed form covering operation of all the various types of equipment and dangerous processes in the plant, e.g. emergency action in case of power failure?					
Are these rules issued to all employees?					
Is there an education programme for instructing employees on the rules?					

AFDELING	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
5.30 INDIENSNEMINGSOPLEIDING EN TAAKINSTRUKSIE, VOORTDURENDE OPLEIDING BV. LESINGS IN PLAKKAATWARDERING, WERKREGULASIES.	50				
Word anlegtoetse en ander keurings- en plasingstegnieke gebruik?					
Word amptelike opleidingsprogramme goed beplan en op 'n aanhoudende basis vir alle toesighouers aangebied?					
Sluit hierdie opleidingsprogramme NOSA as Veiligheidsopleidingskursus vir Toesighouers in?					
Woon die suksesvolle kandidate van die Veiligheidsopleidingskursus NOSA se Gevorderde Veiligheidsopleidingskursus by?					
Geskied die opleiding in totale verliesbeheer op 'n aanhoudende basis?					
Word die bywoning van konferensies, seminare en konvensies oor verliesbeheer deur lede van die toesighoudende personeel as deel van die program van opleiding beskou?					
Word 'n handboek met die goedgekeurde prosedures van verliesbeheer aan alle toesighoudende personeel uitgereik?					
Is daar 'n doeltreffende prosedure om leesstof oor verleisbeheer aan toesighouers te voorsien?					
Word opleiding in verliesbeheer vir die hoër bestuursvlakke voorsien?					
Word gespesialiseerde tegniese opleiding met die klem op verliesbeheer gegee?					
Is daar 'n doeltreffende program vir indiensnemingsopleiding vir NUWE WERKNEMERS bv. Plakkaatwaarderingslesings vir Bantoe werkers?					
Word die indiensnemingsopleiding deur taakinstruksie opgevolg?					
Bespreek die toesighoudende personeel metodes van verliesbeheer met die onderskeie werkers?					
5.40 FABRIEKSINSPEKSIE; VERSLAGSTELSEL AAN BESTUUR OOR SPESIFIEKE ITEMS SOOS SKERMS, HANDGEREEDSKAP EN HUISHOUDING.	50				
Word gereelde en gedetailleerde ondersoeke van die fasiliteite en toerusting gemaak om enige afwyking van die standaard wat gestel is, te bepaal?					
Moet fabriekstoesighouers oor spesifieke items skerms, handgereedskap en huishouding verslag lewer?					
Word 'n kontrolelys wat ooreenkom met NOSA pamflet 965 gebruik?					
Gaan die veiligheidskomitee se lede ooit op 'n toer deur die aanleg om die houding teenoor verliesbeheer te bepaal?					
Word steekproef tegnieke gebruik an hoe doeltreffend is hulle?					
Is daar 'n prosedure van verslag doen oor die resultate van ondersoeke?					
Hoe doeltreffend is die kontrole én opvolg van hierdie terugvoer sisteem om te verseker dat foute herstel word?					
5:50 GESKREWE VOORSKRIFTE VIR VEILIGE WERKSPRAKTYKE EN -PROSEDURES.	50				
Is reëls vir die gebruik van die verskillende tipes van toerusting en gevaarlike prosesse in die aanleg bv. noodoptrede in die geval van 'n kragonderbreking, geformuleer en in gedrukte vorm uitgereik?					
Word hierdie reëls aan alle werknemers uitgereik?					
Is daar 'n program van opleiding om die reëls by werknemers tuis to bring?					

SECTION	Maximum Marks	Evaluation	ACTION PLAN	Target Date	Priority
Is there any follow-up to ensure that the rules have been understood and are obeyed?					
5.60 ITEMS NOT PREVIOUSLY DETAILED.	80				
5.61 COMPANY POLICY.					
Does your company have a written safety policy?					
If so, is it over the signature of a senior executive?					
If there is no written policy, is there a verbal safety policy?					
Is such a policy known to all managerial staff?					
Is such a policy known to all employees?					
How well is the safety policy enforced?					
5.62 MEDICAL EXAMINATIONS.	30				
Is there a pre-employment examination for all employees?					
Are examinations of workers in hazardous occupations conducted periodically?					
Are visual-acuity tests made at stated intervals?					
Are audiometric tests made of all employees hearing before employment and six-monthly intervals?					
Are special health examinations made as indicated?					
Are return to work examinations made after illness or injury?					
Are exit examinations made when employment is terminated?					
Is a health history maintained for each employee?					
Are handicapped workers assisted with job placement?					
Is there a rehabilitation programme for employees requiring it?					
5.63 OTHER ITEMS NOT DETAILED.	40				

AFDELING	Maksimum Punte	Waardebepaling	AKSIEPLAN	Doelwit Datum	Prioriteit
Is daar 'n metode van opvolg om seker te maak dat die reëls verstaan en gehoorsaam word?					
5.60 ITEMS NIE VOORHEEN HIER UITEENGESIT NIE.	30				
5.61 MAATSKAPPYBELEID.					
Het u maatskappy 'n geskrewe veiligheidsbeleid?					
Indien wel, is dit deur 'n senior uitvoerende beampte onderteken?					
As daar nie 'n geskrewe beleid is nie, is daar 'n mondelinge veiligheidsbeleid?					
Is die beleid aan alle bestuurspersoneel bekend?					
Is die beleid aan alle werknemers bekend?					
Hoe doeltreffend word die veiligheidsbeleid toegepas?					
5.62 MEDIESE ONDERSOEKE.	30				
Word alle werknemers voor indienstreding ondersoek?					
Word werkers wat gevaarlike take verrig periodiek ondersoek?					
Vind toetse vir gesigsvermoë met neergelegde tussenposes plaas?					
Word oudiometriese toetse vir die gehoor van alle werknemers voor indienstreding en daarna met tussenposes van ses maande uitgevoer?					
Word spesiale gesondheidsondersoeke, soos aangedui, gedoen?					
Wanneer 'n werknemer na 'n siekbed of besering na die werk terugkeer, word by ondersoek?					
Wanneer die diens beëindig word, word 'n uittredingsondersoek gedoen?					
Word die gesondheidsgeskiedenis van elke werknemer op datum gehou?					
Word gestremde werkers gehelp om in werk geplaas te word?					
Is daar 'n program vir die rehabilitasie van werknemers wat dit benodig?					
5.63 ANDER ITEMS NIE UITEENGESIT NIE.	40				

ANNEXURE B

LOCAL AUTHORITY ACCIDENT PREVENTION POLICY

The safety of the municipal enterprise and the workers in its service forms a very important part of management efficiency.

Therefore it is the policy of the Council to introduce and maintain an effective accident prevention programme for the entire undertaking.

In order to achieve this objective the following procedure will be put into practice :

1. Each head of a department will be responsible for the safety of the operations as well as the workers under his control or, in his absence, by his deputy.

2. A constitutionally formed central accident prevention committee consisting of heads of departments (in their absence the deputies) will integrate safely activities at municipal level, and each head of department (or substitute) will ensure that resolutions and recommendations by this committee are carried out by the department under his control.

3. If, because of the nature of the industry and/or the accident and injury experience of a department, it may be necessary for such a department to compose an internal safety committee to ensure and motivate safety practices at departmental level.

4. A full-time / part-time officer will co-ordinate the accident prevention programme at municipal level.

5. General safety rules covering work procedures and codes of conduct will be put into practice and, if necessary, special safety procedures will be laid down for certain jobs.

6. Training in accident prevention will form part of the normal educational programme for supervisors and workers and full utilisation is to be made of the educational facilities of NOSA.

7. Each head of department will fully investigate all accidents which result in injuries or damage to property and will report to the central safety committee by means of an internal accident report form.

8. Each head of department will record accidents and injuries, time lost as well as the total man-hour

BYLAE B

PLAASLIKE OWERHEID ONGELUKVOORKOMINGSBELEID

Die veiligheid van die Munisipale onderneming en die werknemers in sy diens is 'n uiters belangrike deel van bestuursdoeltreffendheid.

Dit is dus die beleid van die Raad om 'n effektiewe ongeluksvoorkomingsprogram vir die hele onderneming in te stel en te handhaaf.

Ten einde hierdie doel te verwesenlik sal die volgende prosedure van toepassing wees:

1. Elke departementshoof sal aanspreeklik wees vir die veiligheid van die bedrywighede en die werknemers onder sy beheer en in sy afwesigheid sy plaasvervanger.

2. 'n Konstitutioneel gestigte sentrale ongelukvoorkomingskomitee bestaande uit departmentshoofde (in hul afwesigheid hul plaasvervangers) sal veiligheidsaktiwiteite op Munisipale wye vlak integreer, en elke departementshoof (of plaasvervanger) sal verseker dat besluite en aanbevelings van hierdie komitee in die departement onder sy beheer ten uitvoer gebring word.

3. Waar dit uit die aard van die werksaamhede en/of die ongeluks en beseringservaring van 'n departement blyk nodig te wees sal so 'n departement sy eie veiligheidskomitee in werking stel om so-doende veiligheidspraktyk en motivering op departementsvlak te verseker.

4. 'n Voltydse/Deeltydse beampte sal die ongelukvoorkomingksprogram op Munisipale vlak koordineer.

. Algemene veiligheidsreëls om werksprosedures en gedragskodes te dek sal van toepassing wees, en indien nodig sal daar ook spesiale veiligheidsprosedures vir spesifieke take voorgeskryf word.

6. Onderrig in ongeluksvoorkoming sal deel van die normale opleiding van Voormanne en werknemers uitmaak en volle gebruik sal van NOSA se opleidingsfasiliteite gemaak word.

7. Elke departemensthoof sal alle ongelukke wat beskadiging van eiendom en toerusting en/of beserings tot gevolg het noukeurig ondersoek en by wyse van 'n interne ongevalleverslagvorm aan die sentrale komitee verslag doen.

8. Elke departementshoof sal 'n rekord hou van ongelukke en beserings, tydverlies asook die

exposure in the department under his control, and will send a monthly return thereof on a prescribed form to the central committee.

9. The central committee on its part will process the statistics and submit a complete statement and report to the Council and circulate the information to heads of departments.

10. The munincipality is a member of the National Occupational Safety Association (NOSA) and will take part in the activities, competitions and the awards-plan of the Association.

totale manuur-blootstelling in die departement onder sy beheer, en maandeliks 'n opgaaf daarvan op 'n voorgeskrewe vorm aan die sentrale komitee stuur.

9. Die sentrale komitee sal op sy beurt periodiek die statistiek verwerk en 'n gesamentlike opgaaf en 'n verslag aan die Raad voorlê asook onder departementshoofde sirkuleer.

10. Die Munisipaliteit is 'n lid van die Nasionale Beroepsveiligheidsvereniging (NOSA) en sal in sy geheel aktief meedoen aan die bedrywighede, kompetisies en toekenningsplan van die Vereniging.

ANNEXURE C

CONSTITUTION OF THE BENONI MUNICIPAL OCCUPATIONAL SAFETY COMMITTEE

1. **Name :**

   The name of the Committee will be BENONI MUNICIPAL SAFETY COMMITTEE.

2. **Objectives :**

   The basic objectives of the Committee will be to induce and maintain active interest for safety in all employees, and to prevent accidents by removing the causes of accidents.

   Further objectives will be:

   (a) to formulate and discuss safety policy and to recommend that it be accepted by management;

   (b) to guard against unsafe conditions and acts and to find and recommend remedies;

   (c) to achieve the desired results by ensuring that recommended action steps are taken;

   (d) to provide for safety training at all levels.

3. **Membership :**

   (a) The committee will consist of officials nominated by the council;

   (b) the chairman will be appointed by the management;

   (c) a vice-chairman will be elected from the committee members;

   (d) the secretary will be appointed by the management.

BYLAE C

KONSTITUSIE VAN DIE BENONI MUNISIPALE BEROEPSVEILIGHEIDSKOMITEE

1. **Naam :**

   Die naam van die komitee sal wees die BENONI MUNISIPALE BEROEPSVEILIGHEIDS-KOMITEE.

2. **Doelstellings :**

   Die basiese doelstellings van die komitee sal wees om aktiewe belangstelling van alle werknemers in veiligheid op te wek en te handhaaf en om ongelukke te voorkom deur die verwydering van ongeluksoorsake.

   Verdere doelstellings sal wees :

   (a) om veiligheidsbeleid te bespreek en te formuleer en om die aanvaarding daarvan by bestuur aan te beveel;

   (b) om onveilige toestande en onveilige handelings te ontdek en oplossings daarvoor te vind en aan te beveel;

   (c) om resultate te bereik deur toe te sien dat die goedgekeurde aanbevelings tot uitvoer gebring word;

   (d) om die geleentheid te skep vir veiligheidsopleiding op alle vlakke.

3. **Lidmaatskap :**

   (a) Die komitee sal bestaan uit amptenare benoem deur die Raad;

   (b) Die voorsitter sal deur die bestuur aangestel word;

   (c) 'n Visie-voorsitter sal vanuit die komiteelede verkies word;

   (d) Die Sekretaris sal deur die bestuur aangestel word.

4. **Authorisation :**

The committee will be authorised to co-opt members, if necessary, and such co-opted members will be accepted as ordinary members.

5. **Vacancies :**

All vacancies as a result of resignation, death, bad health, leave, etc., will be filled by co-optation from the section where the vacancy occurred.

6. **Quorum :**

A quorum will consist of a small majority, in other words, one more than half of the committee.

7. **Time and Place of Meeting :**

The meeting will be held in the committee chamber (room 509), Burger Centre, at 10 a.m. on the first Wednesday of every month.

8. **Minutes :**

Minutes will be kept and copies will be sent to every committee member and NOSA before the next meeting.

9. **Investigation of Accidents :**

(i) All time-loss accidents will be investigated by a sub-committee compiled of the following committee members :

(a) the chairman or vice-chairman;

(b) the committee member who represents the section where the accident occurred;

(c) a third elected committee member nominated by the chairman.

(ii) All other accidents will be investigated by the departmental foreman, except when the seriousness thereof (although injuries might be light) justify the attention of the sub-committee, in which case the sub-committee will be requested to be present.

All accidents will be investigated as soon as possible and the results will be submitted in writing on the prescribed forms and submitted at the next meeting for consideration.

10. **Inspections :**

(a) Inspections of 2 sections per month will be undertaken by a sub-committee compiled of one representative of each of the two sections and two other chosen members. The sections will be decided on and the sub-committee nominated at the meeting preceding the inspections.

(b) Apart from the inspections by the inspection sub-committee, each departmental foreman

4. **Magtiging :**

Die komitee sal gemagtig wees om lede te koopteer indien nodig en sulke geko-optreede lede sal as gewone lede aanvaar word.

5. **Vakatures:**

Alle vakatures wat ontstaan as gevolg van bedanking, dood, swak gesondheid, verlof, ens., sal gevul word deur ko-optasie vanuit die afdeling waarin die vakature ontstaan het.

6. **Kworum :**

'n Kworum sal bestaan uit 'n skrale meerderheid, dit wil sê een meer as die helfte van die komitee.

7. **Tyd en Plek van Vergadering :**

Die vergadering sal om 10 vm. op die eerste Woensdag van elke maand in die komiteekamer (kamer 509), Burgersentrum, gehou word.

8. **Notule :**

Notules sal gehou word en afskrifte sal na elke komiteelid en NOSA gestuur word voor die volgende vergadering.

9. **Ondersoek van Ongevalle :**

(i) Alle tyd-verlies ongelukke sal deur 'n subkomitee bestaande uit die volgende komiteelede ondersoek word:

(a) die voorsitter of die visie-voorsitter;

(b) die komiteelid wat die afdeling waarin die ongeluk plaasgevind het, verteenwoordig;

(c) 'n derde verkose komiteelid deur die Voorsitter benoem te word.

(ii) alle ander ongelukke sal deur die departementele voormanne ondersoek word tensy die ernstigheid daarvan (hoewel beserings lig mag wees) die aandag van die sub-komitee regverdig in welke geval die sub-komitee versoek sal word, teenwoordig te wees.

Alle ongelukke sal so spoedig moontlik ondersoek word en die bevindings sal skriftelik, op die voorgeskrewe vorms, aan die volgende vergadering voorgelê word vir oorweging.

10. **Inspeksies :**

(a) Inspeksies van twee afdelings per maand sal uitgevoer word deur 'n sub-komitee bestaande uit een verteenwoordiger van elk van sodanige afdelings en twee verkose lede. Die afdelings sal gekies word en die sub-komitee benoem word op elke vorige vergadering.

(b) Benewens die inspeksies van die inspeksiesub-komitee sal elke departementele voorman

will do monthly inspections of his section.

(c) All traffic accidents occurring outside municipal premises and involving municipal officials, will not fall under the jurisdiction of the committee.
All findings of inspections undertaken under (a) and (b) above, will be submitted in writing for their consideration to the meeting following the inspections. If the seriousness of the problem demands immediate attention, the section-head involved will be notified immediately.

11. **Amendment of the Constitution :**
Any change in the constitution can only be made when two-thirds of the members are present.

12. **Duties of the Committee :**
Apart from abovementioned duties, the Committee will also be responsible for the following :

(a) reporting any matters of importance arising from the meeting to the Heads of Departments, and if necessary, to the Council in cases where the Departmental Heads are not able or authorised to solve the problem;

(b) recording and analysis of statistical information concerning accidents, and the comparison of monthly statistics;

(c) testing and selecting safety equipment, etc., before purchase;

(d) compiling and, if necessary, amending safety measures and standing regulations;

(e) organising safety weeks, internal competitions, etc., and general distribution of propaganda material;

(f) considering safety suggestions and where necessary recommending to the Council that compensation be granted for the suggestion;

(g) considering plans for proposed extensions or alterations to municipal premises, new equipment, etc., with a view of making recommendations in the interests of safety to the Council;

(h) determining any further steps for the promotion of safety.

13. **Approval of Building Plans :**
The City Engineer has to submit the building-plans of all new Municipal buildings to the Safety Committee before the plans are finally approved.

maandliks inspeksies van die afdeling onder sy toesig uitvoer.
Wysiging goedgekeur Raad 6/1/1972

(c) Alle verkeersongelukke wat buite munisipale persele plaasvind en waarby munisipale amptenare betrokke is, val buite die jurisdiksie van die komitee.

11. **Wysiging van Konstitusie :**
Enige verandering in die konstitusie kan slegs gedoen word wanneer 'n twee-derde meerderheid van lede teenwoordig is.

12. **Pligte van die Komitee :**
Benewens die bogemelde pligte sal die komitee ook verantwoordelik wees vir die volgende :

(a) die rapporteer aan Departementshoofde van enige sake van belang wat uit die vergadering voortspruit, en indien nodig daarna, aan die Raad in gevalle waar die Departementshoof nie by magte of in staat is om die saak reg te stel nie.

(b) Die hou en ontleding van statistiese informasie aangaande ongelukke, en die vergelyking daarvan met vorige maande;

(c) die toetsing en keuring van beskermde toerusting, ens., voor die aankoop daarvan;

(d) die opstel en indien nodig, die wysiging van veiligheidsreëls en staande instruksies;

(e) die reël van veiligheidsweke, interne kompetisies, ens., en die algemene verspreiding van propagandamateriaal;

(f) die oorweging van veiligheidsvoorstelle en indien nodig, die voorlegging aan die Raad van voorstelle ten opsigte van vergoeding daarvoor;

(g) die oorweging van planne van voorgestelde uitbreidings of veranderings aan munisipale persele, nuwe toerusting ens., met gevolglike aanbevelings ten bevordering van veiligheid aan die Raad;

(h) die bepaling van enige verdere stappe ter bevordering van veiligheid.

13. **Goedkeuring van Bouplanne :**
Die Stadsingenieur moet die bouplanne van alle nuwe Munisipale geboue aan die veiligheidskomitee voorlê alvorens sodanige planne finaal goedgekeur word.

14. **Language Policy :**

Meetings will be conducted alternately in Afrikaans and in English.

15. A member who is unable to attend a meeting, must timeously arrange for a suitable alternate.

14. **Taalbeleid :**

Vergadering van die Komitee sal om die beurt in Afrikaans en in Engels gehou word.

15. Wanneer 'n lid nie 'n vergadering kan bywoon nie, moet hy vooraf reël vir 'n geskikte plaasvervanger.

ANNEXURE D

EAST LONDON MUNICIPAL ELECTRICITY UNDERTAKING

MANAGEMENT BY OBJECTIVES

PREAMBLE

One of the main aims of the National Occupational Safety Association is to assist the management in obtaining maximum productivity and minimising losses, and NOSA has established certain definite objectives which management should strive to retain. The criterion which is used is:

" How much more could management reasonably be expected to do within the specific plant, taking cognisance of the materials, the methods, the men and the money available to the plant."

The general objectives for firms or organisations may be classified under the following headings:

Improvement of productivity.
Efficiency of operations.
Profitability.
Improvement of management techniques.

Guidelines along the way which keep management headed continually in the proper direction are the specific objectives and an important area where specific objectives are essential is accident and injury prevention. In this particular area effective, cooperative management is essential in attaining the objectives by means of controlled techniques, which require:

Establishing standards;
Measuring work in progress;
Interpreting results;
Taking necessary action.

Uncontrolled deviation from the established standard is then an ACCIDENT, either injury causing or non-injury causing.

BYLAE D

OOS-LONDEN MUNISIPALE ELEKTRISITEITSONDERNEMING.

BESTUURSMETODIEK DEUR MIDDEL VAN DOELSTELLING

INLEIDING :

Een van die belangrikste doelwitte van die Nasionale Beroepsveiligheidsvereniging is om die bestuur behulpsaam te wees om optimum produktiwiteit en minimum verliese te verseker en daarom het NOSA sekere definitiewe doelstellings opgestel vir bestuur om na te streef. Die maatstaf wat gebruik word is:

„ Hoeveel meer kan redelikerwys van bestuur verwag word om te doen op die gebied van ongeluksvoorkoming in 'n betrokke fabriek of aanleg, met **inagneming** van die materiaal, prosesse, die werkers en die fondse beskikbaar."

Die algemene doelwitte vir die meeste besighede of organisasies kan geklassifiseer word onder die volgende:

Verhoging van produktiwiteit.
Doeltreffendheid van bedryfsmetodes.
Winsgewendheid.
Verbetering van bestuurstegnieke.

Bogenoemde algemene doelwitte word gestel met die oog op langtermyn eindresultate. Om hierdie langtermyn doelwitte te bereik het bestuur sekere wegwysers nodig. Hierdie wegwysers is spesifieke doelwitte, en een van die belangrikste atkiwiteite waar spesifieke doelwitte noodsaaklik is, is op die gebied van ongeluksvoorkoming. Om hierdie doelwitte te bereik, is dit nodig dat die deskundige kennis van bestuur op die gebied van beheertegnieke ingespan word. Dit sluit in:

Vasstelling van standaardprosedures.
Meet van werksvordering.
Vertolking van resultate.
Korrektiewe maatreëls tref.

Onbeheerde afwyking van die vasgestelde standaardprosesse is 'n ongeluk, ongeag of dit besering tot gevolg het of nie.

1.00 PREMISES AND HOUSEKEEPING.

"A place for everything and everything in its place."
Bad housekeeping, untidiness and lack of cleanliness is inexcusable, valuable floor space is wasted and productivity is reduced.

INVENTORY FOR EQUIPMENT AND MATERIALS.

1.10 **Premises.**

1.11 **Buildings and Floors—clean and in good state of repair.**

Clean buildings in a good state of repair impress staff members and visitors. Damaged floors are dangerous.

Guidelines:

Workshop floors painted green—say eau-de-nil. 75mm wide yellow lines painted on the floor around all fixed machines.
Bottom 300mm on all steel roller doors painted with alternate yellow and black diagonal strips.

1.12 **Good lighting—natural and artificial.**

Natural lighting should be the optimum, with no glare—all windows must be maintained in a clean condition. Artificial lighting should be adequate, especially for night work, emergencies, in pits and on stairways.

1.13 **Ventilation.**

Ventilation must be adequate, especially where toxic or irritating substances are used, in battery rooms, oil stores, etc.

1.20 **Housekeeping.**

1.21 **Aisles and Storage demarcated.**

Straight pathways through the premises are essential and must be clearly marked by means of 75mm wide yellow lines painted on the floors. These lines must be well maintained and must not be allowed to become indistinct and so ignored that they become extensions of the storage areas. Pathways must be wide enough for vehicles as well as personnel.

Persons responsible for the housekeeping of all premises should be appointed to maintain the cleanliness and tidiness of all premises to a line 2m beyond all external walls.

1.22 **Good Stacking and Storing Practices.**

Stacking should be orderly, in demarcated areas on floors, and equipment and materials tidily stored on shelves with good labelling.

1.00 PERSELE EN HUISHOUDING.

„'n Plek vir alles, en alles op sy plek." Swak huishouding, onnetheid en vuilheid is onverskoonbaar, waardevolle vloerspasie word vermors en produksietyd gaan verlore.

OPNAME VAN TOERUSTING EN MATERIAAL.

1.10 **Persele:**

1.11 **Geboue en vloere—skoon en in goeie toestand.**

Skoon geboue wat goed in stand gehou word maak 'n goeie indruk op werkers sowel as die publiek. Beskadige vloere is gevaarlik.

Riglyne:

Werkswinkelvloere groen geverf—bv. eau-de-nil. Geel strepe (75mm wyd) op vloere geverf rondom vaste masjiene. Die onderste 300mm van alle staal rollerdeure geverf met geel en swart diagonale strepe.

1.12 **Voldoende beligting (natuurlik en kunsmatig).**

Die natuurlike beligting behoort die optimum te wees, sonder weerkaatsing, vensters behoort skoon gehou te word. Kunsmatig beligting moet voldoende wees, veral vir werk snags, noodgevalle, en aan die onderend van vervoerbandinstallasies en ook op trappe.

1.13 **Ventilasie:**

Ventilasie behoort voldoende te wees veral wanneer giftige of irriterende stowwe gebruik word, bv. in battery kamers, olie-bergplekke ens.

1.20 **Huishouding.**

1.21 **Looppaaie en stoorareas afgemerk.**

Reguit paadjies deur 'n fabriek is onontbeerlik en behoort duidelik gemerk te wees deur geel strepe van 75 mm wyd op die vloere te verf. Hierdie lyne moet goed in stand gehou word en nie toegelaat word om onduidelik te word nie want werkers is genieg om dit te ignoreer en die paadjies to beskou as uitbreidings van pakruimtes. Paadjies moet altyd breed genoeg wees vir voertuie sowel as mense.

Persone behoort aangestel te word om verantwoordelikheid te neem vir huishouding op alle persele; om sindelikheid en netheid op alle persele te handhaaf tot 2 m vanaf alle buitemure.

1.22 **Goeie stapel—en bergingmetodes.**

Stapeling van materiaal behoort ordelik in afgemerkte areas op die vloer gedoen te word, en gereedskap en materiaal moet netjies gemerk en op rakke gestoor word.

1.23 **Factory and Yard—clear of superfluous material.**

The first essential is to provide proper storage facilities. No junk or scrap must be allowed to accumulate. All superfluous material should be disposed of and springcleaning carried out regularly to make additional space available.

Guidelines:

Some person or persons must be made responsible for the cleanliness of all yards and external areas from a line 2m from the external walls.

Barricade posts and chains or rails, painted with yellow and black strips.

Bins should be provided for all scrap materials —clearly labelled—and no materials whatever should be allowed to accumulate on the ground. Where there are no outside storage areas no materials or equipment should be deposited.

1.24 **Scrap Bins and Removal System.**

An adequate number of scrap bins, painted and labelled, should be placed in strategic positions throughout the works. They should be kept in the same places, clearly demarcated by means of yellow lines.

Guidelines:

Small painted scrap bins on all work benches.

Ashtrays on all work benches.

Larger painted bins on all workshop floors.

Refuse and scrap to be removed regularly to avoid overflowing.

1.25 **Colour Coding.**

All machinery and machine parts should be painted in uniform, key colours in accordance with S.A.B.S. 08-1954: Colour Code for Workshops and Factories.

Guidelines:

Electrical conduits and compressed air and gas lines also to be painted to the colour code.

Crane gantries to be painted yellow.

Moving crane girders to be painted with yellow and black diagonal strips.

2.00 ELECTRICAL, MECHANICAL AND PERSONAL SAFEGUARDING.

2.10 **Mechanical Equipment.**

2.11 **Machine Guarding.**

The requirements of the Factories, Machinery and Building Work Act is the minimum standard which should be obtained. A simple test is what would happen if someone had to fall with hands outstretched—could he be caught up in the moving parts? All accessible nip points

1.23 **Fabriek en werf vry van oortollige materiaal.**

Dit is noodsaaklik om behoorlike bergingsfasiliteite te voorsien. Geen gemors of afval mag versamel word nie. Alle oortollige materiaal moet van ontslae geraak word en die fabriek en werf gereeld deeglik skoongemaak word om meer spasie beskikbaar te stel.

'n Persoon of etlike persone behoort verantwoordelik gehou te word vir die sindelikheid van die werf en tot 2 m vanaf die buitemure.

Sperpale en -kettings of relings moet swart en geel geverf word.

Duidelik gemerkte vuilgoedblikke moet voorsien word vir alle afvalmateriaal en geen materiaal van enige aard mag toegelaat word om op die vloer te versamel nie.

Geen materiaal of toerusting moet agtergelaat word waar geen buite-begingsfasiliteite daarvoor voorsien is nie.

1.24 **Vuilgoedblikke en Verwyderingsisteem.**

Voldoende blikke vir afval, geverf en gemerk, behoort in strategiese posisies voorsien word. Die vuilgoedblikke behoort op dieselfde plekke, duidelik gemerg deur geel strepe, geplaas word.

Riglyne:

Klein geverfde afvalblikkies voorsien op alle werksbanke.

Asbakkies op alle werksbanke.

Groter geverfde afvalblikke op alle werkswinkelvloere.

Afval en gemors moet gereeld verwyder word ten einde akkumulasie te voorkom.

1.25 **Kleurkode.**

Alle masjienerie en masjienonderdele behoort in eenvormige sleutelkleure geverf te word in ooreenstemming met S.A.B.S. 08-1954 Kleurkode vir Werkswinkels en Fabrieke.

Riglyne:

Leipypbedradingstelsels en saamgeperste lug- en gaspype behoort volgens die kleurkode geverf te word.

Hyskraanstellasies behoort geel geverf te word. Beweeglike hyskraanbalke moet geel geverf word met swart diagonale strepe.

2.00 MEGANIESE, ELEKTRIESE EN PERSOONLIKE BESKERMING.

2.10 **Meganiese toerusting.**

2.11 **Masjienskerms.**

Die vereistes van die Fabriekswet is die minimum standaard waarna gestreef moet word. 'n Eenvoudige toets is: Wat sal gebeur indien iemand met uitgestrekte arms sou val? Alle knelpunte binne bereik van enigiemand behoort afgeskerm te wees.

must be guarded.
Guidelines:
All grinders with notices showing the r.p.m. clearly marked, in terms of the Act.
Grinding wheels should always be stored—suitable racks.
Every item of machinery should be inspected by a qualified inspection team and guards fitted where found to be required—particular attention should be given to drives, couplings, shafts, conveyors—guards should protect both sides.
Wheelbarrows with hand guards on the outside of the handles.
Barrier guards should be fitted on machines.

2.12 **Lock-out System and Usage.**

To prevent accidents caused by the switching on of equipment while personnel are working on it, switches should be locked out with a lock-out device.
Guidelines:
A Work Permit System must be adopted.
Lock-out warning label boards, with electricians name issued to each electrician, together with written procedures or standing instructions for the method of use.
The gantries of electrically operated cranes to be locked out with guard plates or gates and micro-switch interlocks.

2.13 **Labelling of Shut-off Valves, Switches, Isolators.**

To ensure that the correct switch isolation or valve is operated, they should be clearly labelled.

2.14 **Ladders, Handrails, etc.**

Responsibility for the control of these items should be fixed. Rungs, safety feet, storage, splinters, toe-boards should be checked.
Guidelines:
All ladders numbered, labelled and entered in the Ladder Register.
Ladders chained and padlocked in their allocated positions, on specially constructed racks.
Fibreglass ladders now available.
At Sasol all aluminium ladders—wooden ladders not permitted.
All ladders with rubber padded safety feet.

2.15 **Lifting gear and Records.**

All lifting gear should be checked and tested regularly. All lifting gear numbered and listed in Lifting Gear Register. Responsibility for the control, inspection and testing of all lifting gear should be fixed.

Riglyne:
Alle slypmasjiene moet kennisgewings hê wat die o.p.m. duidelik aandui, volgens die Fabriekswet.
Alle slypwiele moet gestoor word op gepaste rakke.
Elke stuk masjienerie moet nagegaan word deur 'n gekwalifiseerde inspeksie span en skerms aangebring word waar dit nodig blyk—spesifieke aandag behoort aan aandrywing, koppeling, skagte, vervoerbande gegee te word—die skerms moet persoon sowel as masjien beskerm.
Kruiwaens met handskerms aan die buitekant van die handvatsels.
Versperringskerms behoort aan alle masjiene aangebring te word.

2.12 **Afsluitstelsel en Gebruik.**

Om ongelukke te voorkom wat veroorsaak word deur persone wot onwetend toerusting of masjiene aanskakel terwyl daaraan gewerk word, kan skakelaars deur 'n slot afgesluit word.
Riglyne:
'n Werkpermit sisteem moet gevolg word. Afsluitwaarskuwing kennisgewings met die elektrisiën se naam daarop, tesame met geskrewe prosedures aangaande metodes van gebruik, behoort aangebring te word.
Die stellasies van elektriese hyskrane moet gesluit word met skermplate of hekke en mikroskakelaartussensluiting.

2.13 **Merk van Afsluitkleppe, skakelaars en isolators.**

Om te verseker dat die korrekte afsluitkleppe of isolators in- of buite werking gestel word, behoort almal duidelik gemerk te wees.

2.14 **Lere, Handrelings ens.**

Die verantwoordelikheid vir beheer oor hierdie items behoort aan 'n spesifieke persoon of persone opgedra te word. Sporte, veiligheidsvoetstukke, splinters, randskerms en stoorplek behoort gereeld nagegaan te word.
Riglyne:
Alle lere genommer, gemerk en in die Leerregister aangeteken.
Lere vasgeketting en van 'n hangslot voorsien in hulle onderskeie posisies aan spesiaal opgerigte rakke.
Veselglaslere tans beskikbaar.
By Sasol word net alluminium lere toegelaat—geen houtlere.
Alle lere voorsien van rubberveiligheidstaanders.

2.15 **Hysgereedskap en Verslae.**

Alle hysgereedskap moet gereeld nagesien word, bevindings behoort in 'n Hysgereedskapregister aangeteken te word. Verantwoordelikheid vir die kontrole, inspeksie en toetsing van alle hysgereedskap behoort aan 'n spesifieke persoon of

Guidelines:
Mobile cranes checked weekly.
Chain blocks, slings, pull lifts, etc., checked regularly.
Centre prop park on all hooks of chain blocks, pull lifts, etc. At the open end of the hook, the distances between the prop marks are measured regularly to check for overloading and elongation.
Safety belts checked monthly.

2.16 **Compressed Gases.**

Cylinders should be chained upright, either on a well-made trolley or against a firm support.
Guidelines:
No copper connection for acetylene piping.
Oxy-acetylene equipment fitted with flash-back arrestors.
No broken glasses on pressure gauges.
Pre-set devices on oxy-acetylene equipment — no pressure gauges required.

2.17 **Vehicles and Mobile Plant.**

The checking of the condition and efficiency of all vehicles and mobile plant units, including trucks, hydraulic platforms, compressors, ladder wagons, mobile cranes, etc., should be part of every safety programme and should be the responsibility of every Superintendent, Supervisor or Foreman.
Weekly inspections of condition, cleanliness, safety devices should be carried out by the responsible person and recorded in the Vehicle and Plant Inspection Register. All defects should be recorded immediately to the Maintenance Section.

2.20 **Electrical Equipment.**

2.21 **Monthly checking of Portable Electrical Equipment.**

A person qualified to do the work should be given the responsibility for checking the following and recording the findings in the Portable Electrical Equipment Register:

Loose connections.
Continuous earthing.
Cable free from joints.
Polarity correct.
Cracked or broken insulation.
Switches in good order.
Extension leads—correct polarity.

This covers electric kettles, office equipment, cookers, pans, extension leads and all items drawing power from a socket outlet. (Special note: Consideration to be given to the checking of all portable electrical equipment throughout the whole of the Municipality.)

persone opgedra te word.
Riglyne:
Mobiele hyskrane weekliks nagegaan—kettings. takels, stroppe trekhysers, ens gereeld nagegaan.
Sluitstuk aan alle hake van kettingtakels of trekhysers ens. Die opening in die haak word gereeld gemeet om oorlaaiing en uitrekking te voorkom.
Veiligheidsgordels maandeliks nagegaan.

2.16 **Drukgasse.**

Alle gassilinders behoort regop vasgeketting te wees—op 'n goedgemaakte trollie of ander stewige steunstuk.
Riglyne:
Geen koper konneksie vir aseteleenpype nie.
Oksi-aseteleen toerusting voorsien van terugflitsafweerders.
Geen gebreekte glas op drukmeters.
Vooruitgestelde toestel op oksi-aseteleen toerusting—geen drukmeters nodig.

2.17 **Voertuie en Mobiele Eenheid.**

Die nagaan van die toestand en effektiwiteit van alle voertuie en mobiele eenhede, insluitende vragmotors, hidroliese platforms, kompressors, leerwaens, mobiele hyskrane ens., behoort deel te wees van elke veiligheidsprogram en behoort die verantwoordelikheid te wees van elke superintendent, toesighouer of voorman.
Weeklikse inspeksies van toestand, sindelikheid, veiligheidstoestelle behoort deur die verantwoordelike persoon gedoen te word en aangeteken te word in die Voertuig- en Fabrieksinspeksie Register—alle defekte behoort onmiddellik aan die instandhoudingseksie gerapporteer te word.

2.20 **Elektriese toerusting.**

2.21 **Maandelikse nagaan van draagbare elektriese toerusting.**

'n Bevoegde persoon behoort verantwoordelik gemaak te word om elektriese toerusting te ondersoek, te herstel en die volgende items in 'n register aan te teken:

Los verbindings.
Ononderbroke aardverbinding.
Kabelverbindings sonder lasse.
Polariteit korrek.
Gebarste of gebreekte isolasie.
Toestand van skakelaars.
Verlengingskabels—korrekte polariteit.

Dit sluit in ondersoek van elektriese kabels, kantooruitrusting, panne en kooktoestelle, verlengingskabels en ander gereedskap wat van krag voorsien word uit 'n muurprop.

2.22 **Earth Leakage Relays.**

As soon as possible, earth leakage relays should be fitted to the complete fixed electrical installation, on distribution boards, as required. Until such time as this is done, portable earth leakage relays must be used with portable electrical equipment. The testing of earth leakage devices should be carried out at regular intervals and recorded in the Earth Leakage Relay Register.

2.23 **General Electrical Installation.**

No temporary wiring must be allowed to become permanent. Socket outlets must be correctly connected. All switches must work in the approved up and down positions.

2.30 **Hand Tools—Condition, Storage, Use.**

The control of hand tools should be part of every safety programme and should be the responsibility of every Superintendent or Foreman (specially privately owned tools.)
Guidelines:
Monthly inspections of all hand tools such as hammers, chisels, spanners, blowlamps, pliers, screwdrivers, etc., should be carried out by the responsible person and recorded in the Hand Tools Register.
All drills in equipment stores should be stored in specially made racks to improve control.
All special tools in equipment store should be attached to special tool boards, with the shape of each tool outlined in coloured paint, to maintain effective control.

2.40 **Protective equipment.**

2.41 **Hard Hats.**

Where required because of hazards, hard hats must be issued, using different colours for different sections or types of operation. All harnesses must be checked regularly.

2.42 **Eye Protection.**

Generally speaking, in all operations where one metal hand tool strikes against another, where equipment or material is struck by a metal hand tool or where the cutting action of a tool causes particles to fly, grinding and lathe work, eye protection is needed by the user of the tool and by other workmen who may be exposed to flying particles.
Goggles or face shields should be worn when wood working or cutting tools, such as chisels, braces and bits, planes, scrapers and saws are used headhigh or overhead, with the chance of particles falling or flying into eyes.

2.22 **Beskerming teen aardlekkasie.**

Aardlekkasietoestelle moet volgens voorskrifte so spoedig doenlik aangebring word aan alle distribusieborde van permanente elektriese installasies. In die tussentyd moet draagbare lekkasietoestelle saam met draagbare elektriese gereedskap gebruik word.
Gereelde toetsing van aardlekkasietoestelle moet uitgevoer en aangeteken word in die Aardlekkasieregister.

2.23 **Elektriese installasies oor die algemeen.**

Geen bedrading wat tydelik aangebring is mag toegelaat word om permanent in gebruik te bly Nie. Muurproppe behoort korrek bedraad te wees. Skakelaars behoort in die aanvaarde "op" en "af" posisies te funksioneer.

2.30 **Handgereedskap.**

2.31 **Toestand, berging en gebruik.**

Beheer oor handgereedskap moet deel wees van enige veiligheidsprogram. Dit behoort die verantwoordelikheid te wees van elke voorman en toesighouer (veral „privaat" gereedskap).
Riglyne:
Maandelikse inspeksies van alle handgereedskap soos hamers, beitels, sleutels, blaaslampe, tange, skroewedraaiers ens. moet deur die verantwoordelike persoon gedoen en aangeteken word in die Handgereedskapregister.
Alle bore in toerustingstore moet in spesiale rakke gebêre word om kontrole te verbeter.
Alle spesiale gereedskap in store moet op spesiale gereedskapsborde gebêre word, met die vorm van elke stuk gereedskap aangebring met gekleurde verf vir effektiewe kontrole.

2.40 **Beskermde Toerusting.**

2.41 **Hardehoede.**

Waar benodig a.g.v. gevaar moet hardehoede voorsien word, met verskillende kleure vir verskillends seksies. Alle hoede moet gereeld nagegaan word.

2.42 **Oogbeskerming.**

Oor die algemeen, waar toerusting of materiaal met metaalhandgereedskap geslaan word, of waar die sny daarvan kan veroorsaak dat klein gedeeltes wegskram soos bv. by slyp -en draaibankwerk, is oogbeskerming onontbeerlik vir die gebruiker van die gereedskap sowel as vir ander persone wat daaraan blootgestel mag wees.
Stofbrille of gesigskerms behoort gebruik te word wanneer daar bo die kop of op skouerhoogte met hout of snymasjiene soos bv. beitels, omslagbore, skaafmasjiene, skuurders en sae gewerk word en daar gevaar is dat voorwerpe in die oë kan beland.

Special provision should be made for those workers who have to wear prescription lenses.
Guidelines:
Rubber gloves and a hard hat with large face mask attached may be provided in sub-stations as standard equipment to be used during all switching operations. Bilingual notices requiring the use of eye protection must be attached to all grinders.

2.43 **Foot Protection.**

Foot protection, in the form of approved safety boots, must be issued to all personnel where required by the type of operation. Periodic inspections should be made by Superintendents or Foremen.

2.44 **Protective Clothing.**

Loose, tattered clothing worn by personnel working and moving machinery creates a real hazard. Electricians are issued with two garment overalls as added protection of the chest in the event of electrical flashes. (No zip fasteners should be permitted.) Regular inspections of the condition and cleanliness of the overalls should be carried out by Superintendents or Foremen.

2.45 **Breathing apparatus.**

The correct types of apparatus to suit the job in hand should be supplied and used e.g. a dust respirator is useless for spray-painting operations. Fixed breathing apparatus should be installed wherever required by the situation.
Where necessary, breathing apparatus and a lifeline should be provided to pull a man out of a CO2 filled room.

2.46 **Maintenance.**

Supervisory staff should be held responsible for checking protective equipment on a regularised basis and provision should be made to replace or repair damaged equipment.

2.50 **Notices—Electrical, Mechanical, Protective Equipment, etc.**

Bilingual notices complying with the relevant statutory requirements must be displayed e.g. electricity, fire and protective equipment.
Guidelines:
The size in square metres of all workshops, workshop offices, staff, toilets, staff rooms, etc., must be fixed in prominent positions.
Bilingual notices, as required by statute, must be displayed in or on all sub-station premises.
Careful checks should be made to ensure that the wording is explicit and the translations

Voorsiening behoort ook gemaak te word vir werkers wat 'n voorskrewe bril dra.
Riglyne:
Rubberhandskoene en 'n hardehoed met groot gesigsmasker aangeheg kan voorsien word in sub-stasies as standaarduitrusting om gebruik te word gedurende alle skakelingswerk. Tweetalige kennisgewings aangaande die gebruik van oogbeskerming moet aan alle slypmasjiene aangebring word.

2.43 **Voetbeskerming.**

Voetbeskerming, in die vorm van veiligheidstewels moet aan alle personeel voorsien word indien noodsaaklik vir die werksituasie. Periodieke inspeksies behoort uitgevoer te word deur Superintendente en Voormanne.

2.44 **Beskermende Kleredrag.**

'n Groot ongeluksgevaar word geskep deur werknemers wat met los, geskeurde klere tussen bewegende masjienerie werk. Elektrisiëns word voorsien van twee oorpakke vir addisionele beskerming van die bors in die geval van elektriese flitse. (Geen ritsluiters behoort toegelaat te word nie.) Gereelde inspeksies van die toestand en sindelikheid van die oorpakke moet uitgevoer word deur die superintendente of voormanne.

2.45 **Asemhalingsapparaat.**

Geskikte asemhalingsapparaat vir spesifieke werk behoort voorsien en gebruik te word. 'n Stofmasker is byvoorbeeld nutteloos wanneer met spuitverf gewerk word. Permanente asemhalingsapparaat behoort geïnstalleer te word waar die situasie dit noodsaak.
Waar nodig, behoort asemhalingsapparaat en 'n veiligheidslyn vir die redding van 'n persoon uit 'n CO^2-gevulde kamer aangebring te word.

2.46 **Instandhouding.**

Toesighoudende personeel behoort verantwoordelik gemaak te word vir die gereëlde ondersoek van beskermde toerusting en beskadigde toerusting moet onverwyld vervang of herstel word.

2.50 **Kennisgewings: Elektries, Meganies, Beskermende Toerusting,, ens.**

Tweetalige kennisgewings ooreenkomstig betrokke statutêre vereistes moet vertoon word i.v.m. elektrisiteit, brand en die gebruik van beskermende toerusting.
Riglyne:
Die grootte in vierkante meters van alle werkswinkels, werkswinkelkantore, personeel toiletgeriewe, personeelkamers ens. behoort in prominente posisies aangebring te word.
Tweetalige kennisgewings, ooreenkomstig statutêre vereistes, moet vertoon word op alle sub-

correct.
Where considered advisable, trilingual notices should be displayed.
All other factory regulations, as required by statute, must be displayed in the required positions.
The statutory notices for the operation of grinders must be displayed wherever necessary.
The use of safety notices or slogans, fixed in carefully chosen positions, should be encouraged. (The painted scrap bins can also be used for this purpose.

3.00 FIRE PROTECTION AND PREVENTION.

3.01 **Correct types of Extinguishers.**

Listed below are the types of fires against which specific extinguishers can be used:

Type	Example	Use
Water, streams gas propelled	Soda Acid	Wood and Paper
Wetting agents or foams	Foam type	Wood and Oil
Inert Gas	CO^2	Oil and Electric
Chemical powder	Chemical powder	Oil and Electric

Carbon Tetrachloride extinguishers must not be used. Extinguishers should be placed close to likely fire hazards but not so close as to be damaged or cut off from use by fire. They should be located along the normal path of egress from the building and if inflammable material is stored in small rooms or in closed spaces, extinguishers should be located outside the doors and never inside where they might become inaccessible.

3.02 **Extinguishers Accessible—Areas Demarcated and Clear.**

Fire extinguishers must not be blocked or hidden by stock, materials, or machines, but should be placed or hung where they will not be damaged by trucks, cranes and harmful operations or corroded by chemical processes and where they will not obstruct aisles or injure passers by. A yellow demarcated NO-PARKING AREA under each extinguisher should be provided to ensure that it is kept accessible.

3.03 **Locations Marked.**

Each extinguisher should be located in a con-

stasie persele. Dit moet noukeurig nagegaan word om te verseker dat die bewoording duidelik en die vertalings korrek is.
Waar nodig geag behoort die kennisgewings in drie tale te verskyn.
Alle ander fabrieksregulasies, volgens statutêre vereistes, moet vertoon word in die plekke waar dit vereis word.
Die statutêre kennisgewings vir die gebruik van slypmasjiene moet in die vereiste plekke aangebring word.
Die gebruik van veiligheidskennisgewings of slagspreuke, geplaas in strategiese posisies, behoort aangemoedig te word. (Die geverfde afvalblikke kan ook hiervoor gebruik word).

3.00 BRANDVOORKOMING EN BESKERMING.

3.01 **Geskikte Brandblussers.**

Hieronder volg 'n lys van die verskillende brandblussers en die tipes vuur waaroor dit gebruik kan word.

Tipe blusser	Voorbeeld	Tipe Brand
Water onder druk (gas)	Soda-suur	Hout en papier
Benattingsmiddels of skuim	Skuim tipe	Hout en Olie
Onaktiewe gas	CO^2	Olie en Elektriese brande
Droë chemiese poeier	Chemiese poeier	Olie en Elektriese brande

Koolstoftetrachloriedbrandblussers moet nie geword nie. Brandblussers behoort naby moontlike brandgevare aangebring te wees maar nie so naby dat hulle beskadig of deur die vuur afgesny kan word nie. Hulle behoort by die uitgange van geboue aangebring te word. Waar Vlambare materiaal in kamers of in toe plekke geberg word moet die brandblussers aan die buitekant geleë wees—nooit binnekant waar hulle buite bereik is nie.

3.02 **Areas voor Brandblussers afgemerk en skoon.**

Brandblussers moet nie versper of deur voorrade of masjinerie weggesteek wees nie. Hulle behoort op plekke aangebring te word waar hulle nie deur trokke, hyskrane of skadelike prosesse beskadig kan word nie of waar hulle deur chemiese prosesse kan verroes, of waar hulle gange sal versper of verbygangers mag beseer nie. 'n „Geen Parkering" gebied, direk onder elke brandblusser d.m.v. geel strepe afgemerk, sal bydra om blussers altyd bereikbaar te hou.

3.03 **Ligging aangedui.**

Elke brandblusser moet op 'n ooglopende plek

spicuous place and if it is hung on a large column or post a distinguishing red band should be painted around the post and an arrow fixed on the wall above the extinguished. Large signs should be posted, directing attention to extinguishers which are not conspicuously located. Extinguishers should never be painted in colours which will camouflage them.

3.04 **Maintenance of Equipment.**

The responsibility of maintaining and inspecting fire equipment on a scheduled basis, must be established. There should be a systematic plan for checking and repairing various types of extinguishers and records should be kept of this in the Fire Extinguisher Register.
Records of maintenance and inspection should be written on a card fastened to the extinguisher, giving dates of inspection, recharge or repair. Soda Acid and foam fire extinguishers require annual recharging.

3.05 **Storage of Inflammable Materials.**

Inflammable material should be stored in specific areas specially designed for the purpose and complying with all regulations. Inflammable liquids with flash points below 200°F e.g. petrol, paraffin and diesel fuel should be stored in a non-combustible room with a raised threshold across the door to contain the contents of bursting drums. All electrical fittings in such a room should be flameproof. Cotton waste and other cleaning materials should be kept in metal containers with close fitting lids.

3.06 **Signs to Exits, Stairs—Alarm System.**

Signs to emergency exits and stairs should be clearly marked and a definite alarm system understood by all staff should be introduced. The telephone numbers of the local fire brigade, ambulance, police and the management should be prominently displayed at strategic telephones.

3.07 **Fire fighting Drill and Instructions on Fire Extinguishers.**

A fire fighting team carrying out a periodical drill at regular or unexpected intervals should be introduced, because without a planned approach, the equipment is useless in an emergency.
Guidelines:
All electricians should be trained in the use of

aangebring word. As dit aan 'n paal hang moet 'n waarneembare rooi streep om die paal geverf word; of 'n rooi pyl kan teen die muur bokant die brandblusser geverf word.
Groot kennisgewings moet aangebring word om brandblussers aan te dui wat nie op ooglopende plekke is nie. Brandblussers moet nooit 'n kleur geverf word wat hulle onherkenbaar sal maak nie.

3.04 **Instandhouding van Toerusting.**

Spesifieke persone in elke werkplek behoort verantwoordelik gemaak te word om brandbestrydingstoerusting in stand te hou en te ondersoek.
Ondersoek en herstel van die verskillende tipes brandblussers behoort op 'n sistematiese manier gedoen te word.
Aantekeninge van instandhouding en ondersoeke word gewoonlik op 'n kaart aangebring, wat aan die brandblusser vas is. Hierop verskyn die datums van inspeksies, hervullings of herstelwerk. Hou in gedagte dat Soda-suur en skuimtipe brandblussers jaarliks hervul moet word.

3.05 **Berging van Vlambare stowwe.**

Alle vlambare stowwe behoort in spesifieke ruimtes wat spesiaal vir die doel ontwerp is, geberg te word. Hierdie ruimtes moet voldoen aan die vereistes van die betrokke munisipale regulasies.
In die algemeen behoort vlambare stowwe met 'n ontvlammingspunt laer as 200°F, bv. petrol, paraffien, en diesel brandstof, geberg te word in 'n brandvaste kamer met 'n verhoogde drumpel voor die deur om te verhinder dat die inhoud van vanuit gebarste dromme na buite vloei. Elektriese toebehore behoort van die vlamdigte tipe te wees. Katoenafval en ander skoonmaakstowwe behoort in metaalhouers met digte deksels gehou te word.

3.06 **Wegwysers na Uitgange en Trappe—Alarmstelsel.**

Wegwysers na nooduigange en trappe behoort duidelik te wees. 'n Alarmstelsel wat deur alle werkers verstaan word, behoort ingestel te word. Die telefoonnommers van die plaaslike brandweer, polisie en bestuur van die firma behoort by alle telefone duidelik aangebring te word.

3.07 **Brandbestrydingsoefeninge en Gebruiksaanwysings op Brandblussers.**

'n Brandbestrydingspan wat op gereelde of onbeplande tye oefeninge uitvoer behoort ingestel te word. Sonder beplanning en oefening is brandbestrydingsapparaat waardeloos in 'n noodgeval.
Riglyne:

fire extinguishers, with regular refresher courses at six monthly intervals.
Each fire extinguisher should have its own history card.
The preparation of a colour drawing and code to indicate readily the position of fire extinguishers should be considered.

4.00 ACCIDENT RECORDING AND INVESTIGATION.

4.10 **Records.**

4.11 **Adequate Accident Recording—Register and Dressing Book.**

An accident register of all lost time injuries and those which require Workmen's Compensation Ac claim forms to be submitted must be kept. A description of the accident and its causes is essential and it is imperative to report the date when an injured person resumed duty.
First Aid dressings should be recorded in a Dressing Book as the wound may turn septic at some future date and it is important to have a record of the treatment received. The Statutory Register of all accidents must be kept and where required, accidents reported to the Inspector of Machinery by the Personnel Department.

4.12 **Internal Accident Report Forms—Signed by Supervisory Staff.**

This document is probably the most important in any accident prevention programme because, through this document, safety control methods can be applied. An Internal Report Form should be completed whenever a man requires First Aid and the onus is then placed on the shoulders of the Superintendent or Foreman who must suggest ways of preventing reoccurrence of the particular accident. This form should find its way, without delay, to top managerial levels where it can be determined whether the action taken by the Superintendent or Foreman was sufficient and whether the process, the machinery or the material involved can be modified to prevent recurrence of the accident.
Guidelines:
Some organisations require Internal Report Forms to be filled in by injured persons.
Consideration should be given to the introduction of an injury index card system with a card introduced for a person when he suffers his first injury.
A copy of completed Internal Report Form should reach Heads of Departments and top management within 48 hours with full details of investigation and action proposed.

Alle elektrisiëns moet opgelei word in die gebruik van brandblussers, met ses-maandelikse vervrissingskursusse.
Elke brandblusser moet sy eie geskeideniskaart hê.
Die voorbereiding van 'n skets en kode in kleur, om maklik die posisies van brandblussers aan te dui, behoort oorweeg te word.

4.00 ONGELUKSVERSLAGGEWING EN -ONDERSOEKE.

4.10 **Verslae.**

4.11 **Volledige notering van ongevalle (ongeluks -en verbandregister).**

Alle verlore-tyd ongevalle en ander wat lei tot Ongevallefondseise behoort in 'n register aangeteken te word. 'n Beskrywing van die ongeluk en die oorsaak is van groot waarde, en die datum waarop die beseerde weer begin werk het, is noodsaaklik. Noodhulpbehandeling behoort in 'n verbandregister aangeteken te word. 'n Wond mag later septies word en dit is belangrik om 'n rekord van die behandeling te hou. Die Statutêre Register moet van gebruik gemaak word en waar nodig, moet ongelukke aan die Inspekteur van Masjinerie deur die Personeel Departement aangemeld word.

4.12 **Interne Ongeluksverslagvorm, deur Toesighoudende personeel voltooi.**

Hierdie is waarskynlik die belangrikste dokument in enige ongeluksvoorkomingsprogram. Deur middel van hierdie verslagvorm is dit maklik om beheer oor die veiligheidstoestand uit te oefen. 'n Ongeluksverslagvorm behoort voltooi te word selfs wanneer slegs eerstehulp-behandeling nodig is. Die verpligting rus dan by die voorman om voorstelle te maak ter voorkoming van 'n herhaling van 'n betrokke ongeluk.
Die interne ongeluksverslagsvorm behoort die hoofbestuurder te bereik. Bestuur kan dan besluit of die stappe wat geneem is om 'n soortgelyke ongeluk te voorkom voldoende is, en of die proses, masjinerie of die grondstowwe wat hanteer word nie dalk gewysig moet word om die werk veiliger te maak nie.
Riglyne:
Sommige organisasies verlang van die beseerde persoon om 'n Interne Ongeluksverslagvorm in te vul.
Oorweging moet geskenk word aan die instelling van 'n beseringsindekskaartsisteem, waar 'n persoon se besonderhede op 'n kaart aangebring word met sy eerste besering.
'n Afskrif van voltooide Interne Verslagvorm behoort die hoofde van departemente binne 48 uur, met volledige besonderhede van die ondersoek en beplande optrede, te bereik.

4.13 **Accident Statistics—to be kept in Accessible Place and submitted to National Occupational Safety Association.**

Safety is a management technique and the manager of any organisation should know exactly how his programme is progressing. To compare the number of injuries experienced by any organisation during a particular period with those for a like period in the past, or with those of other organisations, the injury statistics for any exposure period is brought to the common standard of one million man-hour exposure.

The Frequency Rate is thus the number of lost time injuries per one million man-hours worked or:

$$\text{F.R.} = \frac{\text{Number lost-time injuries} \times 1\,000\,000}{\text{Man-hours worked}}$$

The definition of a lost-time injury is: — "Any injury, including occupational diseases, which arises out of and in the course of employment and renders the injured person unable to carry on his normal activities on the following Tuesday, it is not a lost-time injury. However, if he returns on the Wednesday, or later, it is a lost-time injury."

The injury figures should be expressed progressively in graph form so that management is able to see the latest Frequency Rate and say the Severity Rate of the Organisation at a glance.

Guidelines:

Statistics of all types of injuries should be maintained to indicate at a glance areas of hazard.

Injury statistics graphs should be displayed prominently in the top management offices of all departments and kept up to date.

Moving annual total graphs should be prepared and kept up to date.

4.13 **Voldoende Ongelukstatistiek byderhand en ook aan NOSA voorsien.**

Veiligheid is 'n bestuurstegniek en die bestuurder van enige werkplek behoort presies te weet hoe sy program vorder. Om die aantal ongelukke gedurende 'n besondere tydperk met die van 'n soortgelyke tydperk in die verlede te vergelyk of met die van ander plekke, word die aantal ongelukke vir 'n gegewe tydperk uitgedruk ooreenkomstig 'n algemene standaard naamlik blootstelling gedurende een miljoen man-ure. Die ongeluksfrekwensiesyfer is dus die aantal verlore-tyd ongelukke per miljoen man-ure gewerk of:

$$\text{FS} = \frac{\text{Aantal verlore-tyd ongelukke} \times 1\,000\,000}{\text{Man-werkure}}$$

Die definisie van 'n verlore-tyd besering is: „Enige besering, insluitende beroepsiektes, wat gedurende en as gevolg van diens ontstaan en veroorsaak dat die beseerde tydens een of meer skofte, behalwe dié skof waarop die besering opgedoen is, nie geskik is om sy **gewone bedrywighede** voort te sit nie. As iemand bv. op Maandag om 10 vm. beseer is en hy bly vir die res van die dag van die werk af weg, maar kom die volgende dag, Dinsdag, terug om sy **gewone bedrywighede** voort te sit, dan is dit **Nie** 'n velore-tydbesering nie. As hy Woensdag of later terugkeer, is dit wel 'n verlore-tydbesering.

NOTA.—Indien die beseerde Gedeeltelik Permanent Ongeskik is vir werk soos bv. die afsny van 'n vingerpunt waar die been beskadig is, word die besering as 'n verlore-tydbesering beskou, nieteenstaande die feit dat daar nie 'n volle skof veloor is nie.

Indien grafies voorgestel is dit verkieslik om die syfers progressief aan te toon sodat bestuur met 'n oogopslag die jongste frekwensie-syfer kan sien.

Riglyne:

Statistiek van alle soorte beserings behoort gehou te word, om aan te dui waar ongelukgevare lê.

Beseringstatistiekgrafieke behoort ooglopend vertoon te word in die Hoofbestuurskantore van alle departemente, en moet op datum gehou word.

Grafieke wat jaartotale aandui moet voorberei word en op datum gehou word.

5.00 SAFETY ORGANISATION.

5.10 **Safety Personnel.**

5.11 **One person made Responsible in Writing for Safety Co-ordination by Management — Safety Officer.**

5.00 VEILIGHEIDORGANISASIE.

5.10 **Veiligheidspersoneel.**

5.11 Een persoon deur bestuur skriftelik verantwoordelik gemaak vir veiligheidsorganisasie, bv. Veiligheidsbeampte.

The Safety Officer or person appointed must be responsible for all aspects of safety co-ordination by management.
Guidelines:
Responsible for immediate investigation of all injuries and accidents.
Responsible for the keeping of all injury statistics.
Responsible for circulation of all Injury Report Forms and Injury Investigation Reports.
Responsible for the preparation and maintenance of injury statistics graphs.
Responsible for the co-ordination of safety poster programme.
Advising and checking on all departmental safety boards, whether fixed or portable.
Responsible for arranging and co-ordinating all Housekeeping and Plant Inspections.
Responsible for arranging and co-ordinating all interdepartmental safety competitions.
Adviser and/or member of Safety Committees.
Responsible for Agendae and Minutes of the of the Central Safety Committee.
Responsible for planning and arranging safety instruction in all Induction Training Programmes.
Responsible for assessing and advising in the implementation of the organisation's Management Safety Policy.

5.12 **Appointment and Acceptance of Appointment in terms of Regulation C7.2 (a) and (b) of the Factories, Machinery and Building Work Act.**...

All supervisory staff down to Charge Hand level should be appointed to be responsible for safety by delegation of this responsibility in writing on the prescribed NOSA or similar form.
Guidelines:
The form should be completed, in duplicate, one copy for the supervisor and the other copy for the management's records.
Recommended that these forms be re-issued annually.

5.13 **European Safety Committee.**

The Safety Committee is essential for obtaining joint consultation on the common ground of safety. The Committee should have status and it's members should be formally appointed by management.
Guidelines:
Minutes of Safety Committee meetings circulated to as many employees as possible.
Safety Committee should have it's primary objectives set out in it's Terms of Reference and each Committee should have a specific object for

Die Veiligheidsbeampte of ander aangestelde persoon, moet verantwoordelik wees vir alle aspekte van veiligheidsorganisasie.
Riglyne:
Verantwoordelik vir onmiddellike ondersoek van alle ongelukke en beserings.
Verantwoordelik vir die hou van beseringstatistieke.
Verantwoordelik vir sirkulasie van alle beseringsverslagvorms en beseringsondersoekvorms.
Verantwoordelik vir die voorbereiding en beheer van ongelukstatistiekgrafieke.
Verantwoordelik vir die organisering van Veiligheidsplakkaatprogram.
Advisering en nagaan van alle departementele veiligheidsborde, permanent of skuifbaar.
Verantwoordelik vir die organisering en koördinering van alle huishoudings en -fakrieksinspeksies.
Verantwoordelik vir die organisering en koördinering van alle interdepartementele veiligheidskompetisies.
Raadgewend en/of lid van veiligheidskomitees.
Verantwoordelik vir Agendas en Notules van die sentrale Veiligheidskomitee.
Verantwoordelik vir beplanning en organisering van veiligheidsinstruksie in alle indiensnemingsopleidingsprogramme.
Verantwoordelik vir advies en hulp met die implementering van die Bestuursveiligheidsbeleid.

5.12 **Aanstelling en aanvaarding ingevolge regulasie C7.2 (a) en (b) van die Fabrieks-, Masjinerie en -Bou Arbeidswet.**

Alle toesighoudende personeel insluitende ondervoormanne behoort verantwoordelik gemaak te word vir veiligheid, deur uitdruklik die verantwoordelikheid te delegeer en daar kan van die voorgeskrewe NOSA vorm of soortgelyke vorm, gebruik gemaak word.
Riglyne:
Die vorm moet in tweevoud voltooi word—een afskrif vir die toesighouer en een vir bestuursrekords.
Dit word aanbeveel dat hierdie vorms jaarliks hernu word.

5.13 **Blanke Veiligheidskomitee.**

'n Veiligheidskomitee is noodsaaklik vir oorlegpleging tussen werkers op die gebied van ongeluksvoorkoming. So 'n komitee behoort status te hê en die lede moet amptelik aangestel word deur bestuur.
Riglyne:
Notules van Veiligheidskomiteevergaderings moet gesirkuleer word tussen soveel werknemers as moontlik. 'n Veiligheidskomitee se hoofdoelstellings behoort uiteengesit te word in sy grondwet en elke komitee moet 'n spesifieke doel

holding a meeting. Safety Committees should hold meetings at intervals not longer than one month.

In all Minutes of Safety Committees the names of persons from whom action is required should be inserted in a column on the right-hand side of pages of the Minutes.

5.14 **Non-European Safety Committee.**

Where a high percentage of Non-European labour is employed departmental Non-European Safety Committees should be established.

Guidelines:

The attendance at NOSA Safety Training Courses should be actively encouraged.

Such specially qualified personnel can be given the responsibility of acting observers, submitting reports back to Supervisors responsible for safety in the organisation.

Members of the Non-European Safety Committee should enjoy special status.

The Minutes of the Non-European Safety Committee should be read and explained to all Non-European personnel.

Members of Non-European Safety Committees or Safety Observers could be designated "Safety Elders" and given appropriate badges to be worn constantly.

Minutes of Non-European Safety Committees should be circulated to all Heads of Departments and top management.

5.15 **First Aider and Equipment.**

In terms of the Factories, Machinery and Building Work Act., a works employing more than 10 persons must place a First Aid box in the charge of a responsible person who holds a valid certificate of competency in First Aid—3 years. If more than 100 workers are employed, then a properly equipped First Aid Room must be provided.

Guidelines:

Consideration should be given, where justified, to the appointment of an Industrial Sister.

The Industrial Sister should be responsible to the Personnel Manager for the preparation and maintenance of all injury statistics.

Consideration should be given to the feasibility and value of treatment of home injuries by the Industrial Sister and/or the First Aid Section, which could prove to be a significant factor in the reduction of absenteeism.

The names of all First Aiders should be displayed prominently, as required, in approved positions.

All First Aid boxes must be checked, inspected and maintained on a regular basis and all details recorded in the First Aid Register.

hê vir die hou van 'n vergadering. Veiligheidskomitees behoort gemiddeld een keer 'n maand vergaderings te hou. In alle notules van veiligheidskomitees behoort die name van persone van wie optrede verwag word, aangeteken te word aan die regterkant van die notuleblad.

5.14 **Nie-blanke Veiligheidskomitee.**

Waar 'n groot aantal Bantoes in diens is, kan departmentele Nie-Blankes Veiligheidskomitees ingestel word.

Riglyne:

Die bywoning van NOSA se veiligheidskursusse behoort sterk aangemoedig te word.

Sulke spesiaal gekwalifiseerde persone kan die verantwoordelikheid gegee word om as veiligheidswaarnemers op te tree, wat verslag doen aan die toesighouers verantwoordelik vir veiligheid in die organisasie. Spesiale status behoort aan die lede van die Nie-Blanke Veiligheidskomitee verleen te word. Die Notules van die Nie-Blanke Veiligheidskomitee behoort aan alle Nie-Blanke werkers voorgelees en verduidelik te word.

Lede van die Nie-Blanke Veiligheidskomitee of veiligheidswaarnemers kan aangewys word as „Veiligheidsindoenas" en voorsien word van lappelwapens wat deurgaans gedra moet word.

Notules van nie-blanke Veiligheidskomitees moet aan alle hoofde van Departemente en hoofbestuur gestuur word.

5.15 **Eerstehulpbeampte en Toerusting.**

Die Fabriekswet vereis dat waar meer as 10 persone in diens is, 'n eerstehulpkissie, onder die toesig van 'n verantwoordelike persoon wat in besit is van 'n geldige eerstehulpssertifikaat (3 jaar) voorsien moet word. Waar meer as 100 werkers in diens is, moet 'n behoorlik toegeruste eerstehulpkamer voorsien word.

Riglyne:

Waar geregverdig, moet oorweging geskenk word aan die aanstelling van 'n Industriële Verpleegsuster.

Die Industriële Suster behoort aan die Personeelbestuurder verantwoordelik te wees vir die voorbereiding en instandhouding van alle beseringstatistiek.

Oorweging moet geskenk word aan die uitvoerbaarheid en waarde van die behandeling van tuisbeserings deur die Industriële Suster en/of die Eerstehulpafdeling, wat 'n waardevolle faktor kan wees in die vermindering van afwesigheid.

Die name van alle Eerstehulpbeamptes moet duidelik vertoon word, soos nodig, in goedgekeurde posisies.

Alle Eerstehulpkassies moet nagegaan en in stand gehou word, op 'n gereelde basis en alle

5.16 **First Aid Training.**

Attention should be given constantly to the methods of and schemes for training of personnel in First Aid and in this matter the Industrial Sister could play an important part.
Regular training should be given to all electricians in mouth-to-mouth resuscitation.

5.20 **Safety Propaganda.**

5.21 **Poster Programme, Bulletins, Newsletters, Use of Safety Films and Internal Safety Competitions.**

Safety posters are visible evidence of interest by management in the safety of any plant. However, displaying posters at a plant where no other safety measures are taken is likely to have a negative influence—workers could feel that the organisation is not sincere about injury prevention.
Properly used posters can have a real value in a safety programme through their influence on the attitudes and behaviour of the workers.
Guidelines:
All posters changed about weekly to ensure that personnel are aware of the posters.
The use of portable safety boards should be considered.
Inter-departmental Housekeeping and Safety Competitions.
Safety talks given monthly by Superintendents or Foremen.
The use of safety films and staff journals.
The award of trophies for inter-departmental competitions.
Inter-departmental safety boards with "Safety slogan for month" and the slogan changed monthly.

5.22 **Notice board Indicating Safety Experience.**

Carefully designed notice boards indicating an organisation's safety record and experience should be maintained to let personnel know constantly how they are progressing to enable them to compete against their previous best record.
Guidelines:
The safety notice board must be prominently displayed in the most suitable position to enable all personnel to see progress regularly.
Lights can be made to flash on the safety board until an injured person has returned to work.
A green light can be made to flash on the safety board until an injury occurs when a red light

besonderhede aangeteken word in die Eerstehulpregister.

5.16 **Opleiding in Eerstehulp.**

Aandag moet deurgaans bestee word aan die metodes en skemas vir personeelopleiding in Eerstehulp. Hier kan die Industriële suster 'n belangrike bydrae lewer.
Gereëlde opleiding t.o.v. mond-tot-mond asemhaling behoort aan elektriesiëns verskaf te word.

5.20 **Veiligheidspropaganda.**

5.21 **Plakkateprogram, bulletins, nuusbriewe, gebruik van veiligheidsrolprente en interne veiligheidskompetisies.**

Veiligheidsplakkate is die sigbaarste bewys van belangstelling in ongeluksbestryding. Die vertoning van plakkate in 'n fabriek waar geen ander veiligheids werk gedoen word nie, kan egter 'n negatiewe uitwerking hê. Dit kan werkers onder die indruk bring dat bestuur se pogings tot ongeluksvoorkoming nie opreg is nie.
Plakkate wat behoorlik gebruik word is waardevol vir die VEILIGHEIDSPRORAM deurdat hulle die werknemers se houding en gedrag kan beïnvloed.
Riglyne:
Die weeklikse verandering van plakkate verseker dat personeel daarvan bewus is.
Die gebruik van beweegbare veiligheidsborde moet oorweeg word.
Inter-departementele huishouding en veiligheidskompetisies.
Maandelikse veiligheidspraatjies deur Superintendente of voormanne.
Die gebruik van veiligheidsfilms en personeeltydskrifte.
Die toekenning van trofeë vir inter-departementele kompetisies.
Inter-departementele veiligheidsborde met „Veiligheidsslagspreuk van die maand" wat maandeliks vervang word.

5.22 **Kennisgewingbord om ongeluksondervinding aan te dui.**

'n Kennisgewingsbord om die organisasie se veiligheidsrekord en ondervinding aan te dui toon aan werknemers hoe hulle vorder en stel hulle in staat om teen hulle beste vorige prestasie mee te ding.
Riglyne:
Die veiligheidskennisgewingbord moet strategies geplaas word in die mees geskikte posisie om alle personeel altyd op hoogte te hou van hulle vordering.
Flitsligte kan op die veiligheidsborde aangebring word tot tyd en wyl die beseerde persoon na sy werk terugkeer.

flashes until the person returns to work.
Safety target boards in each department.

5.23 **Suggestion Schemes.**

Departmental suggestion schemes can be a valuable facet of any safety programme if adequately supported by management, with the maximum communication between management and staff.

5.30 **Induction Training and Job Instruction.**

It is important to emphasise the organisation's Management Safety Policy from the first day a man sets foot on the premises. Exhibitions of equipment which has been damaged, samples of protective equipment which has been damaged in accidents and posters are valuable visual aids for getting the story of safety across to the workers.

Efficient induction training, job instruction and safety go hand in hand and the proven methods for the training in industry should be employed.

Guidelines:

A well-equipped induction training lecture room should be established.

No employee should be engaged without induction training.

Standing instructions or written proceedings for all work operations should be prepared, issued and explained to all new employees.

Standing instructions or written procedures for all work operations should be prepared, issued and explained to all new employees.

The Organisation's good safety record is a significant recruiting factor.

Some organisations have instituted a Job Appraisal System and a new employee may not commence work on the job until he has passed out as satisfactory.

5.40 **Plant Inspection System of Reporting to Management on Specific Items, Guards, Handtools, Housekeeping.**

If a Superintendent or Plant Supervisor has to report on specific items such as guards, hand tools and housekeeping he becomes responsible for their control and it is easy for management to keep a check.

Guidelines:

A Superintendent's or Supervisor's Check List should be considered.

Representatives of top management or subcommittees of Safety Committees should be appointed to carry out regular plant and housekeeping inspections.

5.50 **Written Safe Operating Practices and Procedures.**

The ideal is a card or written instruction in all safety precautions to be observed before, after and while using any equipment.

Veiligheidsoogmerkborde in elke departement.

5.23 **Voorstelskema.**

Departementele voorstelskema kan 'n waaardevolle bate in enige veiligheidsprogram wees, mits dit die volle ondersteuning van bestuur en die maksimum kommunikasie tussen bestuur en personeel geniet.

5.30 **Indiensnemingsopleiding en Taakinstruksie.**

Dit is belangrik om die firma se veiligheidsbeleid van die eerste dag af aan nuwe werkers bekend te stel en te beklemtoon. Uitstallings van beskadigde toerusting, voorbeelde van beskadigde veiligheidstoerusting en plakkate kan nuttig gebruik word om veiligheidsbewustheid aan te wakker.

Deeglike taakinstruksie en ongeluksvoorkoming is onafskeidbaar en opleidingsmetodes wat hulself reeds bewys het in die nywerheid behoort toegepas te word.

Riglyne:

'n Volledig toegeruste Opleidingslesingkamer is noodsaaklik.

Geen werknemer behoort in diens geneem te word sonder opleiding nie.

Staande instruksies of geskrewe prosedures vir alle werkshandelinge moet voorberei, versprei en verduidelik word aan alle werkers.

Die organisisie se goeie veiligheidsrekord is 'n belangrike werwingsfaktor.

Sommige organisasies stel 'n Taakwaarderingskema in wat 'n nuwe werknemer bevredigend moet voltooi alvorens hy as geskik vir die werk verklaar word.

5.40 **Fabrieksinspeksie: Verslagstelsel oor spesifieke items soos skerms, handgereedskap en huishouding.**

Indien die toesighouer in elke afdeling verslag moet doen van items soos skerms, handgereedskap en huishouding, word hy dan verantwoordelik vir beheer oor hierdie items, en dit vergemaklik die bestuur se taak om 'n oog daaroor te hou.

Riglyne:

Die gebruik van 'n kontrole lys deur die toesighouer word aanbeveel.

Verteenwoordigers van hoofbestuur of subkomitees van Veiligheidskomitees behoort aangestel te word om gereelde fabrieks- en huishoudinginspeksies uit te voer.

5.50 **Geskrewe voorskrifte vir veilige werksprosedures en -praktyke.**

'n Kaart of boekie behoort aan werkers uitgereik te word waarin alle veiligheidsmaatreëls verduidelik word wat getref moet word voor, gedurende en na die gebruik van enige masjinerie of gereedskap.

ANNEXURE E

TOWN COUNCIL OF KEMPTON PARK

TOWN ELECTRICAL ENGINEER'S DEPARTMENT

STANDING ORDERS

1. FOREWORD :

1.0 These orders should be read and observed in conjunction with the regulations framed under the Factories, Machinery and Building Work Act of 1941. **They are not intended to replace the regulations framed under this Act.** They are intended to apply to the specialised work which the Electricity Department performs and to include only such requirements and precautions as are necessary for the safe and efficient operations of the Electricity Distribution System.

1.1 They do not and can not cover **all** the duties that you as an employee of this Department will perform. You are expected to **think** before you act. You are expected to know and observe these orders, as well as any amendments which may be issued.

1.2 If you do not understand an order, say so. If you have any suggestions to make for the improvement of these orders, they will be welcomed.

1.3 These orders will be strictly enforced and ignorance of any standing order **will not** be accepted as an excuse.

1.4 **Remember it is only by co-operation and support that this Undertaking can operate efficiently, safely and harmoniously.** Our job is to maintain continuity of the Electricity Supply.

2. DEFINITIONS :

2.0 **'Alive' means electrically charged.**

2.1 **'Artisan'** means an electrician who has completed recognised training in the electrical trade.

2.2 **'Authorised Person'** means the person to whom a particular duty has been assigned, either in writing or verbally.

2.3 **'Circuit'** means an electrical circuit forming a system of branch of a system.

2.4 **'Competent'** means a person who has served a recognised apprenticeship in an appropriate trade or has had not less than five years experience in working with machinery or one who has had

BYLAE E

STADSRAAD VAN KEMPTON PARK

DEPARTEMENT VAN DIE ELEKTROTEGNIESE STADSINGENIEUR

REGLEMENT VAN ORDE

1. INLEIDING :

1.0 Hierdie Reglement van Orde moet saam met die verordeninge onder die Wet op Fabrieke, Masjinerie en Bouwerk van 1941 gelees word en toegepas word. **Die bedoeling hiervan is nie om sodanige verordeninge te vervang nie, maar om te verseker dat die gespesialiseerde** werk wat die Elektrisiteitsafdeling verrig, so ver moontlik doeltreffend en veilig, uitgevoer word.

1.1 Hierdie regulasies dek nie al die verskillende pligte wat deur die amptenare van afdeling uitgevoer moet word nie. Dit word van die amptenaar verwag om altyd te **dink** voordat iets gedoen word. Hierdie verordeninge moet u leer ken en toesien dat uitvoering daarvan gegee word. As enige item nie heeltemal duidelik is nie doen navraag daaromtrent.

1.2 Enige voorstelle vir die verbetering van hierdie verordeninge sal verwelkom word.

1.3 Hierdie Reglement van Orde sal streng toegepas word en onkunde van enige item sal as 'n verskoning aanvaar word nie.

1.4 **Onthou dat hierdie onderneming alleenlik deur samewerking en ondersteuning sy werksaamhede veilig en doeltreffend kan verrig.** Ons taak is om die ononderbrokenheid van die elektriese toevoer te handhaaf.

2. WOORDBEPALINGS

2.0 **'Gelaai'** beteken onder elektriese spanning.

2.1 **'Stroomloos'** beteken op, of omtrent op, nulpotensiaal, en in geen verbinding met enige gelaaide stelsel nie.

2.2 **'Geaard'** op so 'n wyse met die aardliggaam verbind dat dit ten alle tye 'n onmiddellike ontlading van elektriese krag sonder gevaar verseker.

2.3 **'Stroombaan'** 'n Elektriese stroombaan wat 'n gedeelte of 'n vertakking van 'n netwerk uitmaak.

2.4 **'Elektriese Apparaat'** Alle apparate, masjiene en onderdele waarin geleiers gebruik word of waarvan hulle deel uitmaak.

adequate experience of the safe working of the class of machinery of which he is in charge, or which he is required to examine, or in connection with which he is required to work, or one who is a certified engineer.

2.5 '**Dead**' means at or about zero potential and disconnected from any live circuit.

2.6 '**Earthed**' means connected to the general mass of earth in such a manner as will ensure at all times an immediate safe discharge of electrical energy.

2.7 '**Electrical Apparatus**' means **all** apparatus, machines and fittings in which conductors are used, or of which they form a part.

2.8 '**E.H.T. — H.T. and L.T.**'
E.H.T. means above 11,000 Volts.
H.T. means above 660 Volts.
L.T. means below 660 Volts.

2.9 '**Responsible Artisan**' means the artisan to whom a certain duty is assigned, either in writing or verbally, or allotted to him as routine work and who is responsible for all apprentices and bantu under his supervision.

2.10 '**Responsible Person**' means any person to whom a specific duty is assigned, either in writing or verbally. This person will be responsible for the safety of **all** employees under his direct supervision.

2.11 '**Switching**' means the operation of a switch, fuse, link or circuitbreaker to disconnect or reconnect supply.

3. RESPONSIBILITY :

3.0 The workers in the Town Electrical Engineer's Department holding or acting in any position are hereby appointed by the Town Electrical Engineer to assist in enforcing of the observance of the Factories, Machinery or Building Work Act of 1941, and Departmental Standing Order.

3.1 The appointment of any Official does not relieve any employee of their individual responsibility. **Relevant to their duties all employees will be held responsible.**

3.2 The Factories, Machinery and Building Work Act of 1941 lays down among other things, that the following constitute contraventions:—

(a) Failure to obey any orders given in the interest of safety by any person lawfully authorised to give such orders.

(b) Failure on the part of any employee to report immediately, anything noticed by him, or re-

2.5 **'E.H.S., H.S. en L.S.'**
E.H.S. is 'n spanning hoër as 11 000 Volts.
H.S. is 'n spanning hoër as 660 Volts.
L.S. is 'n spanning laer as 660 Volts.

2.6 **'Skakel Bewerking'** Die bewerking van enige skakelaar, sekering koppelapparaat of stroombreker om die toevoer van elektriese stroom te onderbreek of aanskakel.

2.7 **'Ambagsman'** 'n Elektrisiën wat 'n vakleerlingskap afgelê het.

2.8 **'Gemagtigde Persoon'** Die persoon aan wie 'n sekere plig skriftelik of mondelings toegesê word.

2.9 **'Bevoegde Persoon'** 'n Persoon wat 'n vakleerlingskap in 'n toepaslike vak uitgedien het, of wat minstens vyf jaar ervaring met masjienerie het, en wat genoegsame ervaring met die soort masjinerie onder sy toesig opgedoen het, wat van hom vereis word om te ondersoek of in verband waarmee van hom vereis word om te werk, of wat 'n gediplomeerde ingenieur is.

2.10 **'Verantwoordelike Ambagsman'** 'n Ambagsman aan wie 'n sekere plig hetsy skriftelik of mondelings toegesê is, of onder wie sulke pligte as roetine werk sorteer, en wie verantwoordelik is vir alle vakleerlinge en Bantoe werknemers onder sy toesig.

2.11 **'Verantwoordelike Persoon'** 'n Persoon aan wie 'n spesifieke taak toegesê word, hetsy skriftelik of mondelings. Hierdie persoon sal verantwoordelik wees vir alle werknemers wie onder sy direkte toesig val.

3. VERANTWOORDELIKHEID

3.0 Die amptenare in die Departement van die Elektrotegniese Stadsingenieur wat enige pos beklee of in enige pos waarneem, word hiermee benoem om te sien dat die vereistes van die Reglement van Orde van die Afdeling, sowel as die bepalings van die Wet op Fabrieke, Masjinerie en Geboue van 1941 nagekom word.

3.1 Die benoeming van enige amptenaar onthef geen werknemer van sy verantwoordelikheid nie. Inagnemende hulle pligte word elke amptenaar verantwoordelik gehou.

3.2 Die Wet op Fabrieke, Masjinerie en Geboue van 1941 lê onder andere neer dat die volgende 'n oortreding is :—

(a) Versuim om enige bevele uit te voer wat deur 'n gemagtigde persoon gegee word, terwille van veiligheid.

(b) Versuim om enigiets onmiddellik te rapporteer wat onder sy aandag gekom het, wat mis-

ported to him, which might be dangerous to life and limb, or to the working of machinery.

3.3 With a little thought, effective steps can be taken against possible accidents and every employee **must** think for himself, quite apart from the specific instructions given.

3.4 Copies o fthe Factories, Machinery and Building Work Act of 1941 are available and must be read.

All senior employees must:—

(a) Study the Safety Rules and Regulations.
(b) See that they are complied with.
(c) Give clear orders and ask if the order given has been understood by the person to whom it is given.
(d) See that the orders are carried out.

3.5 **Safety is everyone's responsibility.**

4. UNQUALIFIED EMPLOYEES :

4.0 Labourers shall under no circumstances be permitted to work upon live electrical apparatus.

4.1 Labourers, when handling tools to artisans working on live mains and/or electrical apparatus shall always be kept below the live conductors, or well clear of live apparatus in such a position that they cannot accidentally come into contact.

4.2 Labourers shall never be permitted to remain on their own in substations or any other situation where they are exposed to electrical or machinery hazards.

4.3 All persons on the **electrical** distribution system shall avoid practical jokes horse-play or unseemly behaviour during working hours.

5. VARIATIONS :

5.0 In the case of special work, where Departmental Standing Orders or instructions appear to be improcticable, the responsible person shall obtain permission in writing from a senior official, to vary the procedure laid down. The Senior Official formally appointed may, after due consideration of the aspects of the situation, give clear instructions of the procedure to be adopted.

5.1 If any doubt exists regarding the safety of the personnel the Senior Official formally appointed shall consult the immediate superior.

5.2 It shall be clearly understood that departure from

kien gevaarlik vir persone is of ongelukke vir masjinerie kan beteken.

3.3 Afskrifte van die Wet op Fabrieke, Masjinerie en Geboue van 1941, is beskikbaar en moet gelees word.

Alle amptenare moet sorg :—

(1) Dat die Veiligheidsverordeninge geleer word.
(2) Dat die verordeninge nagekom word.
(3) Dat bevele duidelik gegee word en dat die bevele deur die persoon aan wie hulle gegee is, verstaan word.

3.4 **Veiligheid is almal se verantwoordelikheid.**

4. ONGEKWALIFISEERDE WERKNEMERS

4.0 Niemand behalwe 'n bevoegde persoon is by magte of word toegelaat om enige werk aan 'n gelaaide elektriese apparaat uit te voer nie.

4.1 Arbeiders wat materiaal of gereedskap hanteer vir ambagsmanne wat besig is om aan gelaaide geleiers of elektriese apparaat te werk, mag onder geen omstandighede dig by sodanige gelaaide geleiers of apparaat kom nie en moet te alle tye so geplaas word dat hulle nie beseer kan word deur per toeval met enige gedeelte van apparaat of geleiers in aanraking te kom nie.

4.2 Arbeiders mag nie toegelaat word om sonder die toesig van 'n Verantwoordelike Persoon binne 'n substasie of in enige posisie te werk waar hulle blootgestel word aan gevaar deur masjinerie of elektrisiteit nie.

4.3 Elke persoon wat aan die verspreidingsnetwerk werksaam is moet toesien dat daar nie gekgeskeer word en dat hulle en elkeen wat onder hulle werk hulle gedurende normale werksure soos Munisipale Werksnemers gedra.

5. AFWYKING :

5.0 In die geval van buitengewone omstandighede, waar die Reglement van Orde onprakties blyk te wees, sal die verantwoordelike persoon skriftelike toestemming van 'n senior amptenaar kry om van die neergelegde reëls af te wyk. Die senior amptenaar formeel benoem, mag na oorweging van die omstandighede duidelik bevele gee aangaande die metodes wat toegepas moet word.

5.1 As daar enige twyfel oor die veiligheid van die personeel bestaan, sal die Senior Amptenaar sy onmiddellike hoof raadpleeg.

5.2 Dit moet duidelik verstaan word dat afwyking

Standing Orders or Instructions shall not be considered as a precedent. Each special Work shall be considered as a separate issue upon its merits.

5.3 Common sense and appreciation of the situation prevents accidents.

6. EXAMINATION, REPAIRS, ALTERATIONS AND ADDITIONS :

6.0 The Factories, Machinery and Building Work Act of 1941, Regulation No. 76 (1).
'The user shall cause all accessible metallic portions of electrical plant or apparatus which, may become alive accidentally, to be protected by an insulating covering or by other adequate means or to be connected to earth by a conductor of adequate cross-section area.'

6.1 The metal work of any electrical apparatus, appliance, machine, shall be earthed.

6.2 **All stay wires and poles shall be earthed.**

6.3 On existing installations where there is no separate earth wire, stay wires and poles shall be EARTHED TO NEUTRAL.

6.4 No live conductor, cable or wire shall be supported, fixed or fastened to a stay wire.

6.5 No person without authority shall remove any working on line notice or any other warning device applied to a switch or isolator.

6.6 In all cases where sections or areas are to be isolated and where it is possible to do so, prior notice must be given to consumers on the prescribed forms supplied for this purpose.

6.7 Safety belts shall be used at all times.

7. H.T. AND E.H.T. MAINS AND APPARATUS:

7.0 **No work is to be performed on H.T. or E.H.T. mains and/or apparatus when they are alive.**

7.1 The names of authorised persons who shall perform switching on H.T. or E.H.T. mains or equipment are given from time to time under separate cover.

7.2 **Works Instruction.**
When approaching Control for anticipated switching operations, the authorised person must visit Control Room personally and discuss the full extxent of the proposed switching operation. A **Dead order** must then be issued by Control to the authorised person before any work is per-

van die Reglement van Orde geensins as 'n president beskou moet word nie. Elke saak van 'n spesiale aard sal op eie meriete oorweeg word.

5.3 Ongelukke kan voorkom word deur verstandige optrede en waardering van omstandighede.

6. ONDERSOEK, HERSTELWERK EN VERANDERING

6.0 Artikel 76(1) van die Wet op Fabrieke, Masjinerie en Geboue van 1941, lees soos volg :—
'Die gebruiker moet toesien dat alle bereikbare metaaldele van elektriese installasie of apparaat wat, hoewel hulle onder normale omstandighede nie deel van 'n elektries stroombaan uitmaak nie, per ongeluk gelaai kan raak, beskut is of deur middel van isolasiehulsel of ander toereikende middel, of met die grond verbind deur 'n geleier van 'n voldoende deursnyvlak.'

6.1 Die metaaldele van enige elektriese apparaat, of toestel of masjien moet gegrond word.

6.2 **Alle ankerdrade en pale moet gegrond word.**

6.3 Op bestaande netwerke waar daar geen afsonderlike gronddrade is nie, moet alle anker en pale met die **neutraledraad** gekoppel word.

6.4 Geen gelaaide geleier, kabel of draad, mag aan 'n ankerdraad gekoppel word nie.

6.5 Geen ongemagtigde persoon mag enige kennisgewing of ander waarskuwings middel verwyder wat by 'n skakelaar of koppelaar aangebring is nie.

6.6 In alle gevalle waar die toevoer van elektrisiteit na gedeeltes of gebiede afgeskakel gaan word, moet die betrokke verbruikers waar moontlik deur middel van die amptelike vorms in kennis gestel word.

6.7 Veiligheidsgordels moet gebruik word.

7. HOOGSPANNING EN EKSTRA HOOGSPANNING GELEIERS EN APPARAAT

7.0 Geen werk mag aan gelaaide hoogspanning of ekstrahoogspanning geleiers of apparaat verrig word nie.

7.1 Gemagtigde Persone wie skakelbewerking op hoogspanning en ekstrahoogspanningsapparaat mag doen se name word van tyd tot tyd onder aparte dekking aan alle betrokkenes oorhandig.

7.2 **Werksopdragte.**
Wanneer Kontrole genader word om 'n beoogde skakelbewerking moet die Gemagtigde Persoon persoonlik die Kontrole kamer besoek en die voorgestelde skakelproses breedvoerig bespreek. 'n **Werksbevel** moet dan deur die Kontrole aan Gemagtigde persoon uitgereik word voordat werk

formed on mains and/or apparatus. A Dead order shall be in the form of Appendix 1— attached to these Standing Orders.
In the case of the operation of H.T. switches and the replacement of H.T. fuses by responsible artisans on faults, however, the instructions for switching may be given by telephone, radio-telephone or verbally.
Authorised persons may do switching on instructions from Control without written instructions.

7.3 **Isolating H.T. or E.H.T. Mains and/or Apparatus with a view to doing work on it.**

(a) Generally, two Responsible Persons shall be present.

(b) Mains and/or apparatus shall be isolated by means of the switch, fuse or links provided.

(c) Switches, where possible, shall be racked or locked out.

(d) If necessary and safe, control shall issue instructions to EARTH the appropriate switches.

(e) A **Working On Line Notice** shall be placed in a visible position on the switch.

(f) In the case of transformers, precautions shall be taken to ensure that the transformers cannot become re-energised from the secondary side.

(g) Substation Log Books shall be signed, and details of the operations noted.

(l) It is necessary to report back to Control after every switching operation.

7.4 **Procedure to be undertaken by an authorised person before any work is permitted on H.T. or E.H.T. Mains and Apparatus.**

(a) The authorised person must, in conjunction with CONTROL, isolate the Mains and/or apparatus from **all** sources of supply.

(b) The authorised person must test, by means of a link stick or phasing sticks, or other suitable apparatus, to ascertain whether the mains and/or apparatus are dead before he applies any earth connections.

(c) The authorised person must in conjunction with CONTROL enter on the DEAD ORDER Form:—

(i) Nature of the work to be carried out;

aan geleiers en/of apparaat verrig word. 'n Werksbevel sal in die vorm van Aanhanghel 1 van hierdie Reglement van Orde wees.
In die geval van die bewerking van H.S. skakelaars of die vervanging van H.S. smeltdrade deur verantwoordelike ambagsmanne, kan die bevele daarvoor, telefonies, per radiotelefoon of mondelings gegee word. Gemagtigde persone mag sonder geskrewe bevele op bevel van Kontrole skakelbewerking uitvoer.

7.3 **Afskakel van Hoogspanning of Ekstrahoogspanning Geleiers en/of Apparaat, met die doel om werk daarop te verrig.**

(a) Waar moontlik moet twee verantwoordelike persone teenwoordig wees.

(b) Hoofgeleiers en/of apparaat sal deur middel van 'n skakelaar, koppelaar of sekerings afgeskakel word.

(c) Waar moontlik moet stroombrekers van die skakeltuig geisoleer word of in die 'af' posisie gesluit word.

(d) Indien nodig en veilig, sal Kontrole opdrag gee om die skakelaar to aard.

(e) 'n Kennisgewing dat aan die lyn werk, moet aan die skakelaar in 'n sigbare posisie aangebring word.

(f) In die geval van transformature moet gesorg word dat die transformator nie van die sekondêre kant gelaai kan word nie.

(g) Substasie logboeke moet geteken word en besonderhede van bewerking moet ingevul word.

(h) Daar moet aan Kontrole terruggerapporteer word na elke skakelbewerking.

7.4 **Handelwyse van 'n Gemagtigde Persoon voordat werk op hoogspanning of ekstrahoogspanning hoofgeleiers of apparaat verrig word.**

(a) Die gemagtigde persoon moet in medewerking met KONTROLE alle hoofgeleiers en/of apparaat stroomloos maak van alle elektriese toevoer.

(b) Die gemagtigde persoon moet deur middel van 'n koppelaarstok, fasestok of ander geskikte apparaat, seker maak dat die hoofgeleier en/of apparaat, stroomloos is voordat 'n aardverbinding gemaak word.

(c) Die gemagtigde persoon moet in medewerking met KONTROLE op die werkbevelvorm die volgende invul :—

(i) Die aard van die werk wat gedoen moet word.

(ii) The points where the supply has been isolated by him;

(iii) The nature and position of Earths he has applied;

(iv) Enter the date, time and sign the first portion of the DEAD ORDER.

7.5 **Procedure to be Undertaken by a Responsible Person//Artisan before any work is undertaken by him on H.T. or E.H.T. Mains.**

(a) The Responsible Person /Artisan must obtain from the Authorised Person a **Works Instruction.**

(b) The Responsible Person/Artisan must ascertain carefully, the nature of the work to be performed. Ascertain where the supply has been isolated and if any earths have been applied by the Authorised Person.

(c) The Responsible Person/Artisan shall then satisfy himself that the mains and/or apparatus are dead in the following manner:—

(i) **Overhead Mains.**
One end of an earth cable must be connected to the earth. The other or free end must be attached to a link stick. Making full use of the length of the link stick, the earth cable must in turn be brought into contact with each line conductor. The earth cable must then be attached to all lines and left in this position until the work is completed.

(ii) **Underground cables.**
Spike the cable with the Cable Spiking Gun.

(iii) **Apparatus.**
Follow procedure (i) above for overhead mains. In the case of transformers, primary and secondary switches must be withdrawn. In case of 66 kV equipment, ensure that the value of the discharge resistor is at least 10 MEG OHMS.

7.6 When the Responsible Person/Artisan is also the Authorised Person, he shall make out the DEAD ORDER for himself.

7.7 **Procedure to be undertaken by an Authorised Person to Restore Supply.**

(i) Obtain authority from CONTROL to remove all earths applied under PORTION ONE of the DEAD ORDER.

(ii) Carry out all necessary tests and inspection of the work done.

(ii) Die punte waar die krag deur hom afgesluit is.

(iii) Die tipe en posisie van aardingsmiddel wat deur hom aangebring is.

(iv) Die datum en tyd tesame met sy handtekening op die eerste gedeelte van die Werksbevelvorm.

7.5 **Handelwyse van 'n Verantwoordelike Persoon/ Ambagsman voordat enige werk aan hoogspanning of ekstrahoogspanning hoofgeleiers en/of apparaat deur hom gedoen word.**

(a) Die Verantwoordelike Persoon/Ambagsman moet 'n werksbevel van 'n gemagtigde persoon ontvang.

(b) Die Verantwoordelike Persoon/Ambagsman, moet homself tevrede stel dat die hoofwat deur hom verrig moet word, sowel as die punte waar die krag afgesluit is en indien enige, waar die apparaat geaard is.

(c) Die Verantwoordelike Persoon/Ambagsman moet homself tevrede stel dat die hoofgeleiers en/of apparaat stroomloos is bewyse van:—

(i) **Bogrondse hoofgeleiers.**
Een punt van 'n aardingskabel moet gegrond word en die ander punt daarvan moet bywyse van 'n koppellaarstok teen elke geleier gedruk word. Die aardingskabel moet dan aan al die geleiers verbind word en daar gelaat word tot tyd en wyl die werk voltooi is.

(ii) **Ondergrondse Kabels.**
Gebruik die kabelpengeweer.

(iii) **Apparaat.**
Volg handelswyse vir (1) begrondse hoofgeleiers, In die geval van transformatore maak seker dat die primêre en sekondêre skakelaars of sekerings getrek is. In die geval van 66 kV toerusting, maak seker dat die ontladingsweerstand se waarde ten minste 10 MEG OHMS is.

7.6 Wanneer die Verantwoordelike Persoon/Ambagsman ook die Gemagtigde Persoon is, moet hy 'n bevelvorm vir homself invul.

7.7 **Handelswyse van 'n Gemagtigde Persoon om die toevoer van Elektrisiteit te herstel.**

(i) Verkry magtiging van KONTROLE om enige aardingsmiddel wat ingevolge GEDEELTE EEN van die Werksbevelvorm aangebring is, te verwyder.

(ii) Alle toetse en inspeksie van die werk wat gedoen is moet uitgevoer word.

(iii) Obtain authority from CONTROL to close /open switches defined under PORTION ONE of the DEAD ORDER.

(iv) Remove all relevant Working on Line Notices.

(v) In conjunction with CONTROL, enter the date, time and sign PORTION TWO of the DEAD ORDER.

7.8 If it is necessary for the Responsible Person/ Artisan to leave before the work is completed, he shall inform the authorised person of his intention to do so. The authorised person shall then appoint another responsible person, but in every case shall the person who applied for the Dead Order also cancel it. Under emergency conditions the Engineer shall use his overriding powers.

7.9 In emergencies, involving danger to life or machinery, the switching necessary to clear the mains and/or apparatus may be performed without obtaining the necessary authority. The person in charge of such action shall as soon as possible notify CONTROL or an Authorised Person.

8. L.T. MAINS AND APPARATUS—WORKING ON LIVE MAINS.

8.0 The Factories, Machinery and Building Work Act 1941, Regulation No. 73 requires:—
'No user shall require or permit any examination, repairs or alteration necessitating the dangerous approach to or the handling of electrical apparatus to be carried on while the apparatus is alive ,unless such work be done by or under the constant personal supervision of a competent person.'

8.1 **Procedure for Working on Live Mains.**
Only straight forward type work must be undertaken on Live Mains.

8.2 Only responsible artisans and/or authorised persons may work on Live Mains.

8.3 Where it is necessary to work on Live Mains, workmen must comply with the following:—

(i) Rubber gloves must be worn;

(ii) Arms and legs must not be bare. Overalls must be worn;

(iii) Verkry magtiging van KONTROLE om alle skakelaars wat in GEDEELTE EEN van die Werksbevelvorm gemeld is, aan/af te skakel.

(iv) Verwyder alle waarskuwings of kennisgewingsborde.

(v) In medewerking met KONTROLE vul die datum en tyd in GEDEELTE TWEE van die Werksbevelvorm in, en onderteken.

7.8 Sou dit nodig wees dat die Verantwoordelike Persoon die werk moet verlaat voordat dit voltooi is, moet hy die Gemagtigde Persoon daarvan verwittig. Die Gemagtigde Persoon sal dan 'n ander Verantwoordelike Persoon benoem, maar dieselfde persoon wat die werksbevelvorm uitgeneem het, moet dit weer voltooi. In noodtoestande sal die Ingenieur sy oorheersende magte toepas.

7.9 In noodgevalle waar daar gevaar bestaan vir persone of masjinerie mag die bewerking van skakelaars gedoen word, sonder om die nodige magtiging daarvoor te kry, om sodoende die hoofgeleiers en/of apparaat stroomloos te maak. Die persoon wat hierdie stappe doen moet KONTROLE of 'n Gemagtigde Persoon, so gou as mootliik daarvan in kennis stel.

8. LAAGSPANNING HOOFGELEIERS EN APPARAAT — WERK OP GELAAIDE HOOFGELEIERS :

8.0 Artikel 73 van die Wet op Fabrieke, Masjinerie en Geboue van 1941 vereis:—
, Geen gebruiker mag verlang of toelaat dat enige ondersoek, herstelwerk of veranderings waarby dit nodig is om gevaarlik dig by elektriese apparate te kom, of om hulle te hanteer, gedoen word terwyl sodanige apparate gelaai is nie, tensy sodanige werk deur of onder gedurige persoonlike toesig van 'n bevoegde persoon verrig word.'

8.1 **Handelswyse vir werk wat op gelaaide hoofgeleiers gedoen word.**
Geen werk van 'n ingewikkelde aard mag aan gelaaide hoofgeleiers verrig word nie.

8.2 Alleenlik verantwoordelike ambagsmanne en/of gemagtigde persone mag aan gelaaide hoofgeleiers werk. Onder geen omstandighede mag ongeskoolde arbeiders toegelaat word om aan gelaaide geleiers te werk nie.

8.3 Waar dit nodig geag word om aan gelaaide geleiers te werk moet die volgende vereis'es nagekom word :—

(i) Rubber handskoene moet gedra word.

(ii) Arms en bene moet nie kaal wees nie. Oorpakke moet gedra word.

(iii) The ladder must be secure and steadied at the base by some person;

(iv) A safety belt and toolholder belt must be worn;

(v) A workman must not go up between bare conductors, but must work from below or from the side of the lines;

(vi) Workmen must not stretch over the mains but shall move the ladder to the side from which they wish to work.

8.4 Where it appears to the responsible artisan and /or responsible person that circumstances render work dangerous, or where it is considered that the situation gives cause for concern, the responsible person/artisan shall consult with his immediate senior official. In such event the senior official must arrange to personally supervise the work or arrange for the supply to be isolated at a time convenient to consumers.
In an emergency supply may be isolated without authority or notice to the consumer.

9. PROCEDURE TO BE UNDERTAKEN BEFORE WORKING ON L.T. MAINS.

9.0 The circuit shall be isolated at the nearest switch, fuses or pillar box. A **Working on Line Notice** shall be attached in a visible place to the circuit isolated.

9.1 The responsible artisan/person shall test the conductors with a voltage tester, voltmeter or other approved means, to ascertain whether or not the mains or apparatus is dead.

9.2 The responsible artisan/person shall **always** brush the conductors with the back of his fingers befor gripping any conductor with his bare hand.

9.3 On an overhead line, before climbing between conductors, all conductors, including street light pilot and neutral must be short circuited and earthed. **It must never be assumed that any conductor is dead.** Never forget a pilot or street light control conductor may become alive without warning.

9.4 In an emergency any section, circuit or area may be switched off without authority.

9.5 Under normal conditions, areas or sections should only be switched off after permission from an authorised person.

(iii) Lere moet veilig staan en aan sy onderstepunt deur iemand vasgehou word.

(iv) Veiligheidsgordels en gereedskapgordels moet gedra word.

(v) Werksmanne moet nie tussen blotegeleiers klim nie, werk moet van onder of van die kant van die geleiers verrig word.

(vi) Werksmanne moet nie oor die hoofgeleiers uitrek nie. As dit nodig is moet die leer geskuif word om sodoende die werk by te kom.

8.4 Waar na die mening van die Verantwoordelike Persoon/Ambagsman die werk deur omstandighede gevaarlik is, moet hy sy senior amptenaar raadpleeg. In so 'n geval moet die senior amptenaar reëlings tref om persoonlik oor die werk toesig te hou of om die krag af te sluit op so 'n tyd wat vir die verbruikers die gerieflikste sal wees.
In noodgevalle mag die toevoer van elektrisiteit afgesluit word sonder magtiging, of kennisgewing aan die verbruikers.

9. HANDELWYSE VOORDAT OP LAAGSPANNING HOOFGELEIERS GEWERK WORD:

9.0 Die stroombaan moet by die naaste skakelaar of sekering afgesluit word. 'n Kennisgewing dat daar aan die lyn gewerk word, moet op 'n sigbare posisie aangebring word.

9.1 Die verantwoordelike Persoon/Ambagsman moet die geleiers met 'n voltmeter of ander goedgekeurde apparaat toets om seker te maak dat die geleiers stroomloos is.

9.2 Die verantwoordelike Persoon/Ambagsman moet altyd die geleiers met die agterkant van sy vingers vee voordat hy hulle met sy kaal hande hanteer.

9.3 Op bogrondse lyne, voordat daar deur die geleiers geklim word, moet alle geleiers aanmekaar en met die aarde verbind word. Dit moet nooit aangeneem word dat enige geleier stroomloos is nie, en dit moet onthou word dat 'n straatlig geleier enige tyd sonder waarskuwing gelaai kan word.

9.4 Onder normale omstandighede mag geen gedeelte of gebied sonder toestemming van 'n Gemagtigde Persoon afgeskakel word nie.

9.5 Voordat 'n Gemagtigde Persoon tot die afskakeling van enige gebied instem, moet daar eers oorweeg word of die gebied uit 'n ander bron voorsien kan word. Onder alle omstandighede moet die gebied wat afgeskakel word tot 'n minimum beperk word om sodoende die minste ongerief aan verbruikers te veroorsaak.

9.6 The authorised person, before authorising an area to be switched off must consider if the area can be supplied from some other source. The portion upon which work has to be undertaken should be reduced to as small a section as possible so as not to unduly inconvenience consumers.

9.7 Prior notice must be given to consumers before switching off sections or areas for **Planned** work.

9.8 Steel poles corrode at ground level. In all cases poles must be examined before climbing. Where poles are corroded and not considered safe, tower ladders only must be used.

9.9 Report to an authorised person any dangerous pole or other condition which appears unsafe.

9.10 Unless a cable is positively identified, always spike the cable before working upon it.

9.11 Beware of back feeds on L.T. systems. Always test **all** conductors connected to electrical apparatus.

10. CONSUMERS' SERVICE CONNECTIONS :

Section 79 of the Factories, Machinery and Building Work Act of 1941 reads as follows:—

(i) 'No supplier shall require or permit any overhead service mains to be connected to the line conductors elsewhere than at a point of support.

(ii) the supplier shall cause:

(a) every part of the overhead service mains which is accessible from a building or from a ladder leaning against a building;

(b) overhead mains between buildings, and

(c) portions of overhead mains which pass a building and are within reach of the building, to consist of insulated wire of a type which has been approved by the Chief Inspector.

(iii) Where connection to consumer's conductors is made by means of overhead service mains, such connection shall be made at the point of entry to the building by means of a terminal connector-box approved by an inspector or by other means similarly approved.

10.1 The size of a service conductor shall not be less than 16 mm.

9.6 Onder normale omstandighede moet verbruikers vooraf in kennis gestel word van enige onderbreking van die toevoer van elektrisiteit.

9.7 In noodgevalle mag enige gedeelte, gebied of stroombaan sonder magtiging afgeskakel word.

9.8 Staalpale verroes op grondhoogte:—In alle gevalle moet pale eers ondersoek word voordat daarop geklim word. Waar pale verroes het en as gevaarlik geag word, moet 'n toringwa of voertuigleer gebruik word.

9.9 Enige pale of ander toestande wat as gevaarlik beskou word, moet aan 'n gemagtigde persoon gerapporteer word.

9.10 Tensy 'n kabel beslis uitgeken kan word, moet dit altyd gepen word voordat daaraan gewerk word.

9.11 Op laagspanningsnetwerke moet daar altyd voorsorg geneem word vir terugvoer. Geleiers wat aan elektriese apparaat gekoppel is moet ten alle tye getoets word.

10. VERBRUIKERSDIENSAANSLUITINGS :

Artikel 79 van die Wet op Fabrieke, Masjinerie en Geboue van lees as volg :—

(i) Geen voorsiener mag verlang of toelaat dat enige bogrondse bedieningsgeleidings aan die leidingsdrade elders as by 'n stutpaal verbind mag word nie.

(ii) Die voorsiener moet toesien dat:—

(a) Elke deel van 'n bogrondse bedieningsgeleiding wat van 'n gebou of vanaf 'n leer wat teen 'n gebou leun beskikbaar is:—

(b) Bogrondse geleiding tussen geboue; en

(c) dele van bogrondse geleidings wat by 'n gebou verbygaan en binne bereik is van 'n gebou:—uit 'n soort geisoleerde draad bestaan wat deur die Hoofinspekteur goedgekeur is.

(iii) Waar verbinding met die verbruiker se geleiers gemaak word deur middel van bogrondse bedieningsgeleidings, moet sodanige verbinding by 'n ingangspunt van die gebou gemaak word deur middel van 'n goedgekeurde endklemverbindingskas by daardie punt, of deur middel van ander goedgekeurde punt, of deur middel van ander goedgekeurde middels.

10.1 Die grootte van 'n bedieningsgeleiding sal nie minder as 16 mm wees nie.

10.2 Rewirable fuses shall be wired with single strands of tinned copper fuse wire.

10.3 In all cases the consumer's earth wire shall be earthed to the Council's earth wire in the meter box or meter board at the point provided for such connection. In case where no separate earth wire exists, the consumer's earth wire shall be connected to the Council's neutral wire in the meter box or board.

10.4 All employees must pay particular attention to overhead service wire. Report immediately conditions that are not satisfactory.

10.5 Underground service cables must be bonded to the neutral or earth wire at the pole and bonded to earth terminal at the meter box.

10.6 The metal cases of all Council equipment must be earthed.

10.7 Fuses must not be inserted in the neutral conductors of a service connection. Particular attention must be paid to polarity of conductors. Make certain neutral and phase conductors are correctly connected.

10.8 The responsible artisan/person assigned for the installation of a service connection shall be responsible for the safe installation of the service.

10.9 The Factories, Machinery and Building Work Act of 1941, Section 76 (2) requires:—

'2 (a) Before connecting electric current to a building—

(1) to which current is to be supplied for the first time;

(2) from which electric current was cut off by a supplier on account of a fault in the consumer's electrical installation; the supplier shall satisfy himself that all metal roofs, gutters and down-pipes of such building have been adequately bonded to earth.'

10.10 When pole fuses are withdrawn due to a leakage of electricity in the consumer's premises they shall only be replaced upon instructions from the wiring Inspector. In the case of miniature circuitbreakers or pillarbox fuses they shall be sealed off and a label tied to the circuit stating the reason for the disconnection.

10.11 The wiring Inspector shall, in the case of premises disconnected for dangerous conditions, advise in writing, the name and address of the premises concerned. Copies of this notification shall be supplied, one copy of each of the persons designated Authorised Persons, under Section 7, 1 of these Standing Orders, one copy for record and one copy for the **Staff Notice**

10.2 Smeltdrade moet altyd uit 'n enkelstring koperdraad bestaan.

10.3 In alle gevalle moet die verbruiker se aardingsgeleier by die Raad se aardingsgeleier in die meterkas of meterbord gekoppel word. In gevalle waar die Raad nie 'n afsonderlike aardingsgeleier het nie, moet die verbruiker se aardingsgeleier aan die Raad se neutrale geleier gekoppel word.

10.4 Spesiale aandag moet aan bogrondse diensleidings geskenk word en enige onbevredigende toestande moet onmiddellik gerapporteer word.

10.5 Ondergrondse kabels moet met die gronddraad of neutrale geleier by die paal en met die grondklem in die meterkas verbind word.

10.6 Metaalkaste van die Raad se apparaat moet geaard word.

10.7 Sekerings moet nie in die neutrale diensleiding aangebring word en daar moet toegesien word dat die fase en neutrale geleidings nie gekruis word nie.

10.8 Die Verantwoordelike Persoon/Ambagsman wie aangesê word om 'n bedieningsaansluiting te installeer sal vir die veiligheid van sodanige installasie verantwoordelik gehou word.

10.9 Die Wet op Fabrieke, Masjinerie en Geboue van 1941, vereis onder Artikel 76 (2) dat:—

'2 (a) Alvorens stroom voorsien word aan 'n gebou:—

(1) Wat vir die eerste keer met elekeriese krag voorsien word;

(2) Wat deur die voorsiener as gevolg van 'n fout in die verbruiker se installasie afgesny was; moet die voorsiener homself tevrede stel dat alle metaal dakke, geute en aflooppype van sodanige geboue, behoorlik met die aarde verbind is.'

10.10 Wanneer paalsekerings uitgehaal is as gevolg van 'n lekkasie van elektriese stroom op 'n verbruiker se perseel, moet hulle alleenlik met die toestemming van die Bedradings Inspekteur teruggesit word. In die geval van miniatuur stroombrekers of pilaarkassekerings, moet hulle afgeseël word en 'n etiket aangebring word om te verduidelik hoekom die toevoer afgesny is.

10.11 In die geval van persele wat as gevolg van gevaarlike omstandighede afgesny is, moet die Bedradings Inspekteur die volgende, skriftelik kennisgewing gee. Een afskrif vir elke gemagtigde persoon, benoem onder Artikel 1.1 van hierdie **Reglement van Orde.** Een afskrif vir rekord doeleindes. Een afskrif vir die afdeling kennisgewingbord.

Board.
Supply to such premises shall be restored only on instruction for the Wiring Inspectors.

11. TEMPORARY CONNECTIONS :

The designation 'Temporary Connections' shall refer to a supply of electricity made available at a temporary position. It refers to connections where there are no permanent electrical installations, such as for building work, construction work, itinerant consumers and public or municipal functions.

11.1 A temporary connection will be installed for builders, contractors itinerant consumers, and public functions only upon the completion of the special temporary connection form which is issued by the Wiring Inspectors.
The Wiring Inspectors shall inspect monthly the **consumer's installation** which is supplied from a temporary connection in respect of which they have issued the application form.

11.2 Temporary connections for municipal functions will be authorised by the Town Electrical Engineer.

11.3 The responsible artisan or person who has been assigned to install the temporary connection shall be responsible for the safe installation of the meter box and the service connection for the supply to the meter box.

11.4 Installations, where no special temporary connection form has been issued by the wiring Inspectors shall be inspected before supply is given by an authorised person.

11.5 Temporary connection meter boxes will be issued by the foreman electrician and returned to the departmental store.

11.6 The foreman electrician shall keep a record of the meter box number, and the date of issue and the signature of the person to whom it was issued.

11.7 The responsible artisan/person shall complete the temporary connection form and return it upon completion to the Wiring Inspectors.

11.8 The temporary connection form made out for a particular temporary connection will be re-issued for the disconnection and removal of a temporary connection.

11.9 **Installation requirements for a Temporary Connection.**

(1) Clamps and bolts must be used. Tying with wire to secure apparatus is not permitted.

Die toevoer van elektrisiteit na sodanige persele sal alleenlik met opdrag van die Bedradings Inspekteur weer herstel word.

11. TYDELIKE AANSLUITINGS :

Die benaming ‚Tydelike Aansluiting' sal betrekking hê op enige toevoer van elektrisiteit na 'n tydelike posisie. Dit het betrekking op aansluitings waar geen permanente installasie bestaan nie soos byvoorbeeld; bouwerk, konstruksiewerk, rondreisende verbruikers en Publieke of Munisipale funksies.

11.1 Tydelike aansluitings sal vir bouers, kontrakteurs, rondreisende verbruikers en publieke funksies verskaf word **alleenlik** na voltooing van die spesiale tydelike aansluitingsvorms wat deur die Bedradings Inspekteur uitgereik word. Die Bedradings Inspekteur sal minstens een keer per maand sodanige tydelike installasie nagaan om seker te maak dat die verbruiker se bedrading in orde is.

11.2 Tydelike aansluitings vir Munisipale funksies sal deur die Elektrotegniese Stads Ingenieur gemagtig word.

11.3 Die verantwoordelike ambagsman/persoon wie aangesê is om 'n tydelike aansluiting te installeer, sal verantwoordelik gehou word om toe te sien dat die meterkas en diensleidings na die meterkas op 'n veilige manier aangebring word.

11.4 Installasies waar geen spesiale tydelike aansluitingsvorms deur die Bedradings Inspekteur uitgereik is nie, moet eers nagegaan word voordat die toevoer van elektrisiteit deur 'n gemagtigde persoon aangesluit word.

11.5 Tydelike aansluitingsmeterkaste sal deur die voorman elektrisiën uitgereik word, en met die staking van die tydelike aansluiting moet die meterkas na die afdelingspakhuis terugbesorg word.

11.6 Die voorman moet 'n rekord hou van die meterkasnommer, die datum van uitreiking en die handtekening van die persoon aan wie dit uitgereik was.

11.7 Die Verantwoordelike Persoon/ambagsman moet na voltooiing van 'n tydelike aansluiting, die nodige tydelike aansluiting-vorm invul en aan die Bedradings Inspekteur oorhandig.

11.8 Die tydelike aansluitingsvorm wat vir 'n spesifieke aansluiting uitgereik is, sal heruitgereik word alvorens die tydelike aansluiting verwyder word.

11.9 **Vereistes vir tydelike Aansluiting.**

(1) Apparaat moet deur middel van klemme en boute vasgesit word. Die gebruik van draad

(2) Line conductors, bare or insulated must always be carried on insulators. They shall never be tied direct to the pole or stay.

(3) Underground cable supply to temporary meter boxes shall be terminated at the meter box with an approved type of connection.

12. STREET LIGHTING REPAIRS :

12.0 Equipment, vehicles and lamp replacement must be checked before leaving the workshop.

12.1 No vehicle must be driven whilse a person is on the tower ladder.

12.2 Only competent persons may work on live mains.

12.3 Rubber gloves and safety belts must be worn.

12.4 Vehicles must be driven on the correct side of the road and all traffic regulations must be observed.

12.5 Where it is necessary for a vehicle to remain stationary on a public road at night the bubble light, parking lights and tail lights must be left burning.

12.6 Broken lamps must not be thrown into the street, nor must cartons, papers or other material be discarded in the streets.

12.7 One strand of 5 amp tinned copper fuse must be used for flying fuses, connection to the lines must be secure and tight to reduce possible radio interference.

12.8 Street light lines must be considered to be alive at all times as they may become alive due to a faulty time switch.

12.9 Street light fittings and wiring in poor condition must be reported.

13. TREE CUTTING :

13.1 Tree cutting should, whenever possible, be undertaken only by the Parks Department. Report all cases of street trees growing into power lines so that arrangements may be made with the Parks Department for cutting trees.

13.2 The owner or occupier must be advised to cut or trim trees on private property where they interfere with power lines. With the permission of the owner employees may undertake the cutting necessary to clear the lines.

vir hierdie doel sal nie toegelaat word nie.

(2) Geleidrade, bloot of geisoleer moet deur isoleerders gedra word, en moet nooit teen 'n paal of ankerdraad vasgemaak word nie.

(3) Ondergrondse kabels wat tydelike meter kaste van elektriese stroom voorsien, moet aan die meterkas by wyse van 'n goedgekeurde tipe verbinder gekoppel word.

12. STRAATLIG INSTANDHOUDING :

12.0 Toerusting, voertuie en voorraad van lampe moet nagegaan word, voordat daar van die werkswinkel af vertrek word.

12.1 Geen verantwoordelike persoon sal 'n voertuig bestuur terwyl daar persone op die leer staan nie.

12.2 Werk op gelaaide geleidrade mag alleenlik deur 'n bevoegde persoon verrig word.

12.3 Rubber handskoene en veiligsgordels moet waar nodig gebruik word.

12.4 Voertuie moet op die regte kant van die pad bestuur word, en alle verkeersverordeninge moet nagekom word.

12.5 Indien dit nodig is dat 'n voertuig snags op 'n publieke pad moet stilhou moet die wentellig parkeerligte en agterligte gedurig brand.

12.6 Stukkende lampe, kartonhouers, papiere of ander materiaal moet nooit in die strate weggegooi word nie.

12.7 Enkelstring 5 amp. koperdraad moet vir straatlig sekerings gebruik word. Verbindings met die bogrondse geleidings moet behoorlik vas wees om sodoende radiosteurnis tot op 'n minimum te beperk.

12.8 Straatliggeleiers moet ten alle tye as gelaai beskou word aangesien hulle ten enige tyd deur 'n foutiewe tydskakelaar aangesluit mag word.

12.9 Straatliglampe of bedrading wat in 'n swak toestand is moet gerapporteer word.

13. SNOEI VAN BOME :

13.1 Die snoei van bome moet waar moontlik, deur die Parke Afdeling gedoen word. Waar daar gemerk word dat straatbome tussen die elektriese kragrade groei moet die voorman elektrisieën in kennis gestel word sodat die nodige reëlings met die Parke Afdeling getref kan word.

13.2 Op privaat persele, waar bome die kragdrade benadeel, moet die eienaar of bewoner in kennis gestel word om die bome te snoei. Met die toestemming van die eienaar mag die bome wat die kragdrade benadeel deur die werknemer gesnoei word.

13.3 Branches of trees growing in or on the boundary of private property, which overhang public roads may be cut by employees. Notice should be given to the owner or occupier of the premises of the intention to cut the trees and unnecessary mutilation of the trees must be avoided. Unless the owner/occupier of the premises will accept the debris it must be removed.

13.4 The main trunks of trees growing in or on the boundary of private property must not be cut. The owner of the trees must be served with a notice requesting that the trees must be removed.

13.5 If it is necessary to enter private property, the reason for doing so must be **courteously explained to the occupier.**

13.6 If any trimming or cutting is necessary, care must be taken to prevent falling debris from falling on to vehicles or passers-by. If necessary persons must be stationed to warn the public of the danger.

13.7 Ladders or tower ladders must be used where possible, watch soundness and strength of branches before standing on them.

14. SURVEY BEACONS :

14.0 The attention of all employees is directed to the Survey Act of 1927—Under which fines and imprisonment may be imposed for interfering with survey beacons. Employees must report immediately to their immediate superior in case of accidental shifting of any beacon.

14.1 **Excavations.**

(1) All employees are warned to see that all excavations under their jurisdiction are properly barricaded or protected while work is in progress.

(2) Where work is carried over to the next day, trenches pole and stay holes must be filled in and re-opened the next day.

(3) Where it is impracticable to fill back, the trenches or holes must be roped off or protected by drums. Red lamps must be posted in built-up areas.

(4) Before excavating across any busy street, the Traffic Department must be advised.

(5) The responsible person in charge of the excavations shall immediately any excavation work commences on tarred roads, streets or side walks, issue a requisition to the Town Engineer's Department for the surfaces to be repaired.

13.3 Bome wat op privaat eiendomme groei waarvan die takke oor die grens in publieke paaie hang, mag deur die personeel gesnoei word. Die eienaar of bewoner moet in kennis gestel word van die voornemens om sodanige bome te snoei. Tensy die eienaar of bewoner die afval wil benut moet dit weggery word.

13.4 Boomstamme wat op die grens van privaat persele staan moet nie gesnoei word nie. In so 'n geval moet die eienaar versoek word om die bome te verwyder.

13.5 Indien dit nodig is om privaat persele te betree moet die rede daarvoor **hoflik aan die bewoner verduidelik word.**

13.6 Waar bome gesnoei word moet daar gesorg word dat takke ens. nie op verbygangers of voertuie val nie. Indien nodig moet persone aangesê word om die aankomende verkeer teen die gevaar te waarsku.

13.7 Waar moontlik moet lere of toringlere gebruik word. Die sterkte en toestand van enige tak moet eers ondersoek word voordat daarop gestaan word.

14. OPMETINGSBAKENS — UITGRAWINGS :

14.0 **Opmetingsbakens.**
Die aandag van alle amptenare word op die Opmetingswet Nr. 9 van 1927 gevestig. Volgens hierdie wet mag boetes en tronkstraf vir die bemoeiing met opmetingsbakens opgelê word. Indien 'n baken per toeval geskuif word moet dit dadelik aan die hoof gerapporteer word.

14.1 **Uitgrawings.**

(1) Amptenare word gewaarsku om toe te sien dat alle uitgrawings wat onder hulle toesig gedoen word, deeglik versper of beskerm word terwyl sodanige werk aan die gang is.

(2) In gevalle waar werk tot die volgende dag moet oorstaan moet slote en gate vir pale of ankers opgevul word en die volgende dag weer oopgegrou word.

(3) Waar dit prakties onmoontlik is om die slote of gate op te vul moet hulle met dromme, draad of toue afgekamp word en rooi lampe moet in beboude gebiede daarby aangebring word.

(4) Die verkeersafdeling moet in kennis gestel word, voordat oor 'n hoofpad gegrou word.

(5) Die verantwoordelike persoon in bevel van uitgrawings oor 'n teerstraat of plaviebedekte sypad moet toesien dat 'n werksbevelvorm aan die Stadsingenieursafdeling gestuur word om die oppervlakte te herstel.

(6) Upon completion of any excavation work, all rubbish, papers, bits of wire and other debris caused by this Department, shall be removed.

15. MATERIAL RECEIVED AND / OR RETURNED TO STORES, SCRAP METAL: DAILY RETURNS FROM EMPLOYEES:

15.1 Scrap metal and cut-offs from cables, wires and conductors shall be returned to the Departmental Store at the end of each shift.

15.2 All employees shall immediately upon completion of their working day ensure that all time sheets, mileage records, and other returns which he has been instructed to complete have been filled in.

16. METERS AND INSTRUMENTS:

16.1 Meters and Instruments are delicate and must be handled with care. They must be transported, where possible, on the seat of the vehicle or packed and protected against unnecessary jolting or vibration.

16.2 In placing meters, the responsible person shall pay particular attention to the wiring and correct polarity of the conductors. The rotation of a meter must be tested.

16.3 All municipal meters, main fuses / circuit-breakers must be sealed with the sealing wire and lead seals provided.

17. VEHICLES:

17.1 Employees shall not attempt to get on or off any vehicle that is in motion.

17.2 When travelling in a vehicle, all employees shall be seated. Their persons shall be entirely contained by the body of the truck or vehicle.

17.3 The person in charge of the vehicle shall not permit an unlicensed driver to drive the vehicle.

17.4 Vehicles shall be kept in good repair and shall be cleaned at least once a week.

17.5 Speed limits, traffic signs and traffic regulations shall be observed.

17.6 The driver shall check brakes, steering, wheels and tyres, body work, lights, windscreen wipers, fuel, oil, water and battery before taking out a vehicle for the first time each day. Any defect must be reported immediately.

17.7 Ladders, poles and other equipment must be secured against any movement which may occur

(6) Sodra die werk in verband met enige uitgrawing voltooi is, moet alle vuillis, papiere, stukkies draad en ander oorskiet weggery word.

15. MATERIAAL ONTVANG OF TERUGBESORG: YSTERAFVAL, DAAGLIKSE STATE:

15.1 Ysterafval en stukkies wat van kabels, draad of geleiers afgesny word moet na voltooiing van elke skof, by die afdelingspakhuis ingehandig word.

15.2 Amptenare moet sorg dat alle tydstate, myl-afstandstate, en enige ander state wat deur hulle ingevul moet word, met die voltooiing van elke werksdag behoorlik op datum gebring word.

16. METERS EN INSTRUMENTE:

16.1 Meters en instrumente is delikate apparate wat versigtige hantering nodig het. Waar moontlik moet meters en instrumente op die sitplek van 'n voertuig vervoer word.

16.2 Met die aanbring van meters moet die verantwoordelike persoon toesien dat die polariteit van die diensleidings en die rotasie van die meter reg is.

16.3 Munisipale meters, hoofsekerings en stroombrekers moet verseël word.

17. VOERTUIE:

17.1 Werknemers mag nie op of afklim terwyl 'n voertuig beweeg nie.

17.2 As werknemers met 'n voertuig vervoer word, moet hulle ten alle tye sit en geen gedeelte van hulle liggame mag die voertuig se bak oorhang nie.

17.3 Die persoon in bevel van 'n voertuig mag nooit toelaat dat 'n ongelisensieërde persoon die voertuig bestuur nie.

17.4 Voertuie moet in 'n goeie toestand gehou word, en moet minstens een keer per week skoongemaak word.

17.5 Spoedbeperkings, verkeerstekens en verkeersverordeninge moet nagekom word.

17.6 Die bestuurder van 'n voertuig moet elke oggend die remme, stuur, bande, ligte, windskermveërs, brandstof, olie en water nagaan en enige fout moet gerapporteer word.

17.7 Lere, pale en ander toerusting wat per voertuig vervoer word moet altyd behoorlik vasgemaak

due to a sudden stop or negotiating corners.

17.8 **Accidents to Vehicles.**

(1) Render first aid where necessary.

(2) Notify ambulance and doctor if necessary.

(3) Notify police or Traffic Department within 24 hours.

(4) Notify Senior Official of the Department.

(5) Make a sketch of vehicle position and obtain names and addresses of witnesses.

(6) Fill in Insurance Accident Claim Form at Clerk of the Council's Department and produce your drivers licence.

(7) Do not admit liability or make any public statement before the Motor Vehicle Insurance Claim Form at the Clerk of the Council's offices has been completed.

17.9 In the event of an accident involving a third party claim, the Council will be held liable for a claim made by a passenger who is not in the employ of the Council. Drivers are, therefore, warned not to carry passengers who are not in the employ of the Council.

18. ACCIDENTS—GENERAL :

18.0 **Serious Injuries.**

(1) Apply first aid treatment at once.

(2) 'Phone ambulance and doctor.

(3) Notify Electricity Department or any Senior Official.

18.1 **Minor Injuries.**

(1) Apply first aid.

(2) Send victim to his own doctor or hospital.

18.2 In all cases of injury fill in necessary Workmen's Compensation Accident forms immediately. (In duplicate.)

19. FIRST AID :

19.0 First aid equipment must be kept in good condition and stocks replaced immediately they have been issued.

19.1 In the case of severe electric shock, immediately apply artificial respiration. Do not stop until the ambulance staff or doctor takes over. **Immediate and properly applied treatment is absolutely essential to be successful in these cases.**

word.

17.8 **Ongelukke met Voertuie:**

(1) Indien nodig moet eerste hulp toegepas word.

(2) Indien nodig moet 'n dokter of ambulans ontbied word.

(3) Die polisie of vekeersafdeling moet binne 24 uur in kennis gestel word.

(4) 'n Senior amptenaar van die afdeling moet in kennis gestel word.

(5) In Skets van die ongelukstoneel waarop die posisie van die voertuig aangetoon word moet gemaak word en die name en addresse van getuies moet verkry word.

(6) 'n Assuransie Ongeluksvorm moet by die Klerk van die Raad se Afdeling voltooi word.

(7) Verantwoordelikheid vir die ongeluk moet nooit aanvaar word en geen publieke verklaring moet gemaak word voordat die Ongelukseisvorm by die Klerk van die Raad se Afdeling voltooi is nie.

17.9 Voertuig bestuurders word gewaarsku om niemand op to laai wat nie 'n werknemer van die Raad is nie. In die geval van 'n ongeluk waar daar 'n derdeparty eis betrokke is, sal die Raad verantwoordelik vir sodanige eis gehou word, mits die passasier nie in die diens van die Raad is nie.

18. ALGEMENE ONGELUKKE :

18.0 **Ernstige Beserings.**

(1) Noodhulp moet dadelik toegepas word.

(2) Ambulans en dokter moet ontbied word.

(3) Elektrisiteitsafdeling of enige senior amptenaar moet in kennis gestel word.

18.1 **Geringe Beserings.**

(1) Noodhulp moet toegepas word.

(2) Stuur pasiënt na sy eie dokter of hospitaal.

18.2 In alle gevalle van beserings moet die Werksnemerskadeloosstellingvorms voltooi word.

19. NOODHULP :

19.0 Noodhulp toerusting en voorrade moet in goeie toestand gehou word.

19.1 Ingeval van 'n ernstige elektrieseskok moet kunsmatige asemhaling dadelik toegepas word, en daarna volgehou word totdat die ambulanspersoneel of dokter oorgeneem het. **Daadwerklik en behoorlike behandeling is absoluut nood-**

Send for the ambulance and a doctor.

19.2 In spite of all safety precautions an occasional injury may occur. All accidents, **no matter how slight must be reported.**

19.3 **Electric Shock.**

Read the notes—Appendix 2 hereof.

Breaking the contact. The victims must be freed from the contact as promptly as possible. **If it is not possible to switch off immediately, the electricity supply—**

(a) Short circuit, by throwing anything metal across the conductors.

(b) Use rubber gloves, dry stick, dry wood, dry rope, clothing or other non-conductor to pull victim clear.

(c) Use bottom of your foot to push victim away from contact, if your feet are dry.

(d) **The use of any part of your body is dangerous and may add another victim to the accident.**

20. FIRE:

Read the notes—Appendix 3 on fires.

20.0 Keep all fire equipment clear of obstructions.

20.1 In case of fire observe the following procedure:—

(a) cut off power supply.

(b) phone the Fire Station.

(c) phone the Town Electrical Engineer or Senior Official.

(d) Use the fire extinguishers.

(e) Power may only be restored upon instructions from one of the above-mentioned officials.

(f) Do not use water on electrical fires, oil or grease fires, as water will spread the fire.

(g) The substation or maintenance man for the section concerned must see that any extinguishers which have been used or are defective are re-charged at the Fire Station or replaced by new equipment.

21. LADDERS:

21.0 Inspect all ladders for defects **before** they are used.

21.1 Wear a safety belt and toolholderbelt when working from ladders.

saaklik om in hierdie gevalle enige sukses te kan behaal.

19.2 Tenspyte van veiligheidsmaatreëls sal daar af en toe beserings wees. Alle ongelukke, **hoe gering ook al moet gerapporteer word.**

19.3 **Elektrieseskokbehandeling.**

Lees die notas in Aanhangsel 2 hiervan.

Breek die kontak. Die slagoffer moet so gou moontlik van kontak met die krag vrygestel word. **Indien dit onmoontlik is om die krag onmiddelik af te sluit:—**

(a) 'n Kortsluiting moet bewerkstellig word deur enige metaalstuk oor die geleiers te gooi.

(b) Gebruik gomlastiek handskoene, 'n droë stok, droë tou of enige ander nie-geleinde materiaal om die slagoffer weg te trek.

(c) As u skoene droog is kan die slagoffer met u voet weggestoot word.

(d) **Die gebruik van enige kaal gedeelte van u liggaam is gevaarlik en kan lei tot 'n verdere slagoffer by die ongeluk.**

20. BRAND:

Lees die notas in Aanhangsel 3 hiervan.

20.0 Brandblussers moet geredelik bekombaar wees.

20.1 In die geval van brand:—

(a) Skakel die toevoer van elektrisiteit af.

(b) Indien nodig, moet die brandweer ontbied word.

(c) Stel die Elektrotegniese Stads Ingenieur of die Senior Amptenaar in kennis.

(d) Brandblussers moet gebruik word.

(e) Die toevoer van elektrisiteit mag alleenlik by opdrag van een van bovermelde amptenare herstel word.

(f) Brand wat by enige elektriese apparaat, olie of brandstof ontstaan mag nie met water bestry word nie.

(g) Brandblussers moet in 'n goeie toestand en gevul gehou word.

21. LERE:

21.0 Elke leer moet vir moontlike defekte ondersoek word voordat dit gebruik word. Enige gebrek moet gerapporteer word.

21.1 Veiligheidsgordels en gereedskapgordels moet gebruik word wanneer daar van 'n leer af gewerk word.

21.2 The ladder must be secure on the pole and held steady by a person standing at the bottom.

21.3 Keep your hands free while ascending or decending a ladder.

21.4 Use a rope to hoist or lower heavy equipment.

21.5 Do not work with your back to the ladder or attempt to climb down with your back to the ladder.

21.6 Do not be unnecessarily rough with a ladder, your safety depends upon it.

22. MACHINERY :

22.0 When making repairs and/or alterations or adjustments to any electricity driven machinery, the main switch for that circuit shall be locked in the open position, until repairs are complete and guards replaced.

22.1 Belts shall only be inspected, touched or shifted when the machine is stopped.

22.2 Any guard removed shall be replaced before the machine is put into operation.

22.3 The workshop superintendent shall be advised of any defective guards or conditions which on the mechanical side, may cause danger.

22.4 Safety devices, electrical or mechanical, shall not be by-passed or made inoperative except with special permission of a senior Official.

23. TOOLS AND EQUIPMENT :

23.0 Artisans supplied with tools and/or equipment against their signature are responsible for their safety from loss and for keeping them in a serviceable condition.

23.1 Whenever any tool is lost, a report of such loss, together with an explanation as to how it happened must be made immediately. **If a satisfactory explanation cannot be given or a report is not submitted at the time, the artisan will be held liable for the loss.**

23.2 Whenever a tool is damaged or broken, the tool must be returned to the foreman electrician. If a satisfactory explanation is given the tool will be replaced.

23.3 Upon resigning, or proceeding on leave, all tools and/or equipment belonging to the Council shall be returned to the Electrical Department Stores.

21.2 Lere moet stewig teen 'n paal staan en moet aan die onderste deel deur 'n persoon vasgehou word.

21.3 Geen gereedskap of materiaal mag in die hande vasgehou word terwyl daar met 'n leer op of afgeklim word nie.

21.4 Om swaar gereedskap of toerusting op te trek of te laat sak moet 'n tou gebruik word.

21.5 Wanneer u op 'n leer staan en werk, moet u rug nooit na die leer gekeer wees nie en mag u ook nie in hierdie posisie met 'n leer afklim nie.

21.6 Lere moet altyd sorgvuldig hanteer word.

22. MASJINERIE :

22.0 Wanneer enige reparasies, veranderings of werk aan elektriesaangedrewe masjinerie verrig word, moet die skakelaar vir daardie stroombaan afgesluit word tot tyd en wyl die werk voltooi is.

22.1 Dryfrieme moet nooit ondersoek of aan gewerk word wanneer die masjien in werking is nie.

22.2 Enige beskutting wat verwyder is moet teruggesit word voordat die masjien weer in werking gestel word.

22.3 Enige defektiewe skerms of ander toestande wat meganies gevaarlik mag wees moet onder die aandag van die Werkswinkel Superintendent gebring word.

22.4 Veiligheidstoestelle, elektries of meganies, mag nie buite werking gestel word, behalwe met die spesiale toestemming van 'n senior amptenaar nie.

23. GEREEDSKAP EN TOERUSTING :

23.0 Ambagsmanne of verantwoordelike persone aan wie gereedskap en/of toerusting uitgereik is, sal verantwoordelik gehou word vir enige verlies of skade daaraan.

23.1 Wanneer enige gereedskap of toerusting verlore raak moet 'n verduidelikende verslag dadelik ingedien word. **As 'n bevredigende verduideliking nie gegee kan word nie, of as geen verslag ten tye van die verlies ingedien is nie, sal die persoon vir sodanige verlies verantwoordelik gehou word.**

23.2 Wanneer gereedskap of toerusting beskadig raak, moet sodanige gereedskap of toerusting aan die voorman elektrisiën of Elektrotegniese Stads Ingenieur oorhandig word. Sou 'n bevredigende verduideliking gegee word, sal die gereedskap of toerusting vervang word.

23.3 Defektiewe rubber handskoene moet dadelik vir vervanging ingehandig word.

23.4 Artisans must hand in rubber gloves for replacement as soon as they detect any electrical leakage or whenever they are defective.

23.5 It is the duty of the superintendent to inspect tools and equipment issued to artisans for their personal and continued use.

23.6 The superintendent must also inspect annually all tools and equipment, such as tower ladders, ladder chain blocks, sheer legs, vehicles and trailers, etc., under his call and check that the quantities are correct and that their condition is satisfactory.

23.7 The superintendent must inspect annually all test instruments and apparatus under his control and see that they are accounted for and that their condition is satisfactory.

23.8 The Wiring Inspectors must inspect annually all test apparatus and equipment under his control and see that they are accounted for and that their condition is satisfactory.

24. DEPARTMENTAL TIME-LIMITS: WORKSHOP STAFF

Employees shall take note of the following time-limits as listed hereunder and shall strictly comply with it.

24.0 Working hours start at 7.15 a.m.

24.1 Those who perform work external to the workshop shall leave at the latest at 7.30 a.m.

24.2 A tea-break, 10 minutes long, between 10.00 a.m. and 10.10 a.m. have been granted on a departmental basis, and it is expected from the responsible person/artisan to take care that this concession is not abused. Breakfast shall not be prepared on the site.

24.3 Lunch-time **starts** at 1.00 p.m. and ends at **1.30** p.m. There is no reason for a person performing external work, to be in the workshop before or after these times, other than receiving material.

24.4 Employees shall not return to the workshop before 4.50 p.m. unless the given work had been completed, in which case it shall be reported to the foreman electrician immediately.

24.5 In order to accomplish the contents of 24.1 above, requisitions shall henceforth only be made out in the mornings to be followed under normal natural procedure to be followed under normal circumstances is detailed under 24.6 below.

24.6 Should requisitions be required for the following

23.4 Met beëindiging van diens of **voordat met verlof gegaan word** moet alle gereedskap of toerusting wat aan die Raad behoort, ingehandig word.

23.5 Dit sal die plig van die Superintendent wees om periodiek die gereedskap en toerusting na te gaan wat aan verantwoordelike persone uitgereik is.

23.6 Die Superintendent moet alle toerusting, gereedskap en vervoermiddels jaarliks nagaan om vas te stel of die hoeveelhede reg is en of die toestande daarvan bevredigend is.

23.7 Die Bedradings Inspekteurs moet alle toerusting en toetsapparaat wat onder hulle beheer resorteer jaarliks nagaan om te verseker dat die hoeveelhede reg is en dat alles in 'n goeie toestand is.

24. DEPARTEMENTELE TYDSBEPALINGE: WERKSKINKEL PERSONEEL

Werknemers moet kennis neem van onderstaande tydsbepalinge en sorg dra dat die volgende streng nagekom word.

24.0 Werkstyd begin om 7.15 vm.

24.1 Diegene wat werk buite die Werkswinkel verrig moet op die laatste om 7.30 vm. die Werkswinkel verlaat.

24.2 'n Tee-tyd van 10 minute, tussen 10.00 vm. en en 10.30 vm. word op 'n departementele basis toegelaat en dit sal van die Verantwoordelike Persoon/Ambagsman verwag word om toe te sien dat hierdie toegewing nie misbruik word nie. Geen ontbyte sal voor die tyd voorberei word nie.

24.3 Etenstyd **begin** of 1.00 nm. en **eindig** om 1.30 nm. Daar is geen rede vir persone wat buitewerk verrig om gedurende hierdie tye in die werksplaas te wees, anders as om materiaal te ontvang nie.

24.4 Werknemers sal nie voor 4.50 nm. na die Werkswinkel terugkeer nie, tensy die voorgeskrewe werk voltooi is, in welke geval onmiddellik by die voorman elektrisiën aangemeld moet word.

24.5 Ten einde die inhoud van 24.1 hierbo genoem, te bewerkstellig sal rekwisisies voortaan net in uitsonderlike gevalle in die oggende uitgeskryf word. Die normale prosedure wat onder normale omstandighede gevolg moet word, word in 24.6 hieronder beskryf.

24.6 Indien rekwisisies benodig word vir die volgende

day's work, the person concerned shall return to the workshop at 4.40 p.m., make out the requisition personally and submit it to the foreman electrician or superintendent for signature. For this purpose provision has been made for two Requisition books as well as two Code books.

24.7 The foreman electrician shall dictate the following day's work between 4.50 and 5.00 p.m. and only in case of illness or a breakdown shall these instructions be deviated from.

24.8 Working hours end at 5.00 p.m. except on Fridays at 4.45 p.m.

25. GENERAL :

25.0 **Portable Electrical Appliances.**

(a) All persons, before using a portable appliance, shall satisfy himself that the earth wire and three pin plug is connected correctly and that the insulation value is good.

(b) No person shall use a portable appliance unless it is earthed.

(c) Portable appliances not in good condition shall be handed in to the foreman electrician for overhaul and repair.

25.1 Extension/portable electric lights shall be earthed and kept in good condition.

25.2 **Rubber Gloves.**

(a) Only approved rubber gloves shall be worn when working on energised circuits and apparatus. No woollen or leather gloves are permitted to be used.

(b) Rubber gloves shall be worn when placing or removing earthing appliances.

(c) The responsible person/artisan shall ensure that sufficient material and tools are taken to the site to complete a specific job, thus avoiding unnecessary travelling to collect additional stores.

25.3 **Safety Locks.**

Safety locks shall be issued upon request to responsible persons/artisans.

25.4 **Goggles.**

Goggles must be worn when:—

(a) Drilling and grinding.

(b) Using cold chisels.

(c) Any time or place where there is danger of eye injury.

dag se werk, sa ldie betrokke persoon om 4.40 nm. na die werkswinkel terugkeer, die rekwisisie self uitskryf en dan aan die voorman elektrisiën of Superintendent voorlê vir hantekening. Vir hierdie doel is daar voorsiening gemaak vir twee rekwisisieboeke en twee kodeboeke in die voorman elektrisiën se kantoor.

24.7 Die voorman elektrisieën sal tussen 4.50 en 5.00 nm. die werk vir die volgende dag voorskryf en alleenlik in geval van siekte of 'n noodgeval, sal daar van die voorgeskrewe werk afgewyk word.

24.8 Werkstyd eindig om 5.00 um., behalwe op Vrydae, wanneer dit om 4.45 nm. eindig.

25. ALGEMEEN :

25.0 **Draagbare Elektriese Toestelle.**

(a) Voordat enige draagbare elektriese toestelle gebruik word moet die persoon seker maak dat dit behoorlik gegrond is en dat die isolasie daarvan in 'n goeie toestand is.

(b) Geen persoon mag 'n draagbare toestel gebruik wat nie gegrond is nie.

(c) Draagbare toestelle wat nie in 'n bevredigende toestand is nie, moet aan die voorman elektrisiën vir herstel oorhandig word.

25.1 Lei-ligte moet ge-aard wees en in 'n goeie toestand gehou word.

25.2 (a) Wanneer daar op gelaaide stroombane of apparaat gewerk word, moet goedgekeurde rubber handskoene gebruik word, geen wol of leerhandskoene sal toegelaat word nie.

(b) Wanneer aardingsmiddels afgehaal of aangebring word moet rubberhandskoene gedra word.

(c) Die verantwoordelike persoon/ambagsman sal sorg dat genoegsame materiaal en gereedskap na die werksterrein geneem word om die spesifieke werk te voltooi en sodoende onnodige gerondryery om bykomende materiaal te haal, te verhoed.

25.3 **Veiligheidslotte.**

Veiligheidslotte sal op versoek aan 'n verantwoordelike persoon/ambagsman uitgereik word.

25.4 **Skermbrille.**

Skermbrille moet onder die volgende omstandighede gedra word:—

(a) Wanneer geboor of geslyp word.

(b) Wanneer koubeitels gebruik word.

(c) Enige tyd of plek waar oë aan gevaar blootgestel word.

(d) Report to your immediate senior when goggles are lost or destroyed and see that goggles are replaced immediately.

25.5 **Tools.**

(a) Tools shall be kept in good condition and free of grease and dirt.

(b) Check very carefully when a job is completed for tools left across conductors.

(c) Replace worn or defective tools.

(d) Tools are your livelihood, watch over them carefully.

25.6 **Notification of H.T. faults.**

Standby electricians shall immediately notify all H.T. faults or faults of important nature, occurring successively during after-hours, to the foreman electrician. Should the foreman electrician not be available, the Distribution Superintendent shall be informed.

25.7 **Radiotelephone Equipment.**

(i) Radiotelephone equipment has been installed at considerable expense for the sole purpose of facilitating speedy communication between employees, and thereby rendering efficiency to the organisation. Should this equipment be switched off, the entire object is defeated.

(ii) Henceforth it will be considered an offence should a person fail to reply to his call sign.

(iii) A daily schedule will be kept at the Control Room, indicating the movements and positions of vehicles fitted with radiotelephone equipment.

(iv) The responsible person/artisan shall ensure that the equipment is kept in working order any defect shall be notified at once.

(v) The batteries in vehicles fitted with radiotelephone equipment shall be connected to a trickle charger during after hours to avoid same from being discharged excessively.

25.8 **Tidiness.**

The responsible person/artisan shall ensure:—

(a) All jobs shall be left clean and tidy.

(b) All rubbish and debris shall be removed or buried.

(d) Die voorman elektrisiën moet in kennis gestel word wanneer skermbrille verloor of beskadig word.

25.5 **Gereedskap.**

(a) Gereedskap moet vry van ghries of vuilgoed wees en in 'n goeie toestand gehou word.

(b) Wanneer werk voltooi is maak seker dat geen gereedskap oor 'n geleier gelaat word nie.

(c) Verslypte of defektiewe gereedskap moet vervang word.

(d) Gereedskap is u lewensonderhoud, pas hulle goed op.

25.6 **Kennisgewing van Hoogspanningfoute.**

Bystand-elektriesiëns moet hoogspanningfoute, of foute van belangrike aard wat gedurende naure herhaaldelik voorkom, onmiddellik aan die voorman elektrisiën rapporteer. Indien die voorman elektrisiën nie beskikbaar is nie, moet die Distribusiesuperintendent in kennis gestel word.

25.7 **Radiotelefoontoerusting.**

(i) Radiotelefoontoerusting word teen 'n aansienlike koste in voertuie aangebring vir net een doel, naamlik om verbinding tussen werknemers te bespoedig en dus doeltreffendheid aan die organisasie te verleen. Indien die toerusting nie aangeskakel word nie, verydel dit die hele doel en werk dit nog meer ongerief in die hand.

(ii) Dit sal voortaan as 'n oortreding beskou word indien 'n persoon in bevel van 'n voertuig met 'n geïnstalleerde radiotelefoon, nie reageer op sy roepsein nie.

(iii) 'n Daaglikse skedule sal voortaan by Kontrole van die bewegings en omgewing van voertuie gehou word.

(iv) Verantwoordelike persone moet sorg dra dat die radiotelefoontoerusting in 'n werkende toestand bly en enige defek moet sonder versuim gerapporteer word.

(v) Die batterye van voertuie waarin radiotelefoontoerusting geïnstalleer is, moet gedurende na-ure aan 'n sypellaaier gekoppel word ten einde buitensporige ontlading te voorkom.

25.8 **Netheid.**

Die verantwoordelike persoon/ambagsman moet verseker dat:—

(a) Alle werk in 'n netjiese en skoon toestand gelaat word.

(b) Alle vuilgoed en oorskot weggery of begrawe word.

(c) All holes shall be filled and the ground levelled.

(d) The job shall be cleaned of oil/grease/compound.

(e) Fires shall be extinguished and ash removed or buried.

25.9 **Behaviour.**

Municipal employees are always in the public eye. They shall ensure that their behaviour, at all times, gives no cause for complaint.
A consumer of electricity is a customer of the electricity undertaking and shall be treated with due respect and courtesy.

L. FUTCHER,
Town Electrical Engineer.

(c) Alle uitgrawings behoorlik gevul en gekonsolideer word.

(d) Enige vuur geblus en die as verwyder of begrawe word.

25.9 **Gedrag.**

Dit is kenmerkend dat munisipale werknemers gedurende werksure deur die publiek dopgehou word, derhalwe moet daar gesorg word dat hulle gedrag altyd van so 'n aard is dat daar geen rede vir klagte mag ontstaan nie.
Elke verbruiker van elektrisiteit is 'n kliënt van die Elektrisiteitsonderneming en moet met eerbied en hoflikheid behandel word.

L. FUTCHER,
Elektrotegniese Stadsingenieur.

Town Council of Kempton Park

Town Electrical Engineer's Department

DEAD ORDER :—For undertaking work on H.T. or E.H.T. System.

PORTION ONE :

Date ..... Permit No. .....

Nature of work to be undertaken .....

.....

Required by ..... Radio No. .....
(Authorised Person)

Ring/s to be closed at .....

.....

Time closed ..... Time opened .....

ISOLATION SCHEDULE :

Actual Switching Time

Opened	Closed
.....	.....
.....	.....
.....	.....
.....	.....

Note: Before any switching takes place contact **Control.**

Control Officer .....

Authorised Person .....

.....

.....

.....

.....

.....

.....

EARTHING SCHEDULE :

Actual Switching Time

Earth On	Earth Off
.....	.....
.....	.....
.....	.....

The above Isolation Schedule, checked by Authorised Person: .....

.....

.....

.....

Endorsements .....

.....

Signature of Authorised Person ..... Time.....

PORTION TWO :

Restoration of Supply: I..... ..... confirm the abovementioned Isolation and
(Authorised Person)

Earthing have been restored and the ring has been re opened at .....

Signature .....
(Authorised Person)

Date..... Time.....

PERMIT CANCELLED:

Signature .....

Date..... Time.....

(Control Officer

APPENDIX 2

THE ACTION OF THE ELECTRIC CURRENT

In electric shock the current may pass through the breathing centre at the base of the brain and cause the centre to stop sending out the nerve impulses which act upon the muscles responsible for breathing. As a consequence, breathing stops abruptly. If the shock has not been severe, after a time the breathing centre recovers and resumes the vitally necessary duty of sending impulses to the muscles of breathing. In such cases the immediate use of resuscitation substitutes artificial respiration for the natural breathing of the victim. As has been pointed out, the current may so paralyse the breathing centre as to require eight hours for recovery, and resuscitation must be continued unceasingly through this entire time. If, during prolonged artificial respiration the body can be placed on a door or flat surface so that the head and chest are approximately 150mm (six inches) lower than the feet, the flow of blood to the heart is promoted and a better chance given for recovery.

Victims of electric shock of this sort are unconscious, but the heart and blood circulation continue. **Their treatment demands artificial respiration with the greatest possible promptness.**

If the electric current affects the heart it may produce a condition called fibrillation in which the heart resembles a bag of quivering jelly instead of the regular pumping organ which maintains life. Under these circumstances the heart suddenly ceases to pump blood. Many cases of electric shock escape this heart effect and even an experienced examiner requires time to assure himself it has occurred. **Consequently it is the duty of those first reaching the shocked person to give artificial respiration at once and allow time** and medical examination to determine whether the heart has stopped. Medical Science knows no drug which of itself will start breathing in a victim whose breathing has ceased.

Keep a victim in any accident warm by covering him with a coat or other clothing.

Never give an unconscious man anything to drink. It may choke him.

In a serious injury never move a victim unless it is absolutely necessary, and never be unnecessarily rough.

It is most important for your work and home to learn First Aid.

AANHANGSEL 2

DIE AKSIE VAN DIE ELEKTRIESE STROOM

In die geval van elektriese skok kan dit gebeur dat die stroom deur die asemhalingsentrum van die brein gaan en veroorsaak dat die sentrum die uitsending van senupulse wat die asemhalingspiere beheer, staak, gevolglik staak asemhaling onmiddellik. Indien die skok nie noodlittig was nie, kan die asemhalingsentrum met verloop van tyd weer sodanig herstel dat dit weer begin om impulse na die asemhalingspiere te stuur. Onder sulke omstandighede is onmiddellike herlewingsmetodes nodig en word kunsmatige asemhaling toegepas om die normale asemhaling van die slagoffer te vervang.

Die elektriese stroom mag die asemhalingsentrum sodanig verlam dat tot 8 ure benodig word vir herstel. Gedurende hierdie tydperk is dit van lewensbelang dat kunsmatige asemhaling onophoudelik toegepas moet word.

Gedurende langdurige kunsmatige asemhaling is dit wenslik dat die slagoffffer op 'n plat oppervlakte neergelê word sodat die kop en bors ongeveer 150 mm. (6 duim) laer as die voete is. In hierdie posisie word die vloei van bloed na die hart vergemaklik en bevorder dit die kanse om herstel.

Slagoffers van elektriese skok soos hierbo beskryf is bewusteloos, maar die hart en bloedsomloop gaan voort, **derhalwe vereis die behandeling snelle optrede met die grootste sorg.**

Indien die elektriese stroom die hart aangetas het, mag dit 'n toestand van fibrillasie skep waartydens die hart slegs as 'n sak trillende jellie voorgestel kan word en verloor dit dus sy pompmeganisme, wat die lewe behou. Die hart staak dus onmiddellik die pomp van bloed. Baie slagoffers spring hierdie hartaandoening vry en selfs 'n bedrewe ondersoeker het tyd nodig om homself te vergewis dat die hart wel aangetas is. Gevolglik is dit die plig van diegene wat die slagoffer eerste bereik om onmiddellik tot kunsmatige asemhaling oor te gaan en toe te laat dat 'n mediese ondersoek vasstel of die hart gaan staan het, al dan nie.

Hou 'n slagoffer in enige ongeluk warm deur hom met 'n jas of enige ander kledingstukke te bedek.

Moenie 'n bewustelose persoon enige iets gee om te drink nie. Dit mag hom verstik.

In 'n ernstige ongeluk, moenie die slagoffer onnodiglik beweeg of verskuif nie.

Dit is belangrik en tot voordeel van u werk en familie om op hoogte te wees van Eerstehulp Metodes.

APPENDIX 3

FIRES IN ELECTRICAL APPARATUS

1 It is essential that the fundamental principles of fire and fire extinction be understood in order to minimize the risk of personal injury and damage to property and equipment.

It is generally known that three factors are essential for combustion to take place, which can be classified as follows :—

(a) The presence of inflammable substances.

(b) The presence of oxygen (air) or a substance which will assist the fire by supplying oxygen.

(c) The minimum quantity of heat required to precipitate combustion.

2 The extinction of fire depends on the removal of one or more of the three factors which fall under one of the following headings :—

(a) Starvation or the removal of inflammable materials.

(b) Smothering or restricting the supply of oxygen.

(c) Removal of source of heat (by cooling the burning material).

3 Electrical Fire.

(i) In the case of an electrical fire, the first action taken is the switching off of the electrical supply thereby removing the cause.

(ii) The next action to be taken is the closing of doors, shutters etc. of the electrical apparatus involved so as to prevent oxygen (air) from reaching the fire. Smothering the fire can be done by covering the area with sand or other suitable materials if the correct extinguisher is not available. At all times doors and windows should be closed where possible without personal endangering.

(iii) The removable of inflammable materials are not always possible, however three methods may be used which are effective :—

(a) The removal of inflammable materials from the scene of the fire.

(b) The removal of burning material from stocked or stored goods.

AANHANGSEL 3

BRANDE IN ELEKTRIESE APPARAAT.

1 Dit is belangrik om die grondbeginsels van die ontstaan en blus van brande te verstaan ten einde beserings te verhoed en brandskade aan geboue en toerusting tot 'n minimum te beperk.

Dit is algemeen bekend dat drie faktore noodsaaklik is vir verbranding naamlik:—

(a) Die teenwoordigheid van brandstof of 'n vlambare materiaal.

(b) Die teenwoordigheid van suurstof (beter bekend as lug) of ander onderhouer van verbranding.

(c) Die bereiking en handhawing van 'n bepaalde minimum temperatuur.

2 Blussing van brande gaan hoofsaaklik gepaard met die begrensing van een of meer van bogenoemde drie faktors. Metodes van brandblussing kan daarom onder die volgende hoofde saamgevat word:—

(a) Uithongering of begrensing van brandstof.

(b) Smoring of begrensing van suurstof.

(c) Verkoeling of begrensing van temperatuur.

3 Elektriese brand.

(i) In die geval van 'n elektriese brand is die eerste stap dus om die krag af te skakel en sodoende die oorsaak te verwyder, nl. hitte.

(ii) Die volgende stap is om die suurstofgehalte van die lug in die onmiddellike omgewing van die brand genoegsaam te verminder deur die deure van die apparaat toe te maak, of die brand te smoor met sand, 'n kombers of 'n seil, indien die regte tipe blusser nie onmiddellik beskikbaar is nie. Maak deure en vensters toe, indien moontlik sonder enige persoonlike gevaar.

(iii) Die verwydering of begrensing van brandstof is nie altyd uitvoerbaar nie maar hierdie metode kan op drieërlei wyse toegepas word.

(a) Deur verwydering van ontvlambare stof uit die omgewing van die brand.

(b) Deur verwydering van die materiaal wat reeds brand uit die omgewing van brandbare materiale.

(c) The division of the burning material e.g. emulsification of the oil surface.

4 The following extinquishing media do not conduct electricity and can be used with confidence.

(a) CARBONDIOXIDE (CO_2)

Is a gas which has excellent extinguishing properties which will not damage any electrical equipment. The gas penetrates into all crevices providing a complete cover. It does not leave a residue.

(b) DRY CHEMICAL POWDER

Dry Chemical powder has excellent extinguishing properties, but has the disadvantage of being difficult to remove after discharge and will damage delicate instruments.

(c) BROMOCHLORODIFLUOROMETHANE (BCF gas)

Bromochlorodifluoromethane does not cause any damage to equipment and has similar extinguishing properties as CO_2. It is not a toxic gas but will cause suffocation if discharged in large quantities in a closed area.

(d) CARBON TETRA CHLORIDE (CTC)

This liquid will evaporate very quickly on discharge and will form a layer of gas near to the floor level as it is 5½ times as heavy as air. The gas is very poisonous and should not be discharged where large amounts will be inhaled. The use of CTC has resulted in a number of deaths.

WATER — NO!!!!!!

Water is a conductor of electricity and must not be used except where special apparatus is available to discharge water in a fine mist form and then only by trained personnel.

(c) Deur die onderverdeling van die brandende stof bv. die emulsifisering van die oppervlakte van brandende olie.

4 Die volgende blusmedia is nie 'n geleier van elektrisiteit nie en **kan met veiligheid op elektriese brande gebruik word:**

(a) KOOLSUURGAS (CO_2)

Koolsuurgas veroorsaak geen skade aan toerusting nie en laat geen neerslag agter nie. Dit is 'n uitstekende blusmiddel omdat dit by plekke indring wat andersins onbereikbaar is.

(b) DROË POEIER

Droë poeier beskik oor uitstekende bluseienskappe maar laat 'n neerslag agter wat somtyds moeilik is om te verwyder en word om hierdie rede nie vir gebruik op delikate instrumente en toerusting aanbeveel nie.

(c) BROOMCHLOORDIFLUOORMETAAN (BCF GAS)

Broomchloordifluoormetaan veroorsaak geen skade aan toerusting en laat geen neerslag agter nie. Dit het dieselfde eienskappe as Koolsuurgas (CO_2). Dit is nie giftig nie, maar aangesien dit nie 'n onderhouer van verbranding is nie, kan deur inaseming van groot hoeveelhede, nadelige gevolge hê.

(d) KOOLSTOFTETRACHLORIED (CTC)

Koolstoftetrachloried is 'n vloeistof wat vinnig verdamp sodra dit met hitte en aanraking kom en vorm sodoende 'n gaslaag wat ongeveer 5 1/3 keer swaarder as lug is. Die gasdampe is baie giftig en moet daarom nie in geslote ruimte gebruik word waar die persoon wat die blusser hanteer genoodsaak is om 'n groot persentasie van die gas wat ontwikkel in te asem nie. Noodlottige rampe is al hierdeur veroorsaak.

WATER — NEE!!!!!!

Water is 'n geleier van elektrisiteit en moet nie op elektriese brande gebruik word nie, behalwe in die vorm van 'n mis wat alleenlik deur die gebruik van spesiale toerusting verkry kan word.

ELECTRICITY SUPPLY COMMISSION ACCIDENT PREVENTION REVIEW 1971

1. Accident Prevention Policy.

At the end of 1969 Escom Management announced an official policy on accident prevention.

The policy reads as follows:

"The avoidance of accidents is considered an essential requirement of every operation and the safety of persons shall be paramount."

Escom Management, in addition to the above statement of policy, set specific objectives, these being:

1. That Management and the supervisory teams, openly and publicly commit themselves to active participation in the formulation and implementation of the Escom Accident Prevention Programme.
2. The setting up and improvement of procedures for effective joint consultation on accident prevention matters through normal consultative methods and/or through specific accident prevention committees.
3. The establishment of an accident prevention advisory service.
4. The compilation of practical accident prevention standards which will include codes for safe working conditions and practices.
5. The preparation and use of programmes for the training of all employees at all levels.
6. The development of a realistic accident reporting and recording system.
7. The development of an effective accident prevention publicity programme.
8. The development of an organised system to ensure the progressive identification and elimination of hazards involving injury and/or damage potential.
9. The development of an effective first aid and industrial health programme.
10. Active participation in and consultation with National and International organised accident prevention movements, to ensure the maintenance of satisfactory standards in the field of accident prevention.

A review of activities during 1971 shows that virtually all objectives were achieved during the year.

ELEKTRISITEITSVOORSIENINGSKOMMISSIE VEILIGHEIDSOORSIG 1971

1. Ongeluksvoorkomingsbeleid.

Aan die einde van 1969 het Evkom-bestuur 'n formele beleid ten opsigte van ongelukvoorkoming verklaar.

Hierdie beleidsverklaring lees as volg:

„Die voorkoming van ongelukke word as 'n noodsaaklike vereiste van elke werksaamheid geag en die veiligheid van persone moet voorrang geniet."

Ten einde bogenoemde beleid uit te voer, is dit noodsaaklik dat 'n beplande ongelukvoorkomingsprogram geformuleer en toegepas word en dat die formulering van die program op die volgende doelwitte gebaseer word:

1. Die aktiewe deelname van die bestuur en die toesighoudende personeel op alle vlakke aan die formulering en toepassing van die beplande ongeluksvoorkomingsprogram.
2. Die opstel en verbetering van prosedures vir doeltreffende gemeenskaplike oorlegpleging oor ongelukvoorkomingsake volgens normale metodes en/of deur middel van bepaalde ongelukvoorkomingskomitees.
3. Die instelling van 'n adviesdiens oor ongelukvoorkoming.
4. Die samestelling van praktiese ongelukvoorkomingstandaarde waarin kodes vir veilige werktoestande en praktyke vervat is.
5. Die opstel en gebruik van programme vir die opleiding van alle werknemers op alle vlakke.
6. Die invoer van 'n realistiese stelsel vir die aanmelding en optekening van ongelukke.
7. Die opstel van 'n doeltreffende reklameprogram ongelukvoorkoming.
8. Die invoer van 'n beplande stelsel waarvolgens die moontlikheid van beserings en/of skade in toenemende mate uitgeken en uitgeskakel kan word.
9. Die opstel van 'n doeltreffende noodhulp- en bedryfsgesondheidsprogram.
10. Aktiewe deelname aan en/of oorlegpleging met Nasionale en Internasionale ongelukvoorkomingsbewegings ten einde bevredigende standaarde op die gebied van ongelukvoorkoming te handhaaf.

'n Oorsig van aktiwiteite gedurende 1971 toon dat genoemde doelstellings feitlike almal gedurende die jaar bereik is.

2. Management and Supervisory Leadership.

1971 saw the General Manager of Escom present several trophies to units of Escom which had achieved outstanding results in the accident prevention programme. In addition to the General Manager, the Assistant General Manager, the Manager (Operations), the Manager (Electrical Engineering), and the Manager (Mechanical Engineering) also participated in the presentation ceremonies and, by deed and word, committed themselves wholeheartedly to the pursuit of safety.

The General Manager also stated that he believed that there is no task in the Commission's programme which cannot be performed both safely and efficiently.

Managers of Undertakings, Heads of Departments, Sections and Units generally followed the example of Management and organised accident prevention programmes, of varying merit, have been introduced at virtually all Escom units.

3. Joint Consultation on Accident Prevention Matters.

Most undertakings and stations appointed accident prevention committees. Those without, have indicated that they intend appointing such committees in the near future. It would appear that most of the committees are having success in establishing an organised accident prevention programme at the units they represent.

4. The Appointment of Full-time Accident Prevention Officers.

During 1971 all undertakings and several of the larger power stations appointed full-time accident prevention officers.

It is the duty of an Accident Prevention Officer to win the confidence of line management, and to convince them that he is there to assist them and can be of great service to the production programme, if given the opportunity to do so.

5. Codes of Practice and Standards.

The year 1971 closed with the following in progress :

1. Revised operating regulations.
2. A summary of the Factories Act.
3. An Escom safety colour code.
4. The issue of hard hats.
5. The issue of foot protection.
6. A standard method of testing operators.
7. A standard method of reporting and recording work injury experience.

2. Leierskap deur Bestuur en Toesig.

Gedurende 1971 het Evkom se Hoofbestuurder etlike wisselbekers aan eenhede van Evkom wat uitmuntende prestasies op die gebied van ongelukvoorkoming behaal het, oorhandig. Daarbenewens het die Assistent-hoofbestuurder, die Bestuurder (Bedryf), die Bestuurder (Elektrotegniese Ingenieurswese) en die Bestuurder (Meganiese Ingenieurswese) ook aan die oorhandigingsplegtighede deelgeneem en deur woord en daad hulleself tot die nastrewe van veiligheid verbind.

Die Bestuurders van Ondernemings, Hoofde van Afdelings, Seksies en Eenhede het feitlik deurgaans die voorbeeld van Bestuur gevolg en 'n georganiseerde ongelukvoorkomingsprogram, van wisselende gehalte, is bykans in elke Evkom eenheid ingevoer.

3. Samesprekings in Sake Ongelukvoorkoming.

Veiligheidskomitees is bykans by alle Ondernemings en Stasies gestig. Ondernemings waar hierdie komitees nog nie gestig is nie het aangedui dat hulle eersdaags sodanige komitees sal stig. Daar moet gemeld word dat die meerderheid komitees met hulle oorleplegings sukses behaal het.

4. Die Aanstelling van Voltydse Ongelukvoorkomingsbeamptes.

Gedurende 1971 het al die ondernemings en groter kragstasies voltydse ongelukvoorkomingsbeamptes aangestel.

Hierdie manne het 'n groot taak aangepak en hul dienste kan vir die produksieprogram baie beteken indien hulle die geleentheid gegun word om hul plek vol te staan.

5. Ongelukvoorkomingstandaarde.

Die jaar 1971 het met die volgende standaarde ter tafel gesluit :—

1. Hersiende bedryfsregulasies
2. 'n Opsomming van die Fabriekswet
3. 'n Evkom-kleurkode vir veiligheid
4. 'n Kode vir die uitreiking van harde hoede.
5. 'n Kode vir die uitreiking van voetbeskerming
6. 'n Standaardmetode om werkbeserings aan te teken en te meet
7. 'n Evkom-toekenningskema vir uitmuntende veiligheidsprestasies

8. An Escom award scheme for outstanding safety achievements.

6. Training of Employees.

During the past year progress was made in the field of safety training.

Safety is now included in virtually all formal training courses held at the Klip Training Centre.

With the appointment of additional staff at the Klip Training Centre, including a Bantu Trainer, there is great promise of expanding safety training together with other training during 1972.

Induction training of new employees remains a pressing problem, and it must be remembered that whilst training and accident prevention officers can assist in training, it remains the responsibility of line management and supervision to ensure that training is carried out effectively.

7. Accident Recording and Reporting.

Statistics for the year indicate that substantial progress is being made in reducing the number of accidents experienced. With the injury frequency rate slashed by some fifty percent, the results for 1971 are most pleasing.

8. Accident Prevention Publicity.

Accident prevention received a fair share of publicity during 1971, the most significant aspect being the presentation of trophies. The General Manager's trophy for the greatest improvement was won by the following units :

Undertakings—
Cape Western Undertaking

Distribution—
Cape Western Undertaking

Construction—
Natal Construction (Central)

Generation—
Colenso Power Station

Power Station under Construction—
Hendrina Power Station

General—
Rand and O.F.S. Cable Department

The following units received the Manager (Operations) trophy for 1 000 000 injury-free man-hours :

Hex River Power Station
Colenso Power Station
Vierfontein Power Station

6. Opleiding van Werknemers.

Gedurende die jaar is 'n vooruitgang op die gebied van veiligheidsopleiding gemaak.

Ongelukvoorkoming word nou as 'n deel van feitlik alle formele opleidingskursusse wat by die Klip-opleidingssentrum aangebied word, ingesluit.

Met die aanstelling van bykomende personeel by die opleidingsentrum, insluitende 'n Bantoe-opleidingsbeampte, is daar groot hoop dat veiligheidsopleiding, tesame met ander opleiding, gedurende 1972 geweldig sal uitbrei.

Die induksie-opleiding van werknemers is nog 'n groot probleem en daar moet onthou word dat alhoewel opleidings- en ongelukvoorkomingsbeamptes met opleiding behulpsaam kan wees, die verantwoordelikheid om toe te sien dat die opleiding doeltreffend is, die van eenheidsbestuur en toesig bly.

7. Aanteken van Beserings.

Die statistiek in hierdie oorsig toon dat daadwerklike vooruitgang gemaak word en dat die beseringsyfer met bykans 50 persent gedaal het.

8. Reklame.

Ongelukvoorkoming het gedurende 1971 baie goeie reklame geniet, waarvan die noemenswaardigste die oorhandiging van wisselbekers vir verbeteringsprestasie aan die volgende eenhede is :

Ondernemings—
Wes-Kaaplandse Onderneming

Distribusie—
Wes-Kaaplandse Onderneming

Konstruksie—
Natal-konstruksie (Sentraal)

Kragopwekking—
Colensokragstasie

Kragstasie (Konstruksie)—
Hendrinakragstasie

Algemeen—
Randse en OVS Onderneming (Kabelafdeling)

Die wisselbeker van die Bestuurder (Bedryf) vir 1 000 000 beseringsvrye man-ure is aan die volgende eenhede toegeken :

Hexrivierkragstasie
Colensakragstasie
Vierfonteinkragstasie.

Hendrina Power Station (Operation)
Hendrina Power Station (Construction)
Klip Power Station

It is significant that, with the exception of Hendrina Construction, only Generation Stations managed to achieve 1 000 000 injury-free hours.

Hendrina Construction's million injury-free hours is especially noteworthy as the hours include all contractor's hours.

Publicity also includes the display of safety posters and the erection of safety boards indicating the accident experience for the unit concerned. Many of these boards have been erected during the past year.

NOSA safety films were screened at many units and the film "Pulse of Life" purchased by Escom was shown to virtually all employees.

9. Provision of Safe Working Conditions.

It can be stated with confidence that 1971 was a great year for the correction of unsafe conditions. Most units have introduced formal inspection systems to bring to light hazards which have to be eliminated.

In addition to inspections arranged by undertakings, departments and the units themselves, NOSA was called upon to carry out detailed inspections.

There is hardly a unit in the Natal Undertaking which has not received an "A" rating from NOSA.

It is generally found that units which employ an organised inspection system follow the official NOSA checklist which is a very good one, and includes the following :—

1. Buildings and floors—clean and in good state of repair.
2. Lighting—clean lights and adequate lighting.
3. Good ventilation.
4. Aisles and storage area demarcated.
5. Good stacking practices (dumping as opposed to stacking).
6. Working areas and yards clear of superfluous material.
7. Rubbish and scrap bins provided and cleared.
8. Machine guarding.
9. Labelling of switches, valves, isolators, etc.
10. Ladders.
11. Handrails and toeboards.
12. Lifting gear and records.

Hendrinakragstasie (Bedryf)
Hendrinakragstasie (Konstruksie)
Klipkragstasie.

Dit is interessant dat met uitsondering van Hendrina (Konstruksie), alleenlik kragstasies daarin geslaag het om 1 000 000 beseringsvrye man-ure te behaal.

Hendrina-konstruksie se miljoen beseringsvrye man-ure is nog meer lofwaardig as 'n mens in ag neem dat die ure dié van die kontrakteurs ook insluit.

Reklame sluit ook die vertoon van plakkate in en die oprigting van borde wat aantoon hoe die eenheid in ongelukondervinding vaar. Baie van hierdie borde is gedurende die jaar opgerig.

Rolprente is van NOSA verkry en word deur baie eenhede vertoon.

Evkom het ook die rolprent „Pulse of Life" aan gekoop en dit is aan bykans alle Evkom-werknemers vertoon.

9. Die Daarstelling van Veilige Werkomstandighede.

Daar kan met reg gesê word dat daar in die jaar 1971 op hierdie gebied baie vordering gemaak is. Bykans alle eenhede het formele inspeksiestelsels ingevoer waardeur onveilige toestande aan die lig gebring word.

Baie eenhede het ook van NOSA gebruik gemaak om met inspeksie te help.

Daar is seker nie 'n enkele eenheid in Natal wat nie van NOSA 'n „A"- gradering verwerf het nie.

Met inspeksies word bevind dat baie eenhede die bekende NOSA-inspeksielys gebruik om te verseker dat alle aspekte by die inspeksie betrek word. Hierdie lys sluit die volgende in :

1. Vloere en geboue—skoon en in 'n goeie toestand.
2. Goeie beligting—skoon ligte en genoegsame ligte.
3. Goeie lugreëling.
4. Loopgangetjies en bergingsgebiede afgebaken.
5. Goeie stapelpraktyk.
6. Werksgebied en werf skoon van onbruikbare en afvalmateriaal.
7. Vuilisblikke voorsien en skoon gehou.
8. Masjienbeskerming.
9. Merk van skakelaars, kleppe, ens.
10. Lere.
11. Handrelings en voetplanke.
12. Takelgery en rekords.

13. Compressed gases.
14. Condition of portable electrical equipment.
15. Use of earth-leakage devices.
16. General electrical installation.
17. Temporary electrical installations.
18. Hand tools.
19. Hard hats.
20. Eye protection.
21. Foot protection.
22. Protective clothing.
23. Breathing apparatus.
24. Fire extinguishers.

10. First Aid and Industrial Health.

During 1971 industrial nurses were appointed at many of the power stations and first aid services of a very high standard are now available at these stations.

Many employees have attended first aid courses during the year, and although there is still an acute shortage of qualified first aiders generally, the first aiders who qualified during 1971 have greatly relieved the shortage.

11. Co-operation with NOSA.

During 1971 close co-operation was maintained with NOSA. The NOSA awards banquet was well attended by Escom.

Many undertakings participated actively in NOSA affairs, and it is trusted that this tendency will increase during the next year.

NOSA offers, amongst other services, the following :—

1. Merit ratings of premises.
2. Regular meetings where accident prevention matters are discussed.
3. Safety training courses for European supervisors and Boss Boys.
4. A national award scheme for outstanding safety achievements.
5. A comprehensive film library.
6. A comprehensive library.
7. A safety problem consultation service.
8. National and Regional safety competitions.
9. Safety posters.
10. Various safety booklets and registers.

12. Injury Statistics.

1. Graph A shows the injury frequency rates for All Generation for the years 1966 to 1971.

2. Graph B shows the injury frequency rates for All Escom Units for the years 1966 to 1971.

13. Gasse onder druk.
14. Draagbare elektriese gereedskap.
15. Aardlekkasie-installasie.
16. Elektriese bedrading.
17. Tydelike elektriese bedrading.
18. Handgereedskap.
19. Harde hoede.
20. Oogbeskerming.
21. Voetbeskerming.
22. Beskermende klere.
23. Asemhalingsapparaat.
24. Brandbestrydingsapparaat.

10. Noodhulp en Nywerheidsgesondheid.

Gedurende 1971 is nywerheidsverpleegsters by die groter kragstasies aangestel en noodhulp van 'n baie hoë standaard word by hierdie stasies aangebied.

Alhoewel baie persone hul gedurende die jaar in noodhulp bekwaam het, bestaan daar nog 'n groot tekort aan sulke mense. Nietemin word vertrou dat hierdie tekort eersdaags sal verdwyn.

11. Samewerking met NOSA.

Daar was gedurende die jaar baie goeie samewerking met NOSA.

Die meeste van die ondernemings het aktief aan NOSA-aktiwiteite deelgeneem en daar word vertrou dat hierdie deelname in die toekoms verder sal toeneem.

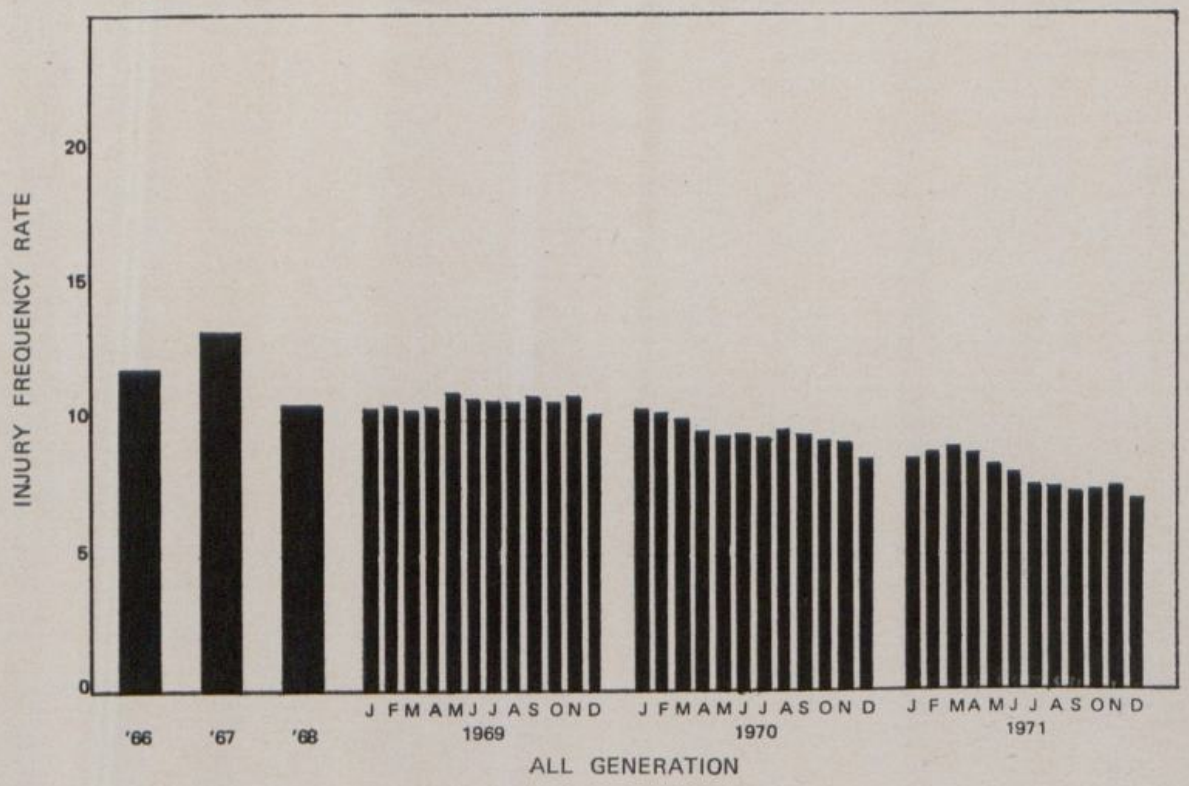
Onder andere bied NOSA die volgende dienste aan :—

1. Gradering van persele.
2. Reël van gereelde vergaderings waar ongelukvoorkomingsaangeleenthede bespreek word.
3. Opleidingskursusse vir Blanke en Nie-Blanke toesighouers.
4. Nasionale toekennings vir uitmuntende veiligheidsprestasies.
5. 'n Rolprentbiblioteek.
6. 'n Uitgebreide biblioteek.
7. Die oplossing van spesifieke veiligheidsprobleme.
8. Nasionale en streekskompetisies.
9. Die uitgawe van plakkate.
10. Verskillende veiligheidsboekies en -registers.

12. Beseringstatistiek.

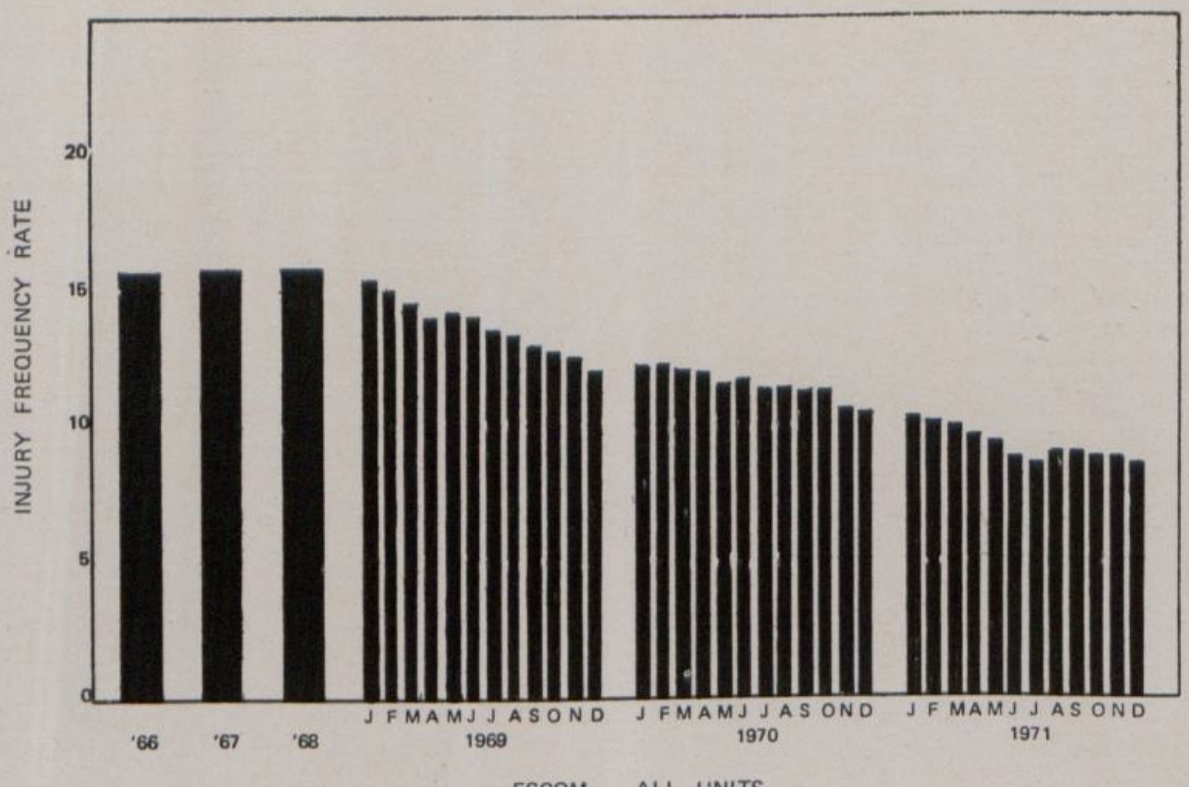
1. Grafiek A toon die beseringsfrekwensie vir alle Kragontwikkeling vir die jare 1966 tot 1971.
2. Grafiek B toon die beseringsfrekwensie vir alle Evkom Eenhede vir die jare 1966 tot 1971.

GRAPH A



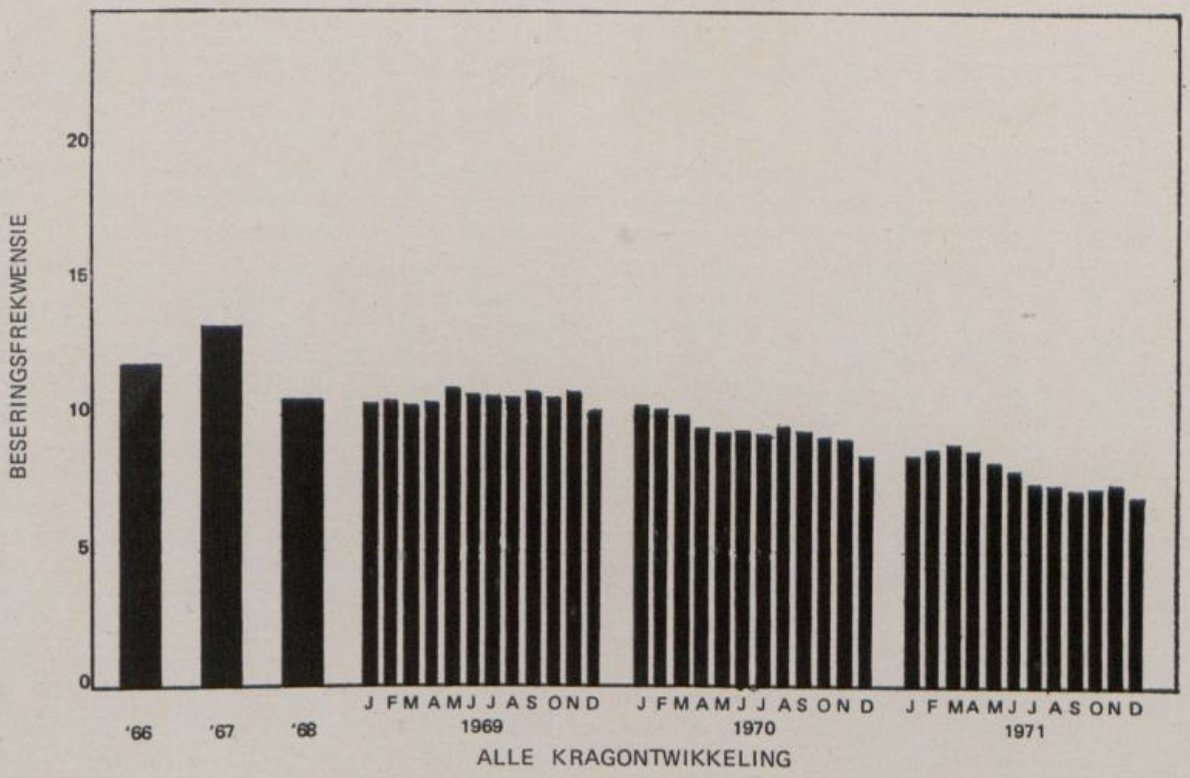
ALL GENERATION

GRAPH B



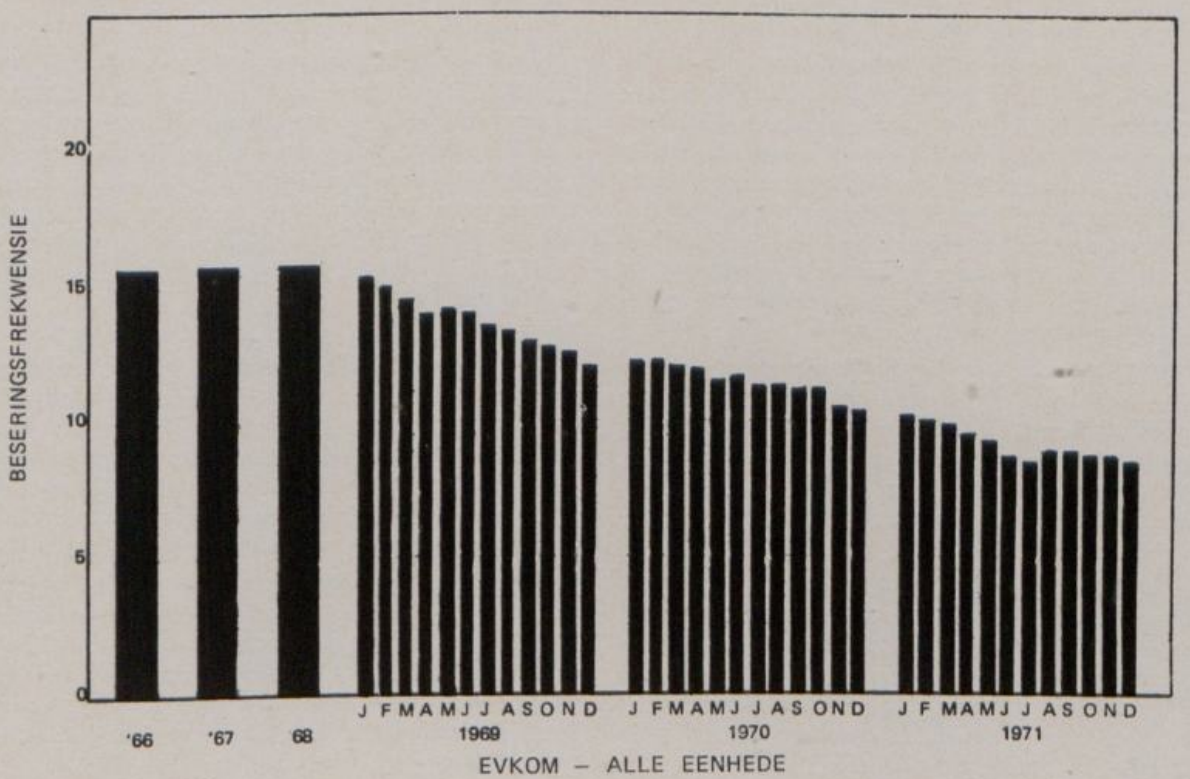
ESCOM – ALL UNITS

GRAFIEK A



ALLE KRAGONTWIKKELING

GRAFIEK B



EVKOM – ALLE EENHEDE

UNDERGROUND POWER DISTRIBUTION CABLES
A REVIEW OF A CHANGING TECHNOLOGY

By D. H. BOOTH, B.Sc. (Eng.), C.Eng., F.I.E.E.

1. INTRODUCTION.

The development of electrical distribution systems in different parts of the world has followed two distinctly different design approaches.

The first used in the majority of countries not directly influenced by North American technology is based on a three-phase network. It is traditionally associated with multi-core cables and an effective earthing and protection system in the form if a metallic sheath or wire armour of such a cross section as to be sufficient to carry a fault current of between 50—100% of the full current rating of the phase conductor. The outer metallic shield also provides a degree of mechanical protection and acts as a safety "earthing electrode" in the event of a mechanical object penetrating the outer covering and touching the live conductors.

The second approach used largely but not entirely in areas of North American influence has as a basis a single phase network and single round core cables, normally with a very limited fault current carrying capacity and little protection against external interference. This simple concept has encouraged the utilisation of elastomeric insulation systems and a design which can be used for overhead, ducted and even for the relatively small number of buried direct circuits.

The newer insulation systems such as chemically cross-linked polyethylene (XLPe) or ethylene propylene rubber (EPR) fit most naturally into the development pattern of the second form of approach and it is of particular interest to note that developments in this field have run in parallel with growth and development within the very progressive North American Chemical Industry and the nation-wide campaign to be rid of the ugly "wire-scapes" associated with overhead distribution.

It is a logical stage in the development process that the techniques apparently so successful in the one approach should be examined in order to determine the degree of their possible application to the other, even to the extent of challenging the viability of its fundamental philosophy in the light of new technologies.

Such an examination must however be critical, objective and take fully into account the basic design philosophies of the two schools of thought. It is rare in fact that one can have the best of both worlds. In this connection it is perhaps worth remembering the words (1) of one of the world's leading power cable engineers P. V. Hunter :

ONDERGRONDSE KRAG DISTRIBUSIE KABELS 'N OORSIG VAN 'N VERANDERDE TEGNOLOGIE

Deur D. H. BOOTH, B.Sc (Eng.), C.Eng., F.I.E.E.

1. INLEIDING.

In verskillende dele van die wêreld het die ontwikkeling van elektriese distribusiestelsels duidelik twee afsonderlike ontwerpe aangeneem.

Die eerste, wat gebruik word in die meerderheid lande wat nie deur Noord-Amerikaanse tegnologie beinvloed is nie, is gebaseer op 'n drie fase netwerk. Dit is verbind met veelvoudige aardkabels en 'n effektiewe bedrading asook 'n beskermingstelsel in die vorm van 'n metaalomhulsel of draadkabel wat voldoende is om 'n foutiewe stroom te dra tussen 50—100% van die volle stroom se vermoë van die geleier. Die metaalomhulsel wat voorsien word is in sekere opsigte ook 'n meganiese beskerming en dien as 'n veilige „aardaansluiter elektrode" in die geval waar 'n meganiese voorwerp deurdring na die omhulsel en die stroomgeleier aanraak.

Die tweede benadering wat dikwels deur die Noord-Amerikaanse gebiede beinvloed word, gebruik basies 'n enkel fase netwerk en enkelronde aardkabels normaalweg met 'n beperkte foutiewe stroom kapasiteit met wynig beskerming teen invloede van buite. Hierdie eenvoudige konsep het die gebruik van buigsamer isoleringstelsels en 'n ontwerp wat oorhoofs gebruik kan word, gebuis en selfs vir 'n relatiewe klein getal van ondergrondse direkte kabels.

Die nuutste isoleringmetodes soos chemiese aaneenkoppeling polietileen (XLPe) of etileen propileen rubber (ERP) pas vanselfsprekend in die ontwikkelingspatroon van laasgenoemde. Dit is interessant om te weet dat verwikkelings in hierdie veld ooreenkomstig gegroei en ontwikkel het in die progressiewe Noord-Amerikaanse Chemiese Nywerheid, wat gepaard gegaan het met die volk se veldtog om ontslae te raak van lugdraadverspreiding.

Dit is 'n logiese stadium in die ontwikkelingsproses dat die tegniek wat skynbaar so suksesvol in die een benadering is, ondersoek behoort te word ten einde vas te stel tot watter mate die gebruik van die een op die ander toegepas kan word, selfs tot daardie mate om die lewensvatbaarheid van sy fundamentele filosofie in die lig van nuwe tegnieke uit te daag.

So 'n ondersoek moet egter krities, objektief en albei basiese ontwerp teorieë van die twee skole in ag neem. Dit is baie seldsaam dat enigeen die beste van albei wêrelde het. In hierdie verband is dit miskien die moeite werd om die woorde (1) van een van die wêreld se leidende kragkabel ingenieurs, P. V. Hunter, te onthou :

"It is with difficulty that engineers have been brought to realise that the most important part of engineering is not the technical results of their productions, nor their engineering beauty, but their economic efficiency."

Much can be learnt by comparing the experiences of others and in this Paper a brief review is made of world trends in the design of cables for underground distribution. The problems of ensuring complete integration of design and of drawing up satisfactory proving test programmes are discussed and the Paper concludes with views on the relevance of the general situation to the present South African position.

2. OVERSEAS INSTALLATION PRACTICES.

(i) Europe

At low voltage there are considerable installations in the major cable using countries of combined neutral and earth (CNE) cables used either as, for example, in Germany on protective multiple earthed (PME) circuits or as in France on traditional circuits where no attempt is made to bring a true earth into the consumers' premises. (2)

In Germany there is a clear division between the attitude of the major undertaking such as Berlin and Hamburg who have developed designs using impregnated paper in association with aluminium conductor and sheaths (3) (now generally known as CONSAC), and the many small undertakings who have made great use of PVC using a design involving a concentric copper wire neutral (4) (CEANDER), arguing that ease of jointing necessary with their limited recources more than compensates for the increased cable cost. Further reduction in the cost of this construction by using an aluminium wire neutral (now used in France and the U.K.) (5) is forbidden by regulation and cost reduction is being obtained by the use of four PVC insulated solid aluminium conductors laid up and sheathed overall with PVC. (4) This is a radical change from the previous European insistence on underground power cables having a concentric metallic shield and is still the subject of considerable controversy. It is, however, the only design of synthetic low voltage cable that can approach the cost of the CONSAC design. PVC is used in Germany for service cables.

The United Kingdom has rejected the use of

„Dit was moeilik om ingenieurs te laat besef dat die mees belangrikste deel van die werk van 'n ingenieur nie die tegniese resultate van hul voortbrengsels is nie, ook nie die werktuigkundige prag daarvan nie, maar hul ekonomiese bekwaamhede."

Heelwat kan geleer word deur 'n vergelyking van ander se ervarings en derhalwe sal in hierdie referaat 'n kort oorsig van wêreldtendense in die ontwerp van kabels vir ondergrondse verbruik gestel word. Die probleme om met sekerheid volledige integrasie van die ontwerp asook die optrek van bevredigende toetsprogramme te verkry word dus bespreek sowel as die gevolgtrekkings, toespaslikhede met menings in verband met die huidige algemene posisie in Suid-Afrika.

2. BUITELANDSE INSTALLERINGS PRAKTYKE.

(i) Europa.

By laagspanning bestaan daar 'n groot aantal installerings in die hoofkabel verbruikerslande van 'n gekombineerde neutrale en aardleiding (GNA) kabels, wat gebruik kan word, soos bv. in Duitsland as 'n beskermende veelvoudige bedradings (BVB) stroombane of soos in Frankryk op die tradisionele stroombane waar geen poging aangewend word om 'n werklike aardleiding in die verbruiker se persele aan te bring. (2)

In Duitsland is daar 'n duidelik onderskeiding by die benadering van groter ondernemings soos bv. Berlyn en Hamburg wat ontwerpe ontwikkel het deur deurdrenkte papier te gebruik in oorleg met 'n aluminium geleier en omhulsel (3) (algemeen bekend as CONSAC) en die baie kleiner ondernemings word daar grootliks gebruik gemaak van PVC koperringkabel wat neutraal geheg (4) (CEANDER), ter aanvoering dat die vergemaklikheid van verbinding noodsaaklik met beperkte hulpmiddels meer dan vergoed vir die verhoogde kabelkoste. Voorts 'n vermindering in die koste van hierdie konstruksie deur die gebruik van aluminium draad neutraal (nou deur Frankryk en V.K. gebruik) (5) is verbode deur regulasie en kostevermindering word verkry deur die gebruik van vier PVC isolerings soliede aluminium geleiers gelê op en algemeen bedek met PVC. (4) Hierdie is 'n radikale verskil om die vorige Europese vasstelling van ondergrondse kragkabels met 'n koperring bedekking en is nog steeds die onderwerp van 'n groot twispunt. Dit is egter die enigste ontwerp van sintetiese laagspanning kabel wat enigsins naby die koste van die CONSAC ontwerp kom. PVC word in Duitsland vir dienskabels aangewend.

Die Verenigde Koninkryk het die gebruik

PVC for the insulation of main distribution cables preferring coarse protective systems and therefore the thermally tolerant materials, impregnated paper, XLPe or EPR.

Up to June, 1972 approximately 57% off the CNE cables purchased by the Area Boards have been CONSAC and the remainder one or other of the two synthetic designs available WAVECONAL (5) or DISTRICABLE (6). There is no use for the unshielded design in the U.K. though limited quantities have been installed in Eire with EPR insulation and PVC sheathing. PVC is widely but not universally used for service cables and on normally earthed circuits the split concentric construction is favoured. On PME circuits service cables with a full concentric are used and there is a growing trend towards these being of aluminium.

When France was considering methods of reducing costs of its underground distribution system, two factors were of particular significance. Firstly a desire to introduce live jointing (standard practice in Germany and the U.K.) and secondly, XLPe could be purchased at a lower price (because of a loop-hole in licencing arrangements) than anywhere else in Europe. The first factor provoked a policy decision to base developments on synthetic cables with their potentially simpler jointing and the second swung the balance in favour of XLPe rather than PVC or EPR. France has a greater use of aerial cables than most other European countries and XLPe is replacing butyl in this field.

At 11kV the present position in the above countries firmly favours impregnated paper with only France showing a limited involvement with straight Polyethylene and XLPe. Germany is still in the main using steel armoured lead sheathed cable but in the U.K. there are indications of the extension of aluminium sheathing into 11kV. (7)

The position in Scandinavia is however quite different and here both PVC and XLPe predominate over impregnated paper but with cable designs related to traditional multi core practice rather than following North American concepts. PVC is normally used up to and including 10kV with XLPe used for 20kV and even some higher voltage circuits.

Holland still retains the more traditional

van PVC vir isolering van hoof verspreidings kabels verwerp en verkies die ru-beskermende stelstels en daarom die hittebestande materiale, deurdrenkte papier, XLPe of EPR.

Tot Junie 1972 was ongeveer 57% van CNE kabels wat aangekoop was deur die Gebiedsrade CONSAC gewees, van die oorblywende twee sintetiese ontwerpe wat beskikbaar was staan bekend as WAVECONAL (5) of DISTRICABLE (6). Daar bestaan geen aanvraag vir die onbeskutte ontwerp in die Verenigde Koninkryk alhoewel beperkte hoeveelhede geinstalleer is in Eire met EPR isolering en PVC as bedekking. PVC omhulsel word in groot dele gebruik maar nie oor die algemeen vir dienskabels nie en by normale grondbedrading word aan die ringkabel konstruksie voorkeur verleen. Op PME geleier dienskabels, ten volle konsentries, is in gebruik en daar bestaan 'n groeiende tendens dat dit van aluminium moet wees.

Toe Frankryk dit oorweeg het om uitgawes te verlaag ten opsigte van hul ondergrondse distribusie stelsels, was daar twee faktore van besondere belang. Eerstens 'n behoefte vir die instelling van lewendige naatvorming (standaard praktyk in Duitsland en die Verenigde Koninkryk) en tweedens XLPe kon teen 'n laer prys aangekoop word (vanweë 'n opening in die lisensie reëlings) as enige ander plek in Europa.

Die eerste faktor wat aanleiding gegee het tot 'n besluit om ontwikkeling te baseer op sintetiese kabels was die moontlikheid dat kabels makliker geheg kan word. Tweedens het die balans gedraai ten gunste van XLPe in plaas van PVC of EPR. Frankryk het 'n groter gebruik vir lugdraadkabels in teenstelling met die meeste ander Europese lande en XLPe vervang „butyl" op hierdie gebied.

Die huidige posisie dui dus daarop aan dat bogenoemde lande beslis deurweekte papier verkies vir gebruik by 11kV met die uitsondering van Frankryk wat 'n geringe belangstelling toon in poli-etheleen en EXPe. Duitsland gebruik nog grotendeels bedekte pantserkabels, maar in die Verenigde Koninkryk is daar reeds aanduidings dat aluminium bedekte kabels uitbrei tot by 11kV. (7)

In Skandinawia is die posisie egter heelwat verskillend. Die oorheersende faktor in hierdie land bly PVC en XLPe in plaas van deurweekte papier. Die gebruik van veelvoudige kernkabels is hier van toespassing instede om Noord-Amerika se voorbeelde te volg. PVC word normaalweg gebruik tot by 10kV en XLPe tot by 20kV, maar kan ook vir hoër stroomspannings gebruik word.

Holland behou egter die tradisionele bena-

approach and there is little use of either of the new cable constructions or of the new insulating materials. Certain pioneering work in the manufacture of high voltage straight polyethylene cable has however been carried out.

Other European countries show various degrees of emphasis between these extremes. Spain for example is rapidly changing to a general use of XLPe while Italy is still mainly wedded to PVC and impregnated paper but with a tendency to favour EPR rather than XLPe in its limited use of the vulcanisable materials. Eastern Europe is mainly concerned with impregnated paper and PVC though investment is now being made for example in Yugoslavia in plant for production of cables using XLPe and EPR.

In view of the important influence of the introduction of the new insulants on power cable design, it is inevitable that any discussion of comparative practices becomes dominated by consideration of the choice of insulant. However, the large scale use of aluminium both in stranded and solid form for conductors or for sheathing has also had a major influence on design and cost reductions. In the U.K. for example the range of rationalised cables for Area Board use is practically entirely based on aluminium conductors.

(ii) **North America**

The distribution system of North America has developed round a combination of aerial and ducted networks substantially using the same basic designs of cable. The majority of Utilities in fact have only the most limited experience with underground cables and much of the underground programme undertaken during the last decade is little more than applying basic local overhead practices underground and there is little evidence that an objective appraisal has been made to establish that this is in fact overall the most economic method of distributing electric power under their conditions. The long established users of underground cables, for example Los Angeles, have in fact conventional networks closer to European practice and still use in the main impregnated paper cables.

In providing insulants for underground cables the active chemical and petro-chemical industries in the U.S.A. have supplied in rapid succession SBR, Butyl, straight polyethylene, high density polyethylene, chemically cross-linked polyethylene, EPR and now polyethylene extended EPR's. A

dering en daar word min gebruik van enige van die nuwe kabelkonstruksies of isolering materiale. Daar is egter al pionierswerk gedoen van die vervaardiging van hoog-stroomspanning poli-etheleen kabels.

Spanje is besig om oor te gaan tot die algemene gebruik van XLPe. Daar is egter Europese lande wat gemengde gevoelens het omtrent die gebruik van albei metodes. Italië maak hoofsaaklik nog gebruik van PVC en deurweekte papier, maar daar is oor die algemeen die neiging dat EPR meer daagliks gebruik word. In dele van Oos-Europa is die belangstelling hoofsaaklik in PVC en deurweekte papier. In Joegoslawië word daar tans ondersoek ingestel na die moontlikheid vir die vervaardiging van kabels wat XLPe en EPR kan gebruik.

Vanweë die feit dat belangrike invloede op die ingebruikneming van nuwe isolemente op kragkabelontwerp ontstaan, is dit onvermydelik dat enige bespreking van vergelykende praktyke oorheersend sal wees by die oorweging van die keuse van isolemente. Die grootskaalse verbruik van aluminium beide in stringkabel en soliede vorm vir geleiers of vir bedekking het ook 'n groot invloed op ontwerp en kostebesparings gehad. In die Verenigde Koninkryk word bv. die reeks vir gerasionaliseerde kabels vir die Gebiedsraad se gebruik hoofsaaklik gebaseer op aluminium geleiers.

(ii) **Noord-Amerika.**

Die distribusiestelsel van Noord-Amerika het ontwikkel in 'n kombinasie van lugdraad en geleibuis netwerke wat deurentyd basies dieselfde ontwerp van kabels benut. Die meerderheid ondernemings het inderdaad die mees beperkte ondervinding van ondergrondse kabels en heelwat van die ondergrondse program wat gedurende die laaste dekade onderneem is, is weinig meer as die basiese toepassing van plaaslike oorhoofse praktyke ondergronds en daar bestaan weinig bewyse dat 'n objektiewe evaluering gedoen is om vas te stel dat dit inderdaad algemeen die beste ekonomiese metode van die verspreiding van elektriese krag onder die toestande is. Die ou gevestigde verbruikers van ondergrondse kabels, bv. Los Angeles, gebruik konvensionele netwerke nader aan die Europese praktyke en gebruik nog steeds deurweekte papierkabels.

In die beskikbaarstelling van isolemente vir ondergrondse kabels het die aktiewe chemiese en petro-chemiese nywerheid in die V.S.A., met vinnige opeenvolging, SBR, Butyl, gewone poli-etheleen, hoogspannings poli-etheleen, chemiese kruisverbinding poli-etheleen, EPR en nou poli-

strange factor which is difficult to understand is the nearly complete abscence of any consideration being given to PVC in North America.

For URD circuits at both the secondary and high voltage levels, single core designs are used but some triplexing is being carried out, particularly on the secondary circuits. Some Utilities favour installation in plastic ducts which are in fact supplied as an intergral part of the manufactured product for more traditional circuits. Multi core designs are used mainly in paper but there is a greater use now being made of both XLPe and EPR.

(iii) **Asia**

Japan came very strongly under the influence of both North American technology and capital after the last world war and it is perhaps therefore not suprising that this country follows North American practices more closely than any other. PVC was however used on low voltage circuits but there is now a more general change over to XLPe for voltages up to 69kV and experimental cables have in fact been made for higher voltages. In general the constructions have followed more traditional multi core and fully protected forms but there is a growing use of the URD concept.

India had traditionally followed European practices in the use of paper cables but under Government decree there is now a general use of PVC for low voltage. This transition has however been slow and generally opposed by the major Utilities. The Government attempted to insist on the use of PVC at 11kV also but the pressure is now for XLPe. However, in pratice, cables at this voltage still follow traditional paper/lead/armour practice.

The area in South East Asia from Indonesia to Taiwan is of particular interest as in many of these rapidly growing countries fundemental considerations are being given to their method of electrical distribution. With the exception of one of the Utilities in Hong Kong and in Thailand and the Phillipines there is in the main a continuation of the use of impregnated paper, even at low voltage, in these countries. This is of particular interest in view of the strong Japanese influence on this area. Similarly traditionally large underground cable users such as Singapore have not as yet shown any significant move away from impregnated paper.

Finally, in Asia recent experiences in Iran are of some significance because again after a

etheleen uitgebreide EPR' voorsien. 'n Vreemde faktor wat moeilik te begrype is, is die feitlik geheel afwesigheid van enige oorweging wat gegee word aan PVC in Noord-Amerika.

Vir URD stroombane by beide die sekondêre en hoë stroomspanninge, word enkel kabelstring ontwerpe gebruik, sommige word drievouding gedoen veral by addisionele stroombane. Sekere ondernemings verkies dat installering in plastiese geleibuise gedoen word, wat in elk geval voorsien word as 'n volledige deel van die vervaardigde produk vir stroombuise. Vir veelvoudige aardontwerpe word papier gebruik, alhoewel die aanvraag nou groter geword het vir XLPe en EPR.

(iii) **Asië.**

Japan het sterk onder invloed van die Noord-Amerikaanse tegnologie en kapitaal na die eerste wêreld oorlog verkeer en dit is daarom nie verbasend dat Japan die stelsel van Noord-Amerika beter toegepas het as enige ander metode. PVC was normaalweg gebruik vir lae stroomspanninge maar daar is nou 'n algemene verandering om XLPe te gebruik vir stroomspanninge tot by 69kV, en eksperimentele kabels is inderdaad reeds vervaardig vir hoër stroomspanninge. In die algemeen het die konstruksies die meer tradisionele veelvoudige kabelstring en beter beskermende vorms gevolg maar daar is 'n groeiende gebruik van die URD konsep.

Indië het tradisionele Europese stelsels gevolg in die gebruik van papierkabels maar onder Staatsbevel is daar nou 'n algemene gebruik van PVC vir lae stroomspanninge. Hierdie verandering vorder stadig en word soms teengestaan deur die groter ondernemings. Die Staat het probeer aandring op die gebruik van PVC tot by 11kV, maar tans word XLPe meer gebruik. Die metode van papier/lood/pantserkabels is nog van toepassing tot op hierdie spanninge.

Soos in baie van hierdie vooruitstrewende lande is die streek in Suid-Oos Asië vanaf Indonesië tot by Taiwan besonder interessant vir die basiese oorweging wat gegee word aan hul metode van elektriese distribusie. Met die uitsondering van een van die ondernemings in Hong Kong, en in Thailand en die Fillipyne is daar hoofsaaklik 'n opvolging in die gebruik van deurweekte papier, selfs by lae spanninge. In die lig gesien van die sterk Japanese invloed in hierdie streek is dit veral baie interessant dat selfs groot verbruikers van ondergrondse kabels soos bv. Singapoer nog geen tekens van belangstelling getoon het om van ander metodes, behalwe deurweekte papier gebruik te maak nie.

Ten slotte, in Asië is die jongste ondervindinge in Iran van betekenis veral na 'n besonder

most thorough examination of the distribution system prior to the granting of a World Bank loan, it has been decided that the new phase of development of the Teheran system should be made both at low voltage and 20kV with conventional impregnated paper cables in spite of the existence of a local cable industry completely equipped for the production of PVC cables.

(iv) **Australasia**

Australia was active some years ago in the investigation of PVC for low voltage distribution and in particular of the use of single core unprotected systems. This line of development was terminated as it was considered to show no real advantage and now the majority of Utilities are developing their systems using aluminium conductors, impregnated paper and either lead or aluminium sheaths. There is quite considerable use of PME with the majority of Utilities favouring CONSAC but one Waveconal. The opportunity has not been taken with the introduction of PME to return to the unshielded construction.

In New Zealand which had been traditional in its approach the situation was disturbed in 1965 by a North American company setting up facilities for the manufacture of XLPe cables. There was an attempt to back this by legislation forbidding import of 11kV cables but in the event local manufacture has supplied this need for paper cables and the actual growth of XLPe in the country has been incredibly slow in view of the facilities that are available.

(v) **Service Experience**

Cable constructions based on impregnated paper insulation have overall given sterling service and the service difficulties whether they have manifested themselves as electrical or mechanical faults have in the main resulted from movement of the impregnant. Such difficulties have promoted the use of the synthetic insulants in some areas but in others the change to non-draining type impregnated paper systems, either mass- impregnated, non-draining or pre-impregnated have removed this source of difficulty.

Similarly PVC has given a good service performance except where attempts have been made to use it on coarsely protected and heavily loaded circuits.

In the rush to introduce straight polyethylene and XLPe in North America many errors of judgement were made, particularly in permitting use of tape conductor screens and excessively

deeglike ondersoek van die verdelingstelsel voordat 'n Wêreld Banklening toegestaan is. Daar is besluit dat die nuwe fase van ontwikkeling, van die stelsel van Teheran gebruik moet maak, van beide die laagspanning en 20kV met konvensionele deurweekte papierkabels ten spyte van die bestaan van 'n plaaslike kabelnywerheid wat volledig toegerus is om PVC kabels te vervaardig.

(iv) **Australasië.**

'n Paar jaar gelede was Anstralië aktief in hul ondersoek van PVC vir laagspanning distribusie en veral in die gebruik van hul metode van onbeskermende enkel aardkabels. Hierdie rigting van ontwikkeling het tot 'n einde geloop aangesien daar geen werklike vooruitgang was nie, en gevolglik ontwikkel die meerderheid van ondernemings hul stelsels gebaseer op aluminium geleiers; deurweekte papier en of lood of aluminium omhulsels. 'n Aanmerklike gebruik van PME bestaan by die meerderheid ondernemings wat ten gunste is van CONSAC met net een golfkanaal. Die geleentheid is nie benut met die ingebruikneming van PME om terug te keer tot die onbeskermende konstruksie.

In Nieu-Seeland wat tradisioneel was in sy benadering, is die situasie in 1965 ontwrig deur 'n Noord-Amerikaanse maatskappy wat die fasiliteite opgerig het vir die vervaardiging van XLPe kabels. Daar was 'n poging aangewend om dit by wyse van wetgewing te steun dat die invoer van 11kV kabels verbied word, maar hierdeur het die plaaslike vervaardigers die aanvraag vir papierkabels voorsien en die werklike groei van XLPe in dié land is ongelooflik swak vanweë die beskikbare fasiliteite.

(v) **Diens Ondervinding:**

Kabel konstruksies gebaseer op deurweekte papier isolering het oor die algemeen voortreflike diens gelewer en die diens moeilikhede wat wel voor gekom het toon elektriese of meganiese foute, dat dit hoofsaaklik ontstaan het deur die beweging van die deurweekte. Sulke probleme het die gebruik van sintetiese isolerings bevorder in sekere streke maar in ander streke dit verander na niedreinerende tipe deurweekte papier stelsels ,of massa-deurweekte, waardeur hierdie bron van probleme oorkom is.

Insgelyks het PVC 'n goeie diensverrigting verskaf behalwe waar pogings aangewend is om dit op 'n ru-beskermende en swaar belaaide stroombaan te gebruik.

In die stormloop om direkte poli-etheleen en XLPe in Noord-Amerika bekend te stel is baie foute gemaak veral om die gebruik van bandgeleier beskerming en buitensporige hoë vlakke van

high levels of discharge acceptibility. Service breakdowns resulting from these errors have been reported (8) and are undoubtedly causing serious problems today. In explaining these faults (9) and correctly emphasising that the majority were caused by bad design or manufacture, there is a danger that certain basic features of the materials are forgotten, e.g.

(a) Their very low resistance to discharge.

(b) Difficulty in obtaining materials free from contamination.

(c) Susceptability to degradation from water and sulphides coupled with the catalytic action of the presence of copper. (10)

(d) On a volume basis they are significantly more expensive than impregnated paper, or PVC.

Clearly the errors of judgement of the past will be avoided and every precaution will be taken in design, selection of materials and in manufacture to minimise the significance of these factors but many authoritites recognising the practical problems of large scale production coupled with the lack of complete understanding of the various degradation mechanisms advocate a cautious approach to the use of the new materials.

(vi) **Summary**

One cannot draw precise conclusions from such a review as practices in different countries are very much affected by local conditions but certain trends are clear :

(a) Utilities who have an established use of cables using non-draining impregnated paper or PVC insulation are in the main sceptical about the economic advantages of changing to designs using XLPe or EPR.

(b) If a Utility primarily using impregnated paper has access to aluminium sheathed constructions it is even less likely to wish to make the change to the new insulating materials.

(c) Economic and technical justification for North American type distribution systems has not been made outside areas affected by American capital investment.

(d) There is a different attitude to potential obsolescence between North America and the rest of the world. The advocacy of a short term life in so many areas of the North American economy has resulted in a pre-

ontlading toe te laat. Diens moeilikhede as gevolg van hierdie foute is aangemeld (8) en veroorsaak ongetwyfeld ernstige probleme vandag nog. Om hierdie foute te verduidelik (9) en nadruk te lê dat die meeste veroorsaak is deur die swak ontwerp of vervaardiging, is daar die gevaar dat sekere basiese kenmerke of materiale vergete gebly het, bv.:

(a) Hulle baie lae ontladings vermoë.

(b) Probleme in die verkryging van materiaal wat vry is van enige besoedeling.

(c) Vatbaarheid om verlaging van water en sulfate saamgestel met die katalitiese aksie van die teenwoordigheid van koper.

(d) Op 'n volume basis is hulle baie duurder as deurweekte papier of PVC.

Dit is duidelik dat die foute wat in die verlede voorgekom het in elke opsig vermy sal moet word wat ontwerp betref, keuse van materiale en in vervaardiging, maar baie owerhede erken die praktiese probleme van grootskaalse produksie tesame met die tekort van 'n algehele verstandhouding van die verskillende verslegte meganika en pleit vir 'n versigtige benadering in die gebruik van nuwe materiale.

(vi) **Opsomming.**

'n Mens kan nie presiese afleidings van so 'n oorsig maak nie, aangesien die praktyke in die verskillende lande besonderlik deur eie omstandighede geraak word, maar sekere tendense is egter duidelik :

(a) Ondernemings wat 'n gevestigde gebruik van kabels het en niedreinerende deurweekte papier of PVC isolering gebruik is oor die algemeen skepties omtrent die ekonomiese voordele om die ontwerp te verander en XLPe of EPR te gebruik.

(b) Indien 'n onderneming primêr 'n verbruiker is van deurweekte papier en toegang het tot aluminium bedekte konstruksies is dit onwaarskynlik dat hulle dit sal verander na nuwe isolerings materiale.

(c) Ekonomiese en tegniese regverdiging vir Noord-Amerikaanse tipe distribusiestel het nog nie ander streke benadeel deur Amerikaanse kapitaal beleggings.

(d) Daar bestaan 'n verskil in die benadering van die potensiële veroudering tussen Noord-Amerika en die res van die wêreld. Die bepleiting van 'n kort lewenstermyn in soveel sektors van die Noord-Amerikaanse ekonomie

paredness to take risks in commercial exploitation of developments which would not be accepted in the majority of other countries.

3. INTEGRATION OF SYSTEM DESIGN.

(i) General

There has been a tendency in the past, particularly at 11 kV and below to consider the design of cable and accessories in isolation and even to establish different design criteria for different components of the system. This could clearly lead to a total design which might not optimise either the technical or economic factors.

A few of the most important factors involved in system integration are discussed in this Section.

(ii) Thermal Performance.

Present published current ratings are based on maximum conductor temperatures assigned by the cable makers and these temperatures have in the main been governed by the thermal performance of the cable insulant. Interaction can however occur with other parts of the system, for example, on other components of the cable itself, on the system as a whole, including accessories, or with the environment, such as to cause drying out, which may have a reciprocal effect upon the cable system.

Taking the cable alone, the following factors must be considered when assigning maximum continuous and short-circuit operating temperatures:

(a) Possible ageing of the insulation.

(b) Effects in impregnated paper cables of compound viscosity / temperature characteristics and its possible effects on drainage and void formation.

(c) Effects in synthetic cables of insulation softening and possible deformation. Expansion and contraction in screened cables could cause development of voids between insulation and screens and thermo-mechanical effects could disturb screening layers.

(d) Possible significant changes in electrical performance either directly because of the material characteristics or indirectly because of void formation.

(e) Degradation of lead and lead alloy sheaths because of grain growth or fatigue.

(f) Possible softening and thermal degradation of non-metallic sheaths.

het as gevolg 'n bereidwilligheid vir die neem van risikos in besigheids ekploitasie van ontwikkelings wat nie in die meeste van die ander lande aanvaar word nie.

3. INEENSKAKELING VAN STELSELONTWERP

(i) Algemeen.

Daar was 'n neiging in die verlede veral by 11kV en laer, om die ontwerp van kabel en toebehore in isolasie en selfs om verskillende ontwerpe as maatstaf vir verskillende komponente van die stelsel te oorweeg. Dit kan duidelik lei tot 'n algehele ontwerp wat nie hoopvol kan wees vir tegniese of ekonomiese faktore nie.

'n Paar van die mees belangrikste faktore in die ineenskakeling van stelsels word in hierdie deel bespreek.

(ii) Hitte Verrigting.

Huidige gepubliseerde stroomvermoë word gebaseer op maksimum geleier temperature vasgestel deur die kabel vervaardigers. Hierdie temperature word oor die algemeen oorheers deur die hittespeling van die kabel isoleerder. Tussenaksie kan ook teenwoordig wees met ander dele van die stelsel, soos bv. op ander toebehore van die kabel, op die stelsel as 'n geheel, insluitende onderdele, of met die hele omgewing, soos om uitdrooging te veroorsaak wat 'n wederkerige effek op die kabelstelsel kan hê.

Met alleenlik die kabel, moet die volgende faktore in aanmerking geneem word wanneer maksimum opvolging aangewys word en kort omlopende temperature terruggebring word.

(a) Die moontlike veroudering van isoleering.

(b) Gevolge in deurweekte papier kabels van saamgestelde taaiheid/temperature karaktereienskappe en die moontlike gevolge op dreinering en lugruimte formasie.

(c) Uitwerking in sintetiese kabels van isolering wat sag raak en moontlike verandering van vorm. Uitsetting en inkrimping in beskermende kabels kan ruimtes veroorsaak tussen isolering en beskerming en hittemeganiese uitwerkings kan die beskermingslae ontwrig.

(d) Moontlike groot veranderings in elektriese speling of direk afhangende van die materiaal karaktertrekke of indirek deur beskadigde formasie.

(e) Verlaging van lood en loodallooi bedekking omdat die draad ontwikkel of verswak het.

(f) Moontlike versagting en hitte oorverlaging van nie-metaal bedekkings.

Similar factors could be detailed for joints and terminations.

Taking all such factors into account there seems to be a growing recognition that realistic maximum continuous operating temperatures for solid type distribution cables should be :

Paper insulated :

Up to 6,6 kV	80°C
11 kV belted	65°C
11 kV screened	70°C
PVC insulated	70°C
Polyethylene insulated	70°C
XLPe and EPR insulated	80°C

with all types, other than those insulated with straight polythylene having a maximum short-circuit temperature limit of 160°C. The use of straight polyethylene would reduce the maximum level to 130°C.

Some authorities, for example, IEC, argue for 90°C continuous and 250°C short-circuit as the level for XLPe and EPR cables. Whilst this can be accepted for the insulants assuming they have been specifically compounded for this duty, such a level does involve the use of more expensive protective coverings, taking precautions against soil drying out and increases the hazard of thermo-mechanical interference with screened interfaces and joint connectors and is therefore of doubtful economic advantage.

There is a danger in judging system performance on the basis that it has run successfully under maximum temperature conditions and has therefore latitude for greater current loading by increasing permissible maximum temperatures. Operation at maximum temperature rarely occurs for circuits of II kV and above and thought could be more usefully applied to better circuit utilisation within conservative temperature limits, rather than designing to higher levels in the hope that they will never be achieved and risking serious service difficulties if good circuit utilisation should be achieved.

(iii) **Mechanical Performance**

Three important factors should be considered under this heading :—

(a) Flexibility.

(b) Resistance to external damage.

(c) Resistance to thermo-mechanical forces.

Undoubtedly a major advantage of cables based on synthetic insulation is their flexibility. In contra-distinction their low cost rivals the

Soortgelyke faktore kan afgesonder word vir laste en eindpunte. In agnemende al hierdie faktore blyk dit dat daar 'n toenemende erkenning is dat realistiese maksimum opvolgbare werkende temperature vir soliede tipe distribusiekabels soos volg moet wees :

Papier isolering :

Tot by 6,6kV	80°C
11kV gordel	65°C
11kV beskutte	70°C
PVC isolering	70°C
Poli-etheleen isolering	70°C
XLPe en EPR isolering	80°C

met alle tipes, anders as die wat geisoleer is met reguit poli-etheleen wat 'n maksimum kortsluiting met beperkte temperatuur het van 160°C. Die gebruik van reguit-poli-etheleen sal die maksimum grens beperk tot 130°C.

Sekere ondernemings, soos bv. IEC voer aan dat 90°C vir aaneenlopende en 250°C kortsluiting as die grens vir XLPe kabels is. Terwyl dit aanvaar kan word vir die isolemente, aanemende dat hulle spesiaal saamgestel is vir hierdie diens, sal so 'n vlak betrokke raak in die gebruik van duurder beskermende bedekkings, met die nodige voorsorgmaatreëls teen uitdroging vir besoedeling en verhoog dit die risiko van litte meganiese inskakeling met beskermende tussenbedekking en gesamentlike heglings en is daarom twyfelagtig vir ekonomiese benutting.

Daar is 'n gevaar om 'n oordeel uit te spreek oor stelsel doeltreffendheid op die basis dat dit suksesvol gewerk het onder maksimum temperatuur omstandighede en het daarom ruimte vir groter stroomladings by hoër toelaatbare maksimum temperature. Inwerkkingtreding by maksimum temperatuur kom selde voor vir geleiers van 11kV en hoër. Daar kan meer gedink word aan beter kring benutting op konserwatiewe vlakke, liewer as om hoër grense te ontwerp met die hoop dat hulle nooit bereik sal word nie en die risiko loop van ernstige diens moeilikhede as om goeie kring-omloop te bereik.

(iii) **Meganiese Verrigting.**

Drie belangrike faktore moet onder hierdie hoof in ag geneem word :

(a) Buigsaamheid.

(b) Weerstand teen uitwendige skade.

(c) Weerstand teen meganiese hitte.

Ongetwyfeld 'n vername voordeel van kabels gebaseer op sintetiese isolering is hul buigsaamheid. In teenstelling is hul lae koste mededingend

aluminium sheathed paper which cables have the least flexibility, although some relief is given if the sheathing is corrugated. It has been argued that the use of solid aluminium conductors reduces flexibility but this can only have credence, if at all, at the very largest sizes, as generally, it is the performance of the armour which controls the flexibility of the cable.

Synthetic cables are more resistant to damage from blunt objects (11) but less to sharp ones such as spades or spikes. They also deteriorate in impact resistance with increase of temperature. During installation the synthetic design has an additional advantage because if the cable is not live and is struck by a blunt object the point of local thinning will be relieved before energisation and no fault will occur, whereas with a paper cable permanent damage is often caused.

Detailed discussion of the problems arising from thermo-mechanical forces could be extensive and is not appropriate to a general paper of this type. Possible effects of screen disturbances have already been mentioned and another major area of potential difficulty lies with accessories, particularly with reference to the mechanical cycling of connectors, wipes and the cable/jointing material interface.

(iv) **Safety**

The interest in the possible introduction of designs omitting the conventional circumferential metallic layer highlights possible problems of safety to personnel if a live cable is damaged. A recent paper by McAllister & Cox (11) has for the first time given facts in an area where emotion is often more prevalent. The study was particularly related to CNE cables (including the unshielded design) but is still very relevant to the more general case. They conclude that impliments causing damage to paper lead cables seldom remain alive although flash is often severe, but in the case of the unshielded design "because of the absence of any metal around the cores there is no flash unless the cable is spiked between cores. The general absence of flash when penetrating such a cable can give rise to a dangerous situation in that the operator will not be alerted by a flash and may therefore continue work with dangerous results."

met aluminium bedekte papier, watter kabels die minste buigsaamheid het, alhoewel 'n geringe verligting voorkom as die bedekking ongelyk is. Daar is beweer dat die gebruik van soliede aluminium geleiers die buigsaamheid verminder, daar kan egter geen waarde hieraan geheg word nie, indien enige, by baie groottes, soos gewoonlik, is dit die gebruik van die pantser wat die buigsaamheid van die kabel kontrolleer.

Sintetiese kabels is meer bestand teen beskading te raak teen stomp voorwerpe (11) maar minder teen skerp voorwerpe soos grawe en spykers. Hulle versleg ook by weerstandsdrukking met verhoging van temperatuur. Gedurende installering het die sinetiese ontwerp 'n addisionele voordeel omdat, as die kabel nie lewendig is nie en dit word getref deur 'n stomp voorwerp sal die punt van plaaslike uitdunning ontlas word voor energie-opwekking en niks sal verkeerd gaan, daarenteen sal met 'n papierkabel permanente skade aangerig kan word.

Volledige besprekings van die probleme wat kan voorkom oor verhitte meganiese krag kan uitgebreid wees en sal nie van toepassing wees by 'n algemene bespreking van hierdie aard nie. Moontlike nadele van beskermings ontwrigtinge is reeds bespreek en 'n ander vername gebied van potensiële probleme word ondervind by toebehore, veral met verwysing na die meganiese sirkel van aanskakelaars, veërs en die kabel/hegting materiaal inlêers.

(iv) **Veiligheid.**

Die belangstelling in die moontlike bekendstelling van ontwerpe met insluiting van die konvensionele omhulmetaal laag, bring die moontlike probleme en veiligheid van personeel wanneer 'n lewendige kabel beskadig is, na vore. 'n Onlangse geskrif deur McAllister & Cox (11) het vir die eerstekeer feite gegee oor die gebied waar gevoeligheid soms meer oorheersend is. Hierdie studie het veral betrekking op die CNE kabels (insluitende die onbeskermende ontwerp) maar is nog altyd besonder van toepassing op die meer algemene gevalle. Hulle kom tot die gevolgtrekking dat implimente wat skade verrig aan papier loodkabels selde lewendig bly alhoewel die golf altyd voldoende diens doen, maar in die geval van die onbeskermende ontwerp „deur die afwesigheid van enige metaal rondom die kabelstring is daar geen golf nie, tensy die kabel vasgespyker word tussen die kabelstringe. Die algemene afwesigheid van die golf wanneer so 'n kabel binne gedring word, kan die kabel laat styg tot so 'n gevaarlike situasie dat die operateur nie deur 'n golf gewaarsku sal word nie en sy werk maar sal voorsit met ernstige nagevolge."

(v) **Jointing**

The problems of the jointing of impregnated paper cables arise from the hygroscopicity of the insulation and the need to ensure avoidance of water ingress at all times during installation and the service life of the system. It should not be overlooked, however, that the new techniques could have important application in traditional fields; and, for example, the application of heat shrink sleeving (12) to paper cable terminations now makes these as simple to produce as for any synthetic cable system.

In contrast, lack of hygroscopicity of the synthetics offers ample scope for the development of jointing systems which demand less manual skill and are less labour intensive. Care, however, must be taken to avoid letting a desire for simplicity override the maintenance of technical standards aimed at ensuring long term reliability. For example, compatability between the jointing medium, be it tape or casting resin, and the cable insulant is essential, and must be maintained under the thermal and thermo mechanical strains of service performance. The breakdown of this interface as has happened for example in Japan, will result in water entry with just as disastrous results as would occur with an impregnated paper cable system.

The terminating of core screening systems is an area of particular interest and views on this can have a profound influence on cable design. On theoretical grounds the extruded semiconducting layer over a cable core is ideal and for optimum long term electrical performance should be bonded to the underlying cable insulation. This immediately provides the jointer with a problem in stripping the semi conducting layer, and has resulted in the development of various "pencil sharpener" techniques. It has also led to the development of compromise solutions based on the concept of a screen designed and manufactured to have sufficient adhesion to avoid electrical deterioration at the interface but at the same time to have no more adhesion than will allow removal by a simple cutting and pulling action. The difficulties are made greater once shaped rather than round conductors are used and attempting to design for these suggests that perhaps screening systems (13) based on a conducting paint which can be solvent removed followed by a compatible conducting tape may well be the preferred technical solution for all designs of synthetic cable systems.

(v) **Hegting.**

Die probleme van die hegting van deurweekte papierkabels is 'n verskynsel by die deurvogtigheid van die isolering, en die nodigheid om te verseker dat water geen toegang het nie, moet altyd van die installering en die dienstydperk van die stelsel verseker wees. Dit moet egter nie nagelaat word om toe te sien dat die nuwe tegnieke belangrike toespassings op tradissionele gebiede uitoefen, byvoorbeeld, die gebruik van hitte krimpbuise (12) tot papierkabel eindpunte, maak dit nou makliker om enige sintetiese kabelstelsel te vervaardig.

In teenstelling, 'n tekort aan vogtigheid van die sintetiese verskaf voldoende vooruitsigte vir die ontwikkeling van hegting stelsels wat minder gewone arbeid vereis en minder intensief werk.

Versigtigheid moet egter aan die dag gete word, om te voorkom dat die begeerte om 'n eenvoudiger stelsel te gebruik ontstaan met die instandhouding van tegniese standaarde wat daarop gemik is om die langtermyn betroubaarheid te verseker. B.v. die verenigbaarheid tussen die hegtings medium, synde dit 'n band of 'n vormkas en die kabel isolement is belangrik, en moet instand gehou word onder die hitte en meganiese temperatuur spanning van diens speling. Die inaanstorting van hierdie tussenlaag, soos bv. in Japan gebeur het, kan die oorsaak hê van water indringing met net sulke rampspoedige gevolge as wat voorkom by die deurweekte papier kabelstelsel.

Die eindpunt van kabel beskerming stelsels is veral 'n interressante gebied en die beskouing hiervan kan 'n grondige invloed op kabel ontwerpe hê. Op teoretiese gronde is die uitdrywende semigeleierlaag oor 'n kabelstring ideaal en vir optimum langtermyn elektriese diens sal dit ooreenkom met die onderlaag kabel isolering. Dit voorsien onmiddelik die hegting met 'n probleem in die uitmekaarhaal van die semi geleierlaag, en het ontwikkeling van verskillende „potlood skerpmaak" tegnieke. Dit het ook gelei tot die ontwikkeling van ooreenkomstige oplossings gebaseer op die konsep van 'n skerm wat ontwerp en vervaardig is om genoegsame gehegtheid te hê om elektriese agteruitgang te voorkom, maar terselfdertyd om nie meer hegting te hê as wat toegelaat word by 'n eenvoudige deurgrawing of trek reaksie nie. Die probleme is groter wanneer dit eers vorm aangeneem het en nie soos by ronde geleiers wat gebruik word en pogings om 'n ontwerp te gebruik met beskermende stelsels (13) gebaseer op 'n geleier verf wat instaat is om oplossings te verwyder, wat gevolg word deur 'n bestandbare geleierband mag miskien die beste tegniese oplossing wees vir alle ontwerp van sintetiese kabelstelsels.

If one considers leaving traditional jointing practices completely, it may be that the jointing processes should be made even more capital intensive than is proposed at present.. This could be done if installation work could be so organised that it was possible to carry out the majority of jointing in the factory or at a distribution depot and be able to take advantage of advanced jointing techniques which would be too expensive to provide under normal joint hole conditions.

4. LABORATORY TESTING.

Laboratories devoted to the study of materials for underground cables and testing, on a small scale, their performance when installed, provide a background of data which is probably unrivalled in the sphere of electric power engineering. However, in spite of this, major failures have occurred, for example with 33 kV belted cables, which have been very expensive to the manufacturer and user alike.

Failure to predict areas of weakness normally results from either :

(i) Laboratory testing not being able to simulate accurately all the electrical and mechanical interactions that can occur in an installed cabel system over a period of many years;

or

(ii) the lack of recognition of a design, be it of cable or accessory, having a potential for occasional lapses in standard when made on a large repetitive scale. Poor jointing of moisture blocks in 11 kV end boxes is a typical example of this type of fault.

Obviously the high standard of testing and quality control for which the industry is well known must be maintained and if possible improved upon, but at the same time critical study of new proposals backed by a knowledge of experience in other areas is essential in order to minimise the chance of future failures.

5. ECONOMICS.

Having emphasised in the introduction the importance of economic efficiency in determining future policy, it is unfortunate that it is difficult to give precise economic information, because in many areas, for example when considering ease of jointing, one is trying to put a price on an intangible and often emotive factor. The position too is not assisted by the fact that when technology is in a very fluid state factory cost and selling price do not necessarily bear the relation-

Indien dit oorweeg word om tradisionele hegtings praktyke heeltemal weg te laat, mag dit wees dat die hegtings prosesse meer kapitaal-intensief gemaak word as wat tans die geval is. Dit kan gedoen word as installerings werk so georganiseer kan word dat dit moontlik sou wees om die vernaamste hegtings in die fabriek te doen of by 'n distribusiedepot en ook om gebruik te kan maak van gevorderde hegtings tegnieke, wat te duur is onder normale ontstandighede.

4. LABORATORIUM TOETSING.

Laboratoriums wat hul toewy aan die studie van materiale vir ondergrondse kabels en toetsing, op klein skaal, hul werkverrigting wanneer geinstalleer, voorsien 'n agtergrond van data wat heelwaarskynlik ongeëwenaard is op die terrein van elektriese krag ingeneurswese. Ten spyte van dit, het vername onderbrekings al voorgekom, soos bv. met 33 kV gordelkabels, wat beide duur is vir die vervaardiger en verbruiker.

Versuim om swak plekke uit te wys is gewoonlik as gevolg van :

(i) Laboratorium toetse wat nie in staat is om akkuraat te funksioneer te opsigte van al die elektriese en meganiese interaksies wat kan onstaan in 'n kabelstelsel wat geinstalleer is oor 'n tydperk van jare.

of

(ii) die tekort aan 'n erkenning van 'n ontwerp, sy dit van 'n kabel of bykomstigheid, wat 'n potensiaal het vir geleenthede in standaarde op 'n basis van herhaalde skaal. Slegte hegting van vogtigheid by blokke in 11kV eindkaste is 'n tipiese voorbeeld van hierdie soort fout.

Vanselfsprekend moet die hoë standaard van toetsing en kwaliteitskontrole waarvoor die nywerheid welbekend is, behou word en indien moontlik verbeter word, maar terselfdertyd moet studie van nuwe voorstelle, gesteun deur 'n kennis van ondervinding of ander terreine noodsaaklik wees om die kanse van onderbrekings in die toekoms minder te maak.

5. EKONOMIES.

Nadat nadruk gelê is in die inleiding op die belangrikheid van ekonomiese doeltreffendheid in die bepaling van 'n toekomstige beleid, is dit ongelukkig moeilik om korrekte ekonomiese inligting te verskaf, omdat in baie gebiede, soos bv. wanneer in ag geneem word die eenvoudigheid van hegting, jy besig is om koste op 'n abstrakte faktor te plaas. Die omstandighede word ook nie gerugsteun deur die feit dat wanneer tegnologie in 'n baie plooibare staduim is, fabrieks-

ship that is necessary for long term commercial viability.

There are, however, a number of guide lines which can be established with some degree of confidence :

(i) For cables of a technical performance at the level associated with the traditional multicore metallic protected designs the most economic cable design results from the combination of impregnated paper and aluminium.

(ii) If the importance of the outer metallic shield and/or the level of fault current carrying capacity is discounted, lower cost designs can be evolved using synthetic forms of insulation.

(iii) The vulcanised insulation systems such as XLPe or EPR are significantly more expensive than PVC and at low voltage can only be justified if their better thermal performance can really be utilised.

(iv) With multicore cables having circumferential metallic shielding the lowest cost designs will be associated with shaped conductors. This, however, can militate against the development of simple jointing systems.

(v) In the choice of the jointing system one must balance the conflicting philosophies of high capital and low labour costs taken to the extreme with the various North American plug-in systems, to the low capital high labour cost systems normally associated with impregnated paper cables.

6. RELATIONSHIP TO SOUTH AFRICAN POSITION.

Present South African municipal distribution practice can be summarised as follows :—

(a) L.V. mains distributors are generally PVC insulated with stranded copper or solid aluminium conductors and a circumferential steel wire or aluminium strip armour. A small number of installations have been made using single core or quadruplexed cores having stranded aluminium conductors, XLPe insulation and no circumferential metallic layer. Approximately 30% of the L.V. mains being installed are however paper/lead/armour constructions.

(b) There is very little use of PME on underground networks.

koste en verkoopspryse nie noodwendig die verbandskap wat nodig is vir langtermyn lewensvatbaarheid dra nie.

Daar is nogtans 'n paar leidrade wat tot stand gebring kan word met 'n sekere mate van vertroue :

(i) Vir kabels van 'n tegniese doeltreffendheid wat verband is om die tradissionele veelvoudigekabels met metaal beskermde ontwerpe, die mees ekonomiese kabel ontwerp ontstaan uit die kombinasie van deurweekte papier en aluminium.

(ii) As die belangrikheid van die buitenste metaal beskerming en/of die vlak van die foutiewe stroomdraer kapasiteit verdiskonteer is kan laer koste ontwerpe voortgebring word deur sintetiese vorms van isolering te gebruik.

(iii) Die vulkaniese isoleringstelsels soos XLPe en EPR is heelwat duurder as PVC en by laagspanning kan dit net geregverdig word as hul hittespeling werklik benut kan word.

(iv) Met veelvoudige kabels van metaal beskermende omtrekspanning sal die laagste koste ontwerpe verband kom met gevormde geleiers.

(v) In die keuse van die hegtingstelsel moet die balans van botsende filosofieë van hoë kapitaal en lae werkkoste geneem word tot die uiterste van die verskillende Noord-Amerikaanse stopkontak stelsels, tot die lae kapitaal, hoë werkskoste stelsel wat normaalweg verband kan hou met deurweekte papier kabels.

6. VERWANTSKAP TOT DIE SUID-AFRIKAANSE POSISIE.

Die huidige Suid-Afrikaanse distribusie praktyke kan soos volg opgesom word :

(a) L.S. hoofgeleiers is oor die algemeen van PVC geisoleer met koperdraad of soliede enkel kabelstringe of viervoudige kabelstringe aluminium geleiers en 'n staaldraad omtrekspanning of aluminium gesplete pantser. 'n Klein hoeveelheid van installerings maak gebruik van enkel kabelstringe of vervoudige kabelstringe met aluminium draadgeleiers, XLPe isolering en geen metaallaag omtrekspanning nie. Ongeveer 30% van die L.S. hoofkabels wat geinstalleer word is egter papier/lood/pantser konstruksies.

(b) Daar is baie min gebruik vir PME by ondergrondse netwerke.

(c) Approximately 95% of all service cables are PVC and approximately 15% of these are of the split concentric variety.

(d) The majority of 11 kV cables use stranded aluminium or copper conductors with impregnated paper insulation. Approximately 10% of new installations at this voltage level have been made with XLPe insulated cables and in the great majority of these cases a circumferential metallic layer has been incorporated in the construction.

(e) 33 kV cables have in the past been imported impregnated paper solid type, gas or oil-filled, but the first installation of XLPe insulated cable using imported cables are now being made.

(f) 66 and 132 kV systems are all gas or oil-filled using imported cable.

In suggesting trends based on experience in other countries there are a number of relevant factors as follows :—

(a) the use of aluminium conductors has lagged behind the majority of the rest of the world.

(b) there is no aluminium sheathing capacity in South Africa.

(c) there is a major investment by the cable manufacturing industry in plant for production of XLPe or ERP insulated core.

(d) there are a number of large Municipalities with trained jointer forces where ease of jointing will only be a factor if the total system economics justify it.

(e) there are a large number of smaller Municipalities with a serious shortfall in trained labour who will be prepared to pay a premium on total system cost in order to be able to simple, if expensive, jointing techniques..

Setting this scene against the trends in world practice summarised in Section 2.6, one would expect :

(a) a greater use of aluminium in both stranded and solid form for conductors.

(b) very little change in the established use of PVC as the insulant for L.V. mains distribution.

(c) a possible change to the use of vulcanised insulation at low voltage by those Utilities who have at present a preference for impregnated paper.

(c) Ongeveer 95% van alle dienskabels is PVC en ongeveer 15% hiervan is van gesplete ringkabel verskeidenheid.

(d) Die meerderheid van 11kV kabels gebruik aluminium kabels of koper geleiers met deurweekte papier isolering. Ongeveer 10% van nuwe installerings op hierdie spanningsvlak is gemaak met XLPe isoleringkabels en in die grootste meerderheid van hierdie gevalle is 'n metaal omtrekspanningslaag ingesluit in die konstruksie.

(e) 33kV kabels het in die verlede deurweekte soliede papier tipe ingevoer, met gas of olie gevul, maar die eerste installerings van XLPe isoleringskabel wat ingevoerde kabels gebruik word nou gemaak.

(f) 66 en 132kV stelsels is almal gas of olie-gevulde ingevoerde kabels wat gebruik word.

In voorgestelde rigtings gebaseer op ondervinding in ander lande is daar 'n paar toepaslike faktore soos volg :

(a) die gebruik van aluminium geleiers het agtergebly by die meerderheid van die res van die wêreld.

(b) daar is geen aluminium bekleding kapasiteit in Suid-Afrika nie.

(c) daar is 'n belangrike belegging in die kabel vervaardigingsbedryf vir produksie van XLPe of EPR isoleringsdraad.

(d) daar is 'n aantal groot Munisipaliteite met geskoolde kragte vir die hegtings waar die hegtings gemaklik alleenlik 'n faktoor sal wees as die stelsel in geheel dit ekonomies kan regverdig.

(e) daar is 'n groot aantal kleoiner Munisipaliteite met 'n ernstige tekort aan opgeleide werkers, wat bereid sal wees om 'n premie te betaal op die totale stelselkoste, om hulle in staat te stel om eenvoudige, moontlik duur, hegtingstegnieke te gebruik.

Gesien in die lig van wêreld tendense en praktyke soos opgesom in seksie 2.6 kan verwag word :

(a) 'n Groter gebruik van aluminium in sowel draad en soliede vorm vir geleiers.

(b) baie min verandering in die gevestigde gebruik van PVC as die isolering vir L.S. hoofkabel distribusie.

(c) 'n moontlike verandering na die gebruik van vulkaniese isolering by laagspanning in ondernemings wat tans deurweekte papier verkies.

(d) a small use of PME in connection with the unshielded four core construction (insulated with PVC, XLPe or EPR) now advocated in Germany.

(e) an increase in the use of vulcanised insulation at 11 kV using constructions with a circumferential metallic layer. It is anticipated that the use of American type practice will be limited to special situations where environmental conditions justify it economically.

(f) as experience is obtained at 11 kV a swing to the use of XLPe or EPR at 33 kV and 66 kV.

World-wide underground power cable technology is going through a greater revolution than has occurred for decades and South Africa is in an excellent position to gain from the experience now available to it. It is hoped that these conditions will not give rise to a plethora of designs and that means can be found for objective discussion between users, manufacturers and the Bureau of Standards aimed at producting a rationalised range of cables capable of being manufactured economically and to high quality standards.

7. ACKNOWLEDGEMENTS.

The author wishes to thank the Directors of Scottish Cables (South Africa) Limited for permission to publish this paper.

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4. BAX, H.—"Modern Low Voltage Cable for the Distribution Networks of Power Supply Companies and Industry"; Congress International des Reseaux Electriques de Distribution (CIRED) Liege, 1970. Paper No. 19.
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(d) 'n klein gebruik van PME in verband met die onbeskermde vier kabel konstruksie (geisoleer met PVC, XLPe of EPR) tans aanbeveel in Duitsland.

(e) 'n verhoging in die gebruik van vulkaniese isolering by 11kV wat konstruksies gebruik met 'n omtrekspanning van metaallaag. Dit word verwag dat die gebruik van die Amerikaanse tipe praktyk verminder sal word tot spesiale omstandighede waar toestande van die omgewing dit ekonomies regverdig.

(f) deur ondervinding verkry by 11kV is daar 'n neiging vir die gebruik van XLPe of EPR by 33kV en 66kV.

Wêreldwye ondergrondse kragkabel tegnologie ondervind 'n groter revolusie as wat voorgekom het vir dekades en Suid-Afrika is in 'n uitstekende posisie om van die ondervinding te benut wat nou beskikbaar is. Dit word egter gehoop dat hierdie omstandighede nie 'n styging na te veel ontwerpe sal laat ontstaan nie, en dat weë gevind kan word vir vrugbare bespreking tussen verbruikers, vervaardigers en die Buro van Standaarde, met die doel om 'n gerasionaliseerde reeks kabels te vervaardig wat ekonomies 'n hoë kwaliteit standaard sal handhaaf.

7. ERKENNING.

Die skrywer wens sy dank uit te spreek aan die Direkteure van Scottish Cables (South Africa) Ltd., vir hul toestemming om hierdie geskrif te publiseer.

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11. MCALLISTER, D. and COX, E. H.—"Behaviour of M.V. power-distributions cables when subjected to external damage." Proc. IEE, Vol. 119, No. 4, April, 1972.

12. LOOMS, J. S. T.—"Polymers get a Grip on Cable Ends." Electronics and Power, November, November, 1972.

13. GRAHAM, R. C., LOWE, J. J., MARWICK, I. J., CESANA, V. V.—"Integral Insulation Shielding for Power Cables—A Simple Solution to a Serious Dilemma." Underground Engineering, June/July, 1971.

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REPORT
S.A. Bureau of Standards

Our thanks again for the good co-operation we as members of the AMEU have had from the Bureau.

A number of administrative problems had to be solved and a further report will be tabled at the Convention on further discussions with the Bureau with reference to the functioning of sub-committees in future.

The Standard Practice Instructions that were issued to representatives etc., are being reviewed and will be re-issued shortly.

On behalf of the Executive Council, I wish to thank all representatives and alternatives of the Association for the hard work performed during the year, and also on behalf of the Association a word of thanks to the Management and personnel of the SABS for their friendly assistance and hard work in the interest of manufacturers and consumers throughout the country.

I have pleasure in presenting the following progress report.

P. J. BOTES,
Co-ordinating Representative.

VERSLAG
Suid-Afrikaanse Buro vir Standaarde

Ons dank weereens vir die goeie samewerking wat ons as VMEO verteenwoordigers van die Buro ontvang het.

Heelwat administratiewe probleme moes opgelos word en 'n verdere verslag sal mondelings by die Konvensie verskaf word oor die verdere sameprekings met die Buro met betrekking tot die toekomstige funksionering van sub-komitees.

Die standaardpraktykinstruksies wat uitgereik was aan Verteenwoordigers ens., word hersien en bygewerk en sal binnekort weer uitgereik word.

Namens die Uitvoerende Bestuur wil ek graag alle verteenwoordigers van hierdie Vereniging bedank vir die harde werk wat hulle gedurende die jaar gelewer het. Ook namens die Vereniging 'n woord van dank aan die Bestuur en personeel van die SABS vir hul vriendelike hulpvaardigheid en vir die harde werk wat hulle in die belang van vervaardigers en verbruikers dwarsdeur die land gelewer het.

Ek het genoeë om aldus die aangehegte vorderingsverslag voor te lê.

P. J. BOTES,
Koödinerende Verteenwoordiger

AMEU REPRESENTATION ON SABS TECHNICAL COMMITTEES: PROGRESS REPORT FOR 1972

SABS Reference No.	TITLE	REPRESENTATIVE	No. of Meetings	REPORT
15/7/19	Sampling and methods of analysis of solid fuels.	G. T. Stevens	One	Acceptance of the iso. draft recommendations 1988 as the basic document. Two sub-committees formed to deal with various aspects concerning sampling of coal.
15/11/51	The Connection of Luminaires to their supporting fixtures.	H. J. de Bruin	One	Discussed draft specification, aspects referred to manufacturers.
15/14/1/3	Traction Batteries.	H. Barnard		
15/14/1/4	Trainlighting batteries.	H. Barnard		
15/14/1/5	Stationary Batteries.	H. Barnard		
15/14/3/1	Standing Advisory Committee on electrical safety.	G. C. Theron		No progress.
15/14/5/1	Manually operated enclosed type airbreak switches and isolators.	D. P. Viljoen		No progress.
15/14/5/2	SABS 163—1963 Wall and appliance switches.	J. A. Loubser		
15/14/5/3	Flush-mounted indoor electrical panelboards.	J. A. Loubser		
15/14/5/4	Light Dimmers.	J. E. Heydenrych	One	Specification completed.
15/14/9/1	Three-phase induction motors.	P. J. Botes	Two	First draft specification discussed. Working Group appointed.
15/14/9/2	Single-phase alternating current motors.	H. J. de Bruin	One	Second Draft specification prepared.
15/14/10/1	Tubular Fluorescent Lamps for General Service.	J. S. v. d. Merwe		
15/14/10/5	Capacitors for fluorescent and discharge lamp ballasts.	A. J. v. d. Berg		Technical aspects finalised. Draft completed.
15/14/12/1	Standard regulations for the wiring of premises.	D. C. Plowden E. E. de Villiers	Two	
15/14/13/3	Contactors.	F. J. v. d. Merwe		No progress.
15/14/14	General Co-ordinating Committee.	G. C. Theron	Correspondence only	SABS 97/70 : Amendment No. 1 published March 1972. SABS 150/70: Amendment No. 2 published June 1972.

VMEO VERTEENWOORDIGING OP SABS TEGNIESE KOMITEES: VORDERINGSVERSLAG VIR 1972

SABS Verwys Nr.	ONDERWERP	Verteenwoordiger	Aantal Vergaderings	VERSLAG
15/7/19	Keuring en metodes van ontleding van soliede brandstof.	G. T. Stevens	Een	Die „Iso draft recommendations 1988" aanvaar as basiese dokument. Twee subkomittees saamgestel om verskeie aspekte van die monster neem van steenkool.
15/11/51	Die bevestiging van armature aan die vaste drastukke.	H. J. de Bruin	Een	Het Konsep Spesifikasie bespreek. Aspekte na vervaardigers verwys.
15/14/1/3	Traksiebatterye.	H. Barnard		
15/14/1/4	Treinligbatterye.	H. Barnard		
15/14/1/5	Vaste batterye.	H. Barnard		
15/14/3/1	Veiligheid van elektriese toestelle.	G. C. Theron		Geen vordering.
15/14/5/1	Omhulde handlugbreek- en afsonderskakelaars.	D. P. Viljoen		Geen vordering.
15/14/5/2	Muur- en toestelskakelaars.	J. A. Loubser		
15/14/5/3	Vlakgemonteerde binnenshuise elektriese paneelborde.	J. A. Loubser		
15/14/5/4	Ligdempers.	J. E. Heydenrych	Een	Spesifikasie voltooi.
15/14/9/1	Drie-fase induksie motore.	P. J. Botes	Twee	Oorspronklike konsep bespreek. Werksgroep saamgestel.
15/14/9/2	Enkelfase wisselstroom motore.	H. J. de Bruin	Een	Tweede Konsep opgestel.
15/14/10/1	Fluoresseerbuislampe vir algemene gebruik.	J. S. v. d. Merwe		
15/14/10/5	Kapasitore vir balaste vir fluoresseer- en ontladingslampe.	A. J. v. d. Berg		Tegniese aspekte afgehandel. Konsep afgehandel.
15/14/12/1	Standaard regulasies vir die bedrading van persele.	D. C. Plowden E. E. de Villiers	Twee	
15/14/13/3	Kontaktors.	F. J. v. d. Merwe		Geen vordering.
15/14/14	Buigsame koorde vir krag- en verligtingtoestelle.	G. C. Theron	Slegs korrespondensie	SABS 97/70: Wysiging nr. 1 afgekondig Maart 1972. SABS 150/70: Wysiging nr. 2 gepubliseer Junie 1972.

SABS Reference No.	TITLE	REPRESENTATIVE	No. of Meetings	REPORT
15/14/14/1	Medium voltage vulcanized rubber insulated cables and flexible cords for power and lighting purposes.	G. C. Theron	Two	Specification will now be published.
15/14/14/18	Heat resisting cables for use in the internal wiring of electrical appliances.	A. J. v. d. Berg	One	Draft completed to be translated.
15/14/14/24	Crimped or pressure type connectors.	H. Barnard		
15/14/18/1	High and Low Voltage Bushings.	C. Lombard		
15/14/20	Ceramic and glass Insulators for overhead power lines with a nominal voltage greater than 1000V.	F. J. Sulter		
15/14/20/1	High voltage post insulators.	F. J. Sulter		
15/14/21	Moulded case circuit breakers.	F. J. v. d. Merwe	2 Working Group I Committee	Good progress was made and the specification will in all probability reach the final stage after another two meetings.
15/14/21/1	Core balance earth leakage protection units.	F. J. v. d. Merwe	2 Committee I Working Group	Revision of the specification in progress but it will still take a considerable time before the revision is completed.
15/14/25	High Voltage Lightning Arrestors.	J. M. Gericke		No progress.
15/14/26	Cartridge type fuse links.	A. H. L. Fortman	7	Considered and accepted but for a few minor amendments.
15/14/30	Conductors for Overhead Electrical Transmission Lines :— Part 1—Copper conductors; Part 2—Aluminium conductors; Part 3—Steel reinforced aluminium conductors; Part 4—Copper clad steel conductors; Part 5—Galvanized steel conductors.	D. Briers		Part 1—Final document being prepared for circulation under members of committee before it is submitted to SABS Council; Part 2—Draft document sent out for general comments; Part 3—Every endeavour will be made to finalise document by correspondence otherwise a meeting will be called. Part 4—No progress. Part 5—No progress.
15/14/34	Electrical Storage Water Heaters.	A. J. van den Berg	One	Draft submitted to translators.
15/14/35/1	Immersion heaters for portable electric appliances-apparatus connector type.	H. Barnard		

SABS Verwys Nr.	ONDERWERP	Verteenwoordiger	Aantal Vergaderings	VERSLAG
15/14/14/1	Buigsame koorde vir krag- en verligtingstoestelle.	G. C. Theron	Twee	Spesifikasie word gepubliseer.
15/14/14/18	Hittebestande kabels vir gebruik by die binnebedrading van elektriese toestelle.	A. J. v. d. Berg	Een	Konsep klaar, word vertaal.
15/14/14/24	Gekartelde of drukaansluiters.	H. Barnard		
15/14/18/1	Hoog- en laagspanningdeurvoerders	C. Lombard		
15/14/20	Keramiek- en glasisolators vir bogrondse kraglyne met 'n nominale spanning bo 1000V.	F. J. Sulter		
15/14/20/1	Hoogspanningpaalisolators.	F. J. Sulter		
15/14/21	Stroomverbrekers met gevormde Hulse (Metrieke eenhede).	F. J. v. d. Merwe	2 Werkgroep 1 Komitee	Goeie vordering is gemaak en die spesifikasie sal na alle waarskynlikheid na 'n verdere twee vergaderings die finale stadium bereik.
15/14/21/1	Aardlekbeveiligingseenhede van die stroombelanstipe.	F. J. v. d. Merwe	1 Werkgroep 2 Komitee	Hersiening van die spesifikasie is aan die gang maar dit sal nog 'n geruime tyd duur voordat die hersiening voltooi is.
15/14/25	Hoogspanningblitsafleiers.	J. M. Gericke		Geen vordering.
15/14/26	Patroontipe elektriese sekerings.	A. H. L. Fortman	Sewe	Oorweeg en aanvaar behalwe vir 'n paar klein wysigings.
15/14/30	Geleiers vir bogrondse elektriese verspreidingslyne :— Deel 1—Koper geleiers; Deel 2—Aluminium geleiers. Deel 3—Staal versterkte aluminium geleiers. Deel 4—Koper oorgetrekte staal geleiers. Deel 5—Gegalvaniseerde staal geleiers.	D. Briers		Deel 1—Finale dokument word voorberei vir sirkulasie aan komiteelede voor voorlegging aan die Raad van die SABS. Deel 2—Konsepdokument is uitgestuur vir algemene kommentaar. Deel 3—Daar sal gepoog word om dokument te finaliseer d.m.v. korrespondensie, maar indien nodig sal 'n verdere vergadering belê word. Deel 4—Geen vordering. Deel 5—Geen vordering.
15/14/34	Elektriese opgaar-waterverwarmers.	A. J. van den Berg	Een	Konsep na vertalers.
15/14/35/1	Dompel verwarmers vir draagbare elektriese toestelle, toestelverbindertipe.	H. Barnard		

SABS Reference No.	TITLE	REPRESENTATIVE	No. of Meetings	REPORT
15/14/36	Domestic electric laundry treat ment machines.	G. C. Theron		
15/14/37	Two Pole and Earthing Pin plugs and socket outlets.	H. Barnard		
15/14/37/1	Plugs, socket outlets and couplers for Industrial purposes.	H. Barnard		
15/14/40	Electric toasters.	E. E. de Villiers		
15/14/41	Electric Irons.	L. Dreyer		
15/14/43	Electric Stoves, hotplates and similar appliances.	W. F. Cronje		
15/14/44/4	Distribution Transformers.	I. F. Boyack		Amendment No. 2 will be issued shortly.
15/14/44/5	Compact transformer substations for use in pubilc areas.	E. de C. Pretorius		Document will be issued for comment shortly. Committee recommends only 3 sizes viz. 100, 200 and 315 kVa units.
15/14/53	Electrotechnical nomenclature.	J. K. von Ahlften		No progress.
15/14/55	Graphical symbols for electrical diagrams—COP.	E. de C. Pretorius	One Working Groups-Two	Committee accepted only a few IEC symbols. Will shortly give attention to schematic diagrams for power installations. (Representative not member of working group).
15/14/60	Safety requirements for electrical appliances.	G. C. Theron	Two	In liason with IEK and is continuous.
15/14/61	Electric refrigerators and food freezers.	M. W. Odendaal		
15/14/64/1	Insulation co-ordination High Voltage.	I. F. Boyack		Document will be issued for comments shortly.
15/14/64/1	Insulation co-ordination for Low voltage equipment.	J. C. Strauss		No committee meeting yet.
15/14/73/2	Wiring trunkings and skirtings.	J. J. Boshoff		No progress.
15/14/73/4	Busbars (copper and aluminium).	C. R. Leaning	Two	Draft document discussed. Working Group formed to discuss detail.
15/23/13/1	Switchboard Instruments.	G. R. Marloth	One	Draft specification based TEC draft 138 (c.o) 23A. Working group appointed.

SABS Verwys Nr.	ONDERWERP	Verteenwoordiger	Aantal Vergaderings	VERSLAG
15/14/36	Huishoudelike elektriese wassery-behandelingstoestelle.	G. C. Theron		
15/14/37	Tweepool en aardingspen proppe en sokuitgange.	H. Barnard		
15/14/37/1	Kontakproppe en sokke en koppelaars vir nywerheidsdoeleindes.	H. Barnard		
15/14/40	Elektriese roosters.	E. E. de Villiers		
15/14/41	Elektriese strykysters.	L. Dreyer		
15/14/43	Elektriese stowe en verwarmingsplate.	W. F. Cronje		
15/14/44/4	Verspreidingstransformatore.	I. F. Boyack		Wysiging nr. 2 sal binnekort uitgereik word.
15/14/44/5	Kompakte transformatorsubstasies vir gebruik in openbare gebiede.	E. de C. Pretorius		Dokument sal binnekort uitgereik word vir kommentaar. Komitee beveel aan alleenlik 3 groottes nl. 100, 200 en 315 kVa eenhede.
15/14/53	Elektrotegniese benamings.	J. K. von Ahlften		Geen vordering.
15/14/55	Grafiese simbole vir elektrotegniese diagramme.	E. de C. Pretorius	Een werkgroep Twee	Komitee besluit dat slegs enkele IEK simbole aanvaar-word. Sal binnekort aandag skenk aan skematiese diagramme vir kraginstallasies. (Verteenwoordiger nie op werkgroep).
15/14/56	Muuruitlaatkassies en dekplate.	J. A. Loubser		
15/14/60	Veiligheidsvereistes vir elektriese toebehore.	G. C. Theron	Twee	Skakel met IEK en is deurlopend van aard.
15/14/61	Elektriese yskaste en voedselvriesers.	M. W. Odendaal		
15/14/64/1	Koördinering van isolering (Hoogspanning)	I. F. Boyack		Dokument sal binnekort vrygestel word vir kommentaar.
15/14/64/1	Koördinering van isolering (Laagspanning).	J. C. Strauss		Komitee nog nie vergader.
15/14/73/2	Bedradingsroetering en vloerlyste.	J. J. Boshoff		Geen vordering.
15/14/73/4	Geleistamme (koper en aluminium).	C. R. Leaning	Twee	Konsep dokument is bespreek. Werkgroep is gevorm om fyner besonderhede te bespreek.
15/23/13/1	Skakelbordinstrumente.	G. R. Marloth	Een	Konsep Spesifikasie gebaseer op "TE (draft) 138 (c.o.) 23A Werksgroep aangewys.

SABS Referance No.	TITLE	REPRESENTATIVE	No. of Meetings	REPORT
15/24/4/5	Non-metallic flexible conduit.	J. J. Boshoff		Finalised. Last meeting 20/3/69.
15/65/8	Colour and monochrome television receivers.	J. A. Loubser		
19/3/3	Protection of Buildings against Lightning.	J. A. Loubser		
19/9/5	Starting of 3-phase induction motors—COP.	P. J. Botes	One	
19/9/6/1	Installation, wiring and use of electrical equipment in anaesthetizing and similar locations.	C. A. Anderson		These two proposed codes of practice are at present grammatically prepared for submission to the Council of the SABS. It will be endeavoured to get it approved by March 1973.
19/9/6/2	Control of electrostatic hazards in anaesthetizing and similar locations.	C. A. Anderson		
19/9/24	Handling, installation and operation of electric cables.	A. H. L. Fortman		No progress.
19/9/27/1	Public Lighting.	A. F. Turnbull		
19/9/82	Cathodic Protection.	P. J. Botes	One	Considered draft.
19/65/6	Co-ordinating committee on Noise.	W. J. Cronje		
19/60/1	Insulators for standard Bushings.	C. Lombard		
15/14/64/1	Standard voltages and currents for electrical supplies.	E. de C. Pretorius	One	Document being prepared for general comment.

SABS Verwys Nr.	ONDERWERP	Verteenwoordiger	Aantal Vergaderings	VERSLAG
15/24/4/5	Nie-metaal buigbare pype.	J. J. Boshoff		Reeds gefinaliseer. Laaste vergadering 20/3/69.
15/65/8	Kleur en eenkleur televisie ontvangstoestelle.	J. A. Loubser		
19/3/3	Beskerming van geboue teen weerlig.	J. A. Loubser		
19/9/5	Aansit van 3-fasige induksiemotors.	P. J. Botes	Een	
19/9/6/1	Installering, bedrading en gebruik van elektriese toerusting in narkose en soortgelyke lokale.	C. A. Anderson		Hierdie twee voorgestelde gebruikskodes word tans taalkundig voorberei vir voorlegging aan die Raad van die SABS. Daar word gepoog om dit teen Maart 1973 goedgekeur te kry.
19/9/6/2	Beheer van elektrostatiese gevare in narkose- en soortgelyke lokale.	C. A. Anderson		
19/9/24	Hantering, installering en bediening van elektriese kabels.	A. H. L. Fortman		Geen vordering.
19/9/27/1	Openbare beligting.	A. F. Turnbull		
19/9/82	Katodiese beskerming.	P. J. Botes	Een	
19/65/6	Koördinerende komitee vir geraas.	W. J. Cronje		
19/60/1	Isolators vir standaard deurvoerders	C. Lombard		
15/14/64/1	Standaard spannings en strome vir elektriese kragvoorsiening.	E. de C. Pretorius	Een	Dokument word tans voorberei vir algemene kommentaar.

REPORT ON THE INTERNATIONAL ELECTROTECHNICAL COMMISSION

1. Meetings of Technical Committee 64: Electrical Installations of Buildings, were held in Caracas, Venezuela during the period 24—28 April, 1972

   There were 42 delegates from 16 countries but the only South African representative was the Chairman, Mr. A. A. Middlecote.

2. There was also a meeting of the Advisory Committee on Safety in Baden-Baden, Germany on 17 April, 1972 at which several important decisions regarding designation of electrical equipment were made.

3. The 37th Annual General Meeting was held in Athens during the period 31 October to 11 November 1971. It was attended by 14 delegates from the Republic and consequently South Africa was represented on 18 of the 23 technical committees which met during this period. The AMEU sponsored two delegates, Mr. E. E. de Villiers, whose main responsibility was in TC 64: Electrical Installations of Buildings, and your President, Mr. J. von Ahlften, whose main responsibility was TC 61: Safety of Household Electrical Appliances. The South African Bureau of Standards has expressed its appreciation of the help given by the AMEU which thus ensured reasonable representation in a general meeting attended by over 800 delegates from 35 different countries.

Of particular interest were the meetings of TC 64: Electrical Installations of Buildings, both because of its influence on our current thinking regarding our Wiring Regulations but also because it is chaired by a South African, and also SC 23c: World-wide Plug and Socket-outlet systems, because South Africa holds the Secretariat for this very important committee.

Much work has been done by correspondence on the different technical committees during the year and here again the AMEU representatives have contributed much.

P. J. BOTES,
Co-ordinating Representative

VERSLAG OOR DIE INTERNASIONALE ELEKTROTEGNIESE KOMMISSIE

1. Vergaderings van Tegniese Komitee 64: Elektriese Installasies in Geboue is in Caracas, Venezuela gedurende die tydperk 24 tot 28 April 1972 gehou.

   42 Afgevaardiges uit 16 lande was teenwoordig. Die enigste afgevaardigde uit Suid-Afrika was die voorsitter, mnr. A. A. Middlecote.

2. Die Advieskomitee in sake Veiligheid wat op 17 April 1972 in Baden-Baden, Duitsland vergader het, het sekere belangrike besluite met betrekking tot die klassifisering van elektriese toerusting geneem.

3. Die 37ste Algemene Vergadering is vanaf 31 Oktober tot 11 November 1972 in Athene, Griekeland gehou. Dit is deur 14 afgevaardigdes uit die Republiek begewoon, gevolglik kon Suid-Afrika op 18 van die 23 Tegniese komiteevergaderings wat gedurende hierdie tydperk vergader het, verteenwoordig wees. Die VMEO het twee afgevaardigdes gehoog wees. Die VMEO het twee afgevaardigsaaklik vir TK 64: Elektriese Installasies in Geboue verantwoordelik was, en u President, mnr. J. K. von Ahlften, wat hoofsaaklik vir TK61: Veiligheid van Huishoudelike Toerusting verantwoordelik was. Die Suid-Afrikaanse Buro vir Standaarde het sy dank aan die VMEO betuig vir die hulp verleen waardeur redelike verteenwoordiging verseker is by 'n algemene vergadering wat deur 800 afgevaardigdes van 35 verskillende lande bygewoon is.

Die vergaderings van TK 64: Elektriese Installasies in Geboue, was van besondere belang omdat dit in die eerste plek ons huidige denke aangaande ons bedradingsregulasies beïnvloed, en in die tweede plek omdat die voorsitterskap deur 'n Suid-Afrikaner behartig word. Verder was die vergaderings van Subkomitee 23c: Wêreldwye Kontakstop en -sokstelstels van besondere belang aangesien Suid-Afrika die sektretariaat vir dié belangrike komitee behartig.

'n Aansienlike hoeveelheid werk, waarby die VMEO-verteenwoordigers 'n groot bydrae gelewer het, is gedurende die jaar deur middel van korrespondensie ten opsigte van die onderskeie komitees verrig.

P. J. BOTES,
Koördinerende Verteenwoordiger.

GENERAL CONDITIONS OF CONTRACT FOR ELECTRICAL ENGINEERING

Up to date and since the previous annual report nothing further has been heard from the Association of Consulting Electrical and Mechanical Engineers.

ALGEMENE KONTRAKVOORWAARDES VIR ELEKTROTEGNIESE INGENIEURSWESE

Tot datum en sedert die vorige jaarverslag, is niks verder verneem van die Vereniging van Raadgewende Elektrotegniese en Meganiese Ingenieurs nie.

WIRING REGULATIONS COMMITTEE

ALTHOUGH no further amendments have been published since the last report, the progress made by Working Groups 1 and 2 has been satisfactory.

In the period April to September 1972, the two Working Groups had 10½ full-day meetings. It was necessary to devote a fair amount of time to IEC/TC 64 documents in preparation for the 1972 meeting of the IEC Committees to be held in Athens, Greece.

Progress has been unfortunately retarded by a proposed radical change in the format of the International Regulations, which it is expected can only be finalised late in 1973 by a sub-committee of TC 64, comprising members from France, Germany, South Africa and one further member.

Considering the problems encountered the Main Committee took the following resolutions at its meeting in Johannesburg on 17 November, 1972 :—

1. That the membership of two Working Groups be reduced to 5 each with different persons on each Working Group.
2. That the one Working Group deal only with the dynamics of the rewriting of the Regulations (in conjunction with the IEC recommendations) and the other Working Group with the correlating of amendments and approvals. These two Working Groups will respectively be known as Working Group 3 and Working Group 4.
3. Representatives to serve on Working Groups 3 and 4 were named. (At its meeting in Kempton Park on 24 November, 1972, the Executive Council appointed Messrs. E. E. de Villiers and L. B. Cumming to represent the AMEU on these two Working Groups).
4. That the new Working Group 4 proceed with the editing of the Wiring Regulations, incorporating only current amendments.
5. Several definitions and amendments and additions to the regulations, as submitted by the old Working Group 2, were considered and finalised for inclusion in the re-edited version of the Standard Regulations for the Wiring of Premises.

E. E. de VILLIERS, Pr.Eng. B.Sc.(Eng.)
Electrical Engineer.

KOMITEE INSAKE BEDRADINGSREGULASIES

NIETEENSTAANDE daar sedert die vorige verslag geen verdere wysigings gepubliseer is nie, het die werksaamhede van Werkgroep 1 en 2 van die Hoofkimitee na wense gevorder.

In die maande April tot September 1972 het dié twee Werkgroepe 10½ voldaagse vergaderings gehou. Dit was nodig om heelwat tyd te bestee aan IEK/TK 64 dokumente wat tydens die 1972 vergadering van die IEK Komitees in Athene, Griekeland, behandel sou word.

Vordering het 'n ongelukkige terugslag ondervind deur 'n voorgestelde radikale verandering in die samestelling van die Internasionale Regulasies wat, na verwagting, eers laat in 1973 afgehandel kan word deur 'n subkomitee van TK 64 bestaande uit lede van Frankryk, Duitsland, Suid-Afrika en 'n vierde lid.

In die lig van die probleme teengekom het die Hoofkomitee tydens 'n vergadering in Johannesburg op 17 November 1972 soos volg besluit :—

1. Dat die ledetal van die twee Werkgroepe verminder word na 5 lede elk met verskillende persone op elke Werkgroep.
2. Dat die een Werkgroep alleenlik die dinamika van die hersiening van die Bedradingsregulasies sal hanteer (in ooreenstemming met IEK aanbevelings) en die ander alle wysigings en goedkeurings sal korreleer. Hierdie twee Werkgroepe sal onderskeidelik bekend staan as Werkgroep 3 en Werkgroep 4.
3. Die verteenwoordigers wat op die Werkgroepe 3 en 4 sal dien is benoem. (Die Uitvoerende Raad het tydens sy vergadering te Kempton Park op 24 November 1972, mnre. E. E. de Villiers en L. B. Cumming as verteenwoordigers van die VMEO benoem).
4. Dat die nuwe Werkgroep 4 voortgaan met die redigering van die Bedradingsregulasies met insluiting alleenlik van lopende wysigings.
5. Verskeie woordomskrywings en wysigings en toevoegings van regulasies, soos deur die ou Werkgroep 2 voorgelê, was oorweeg en finaal oor besluit vir insluiting in die geredigeerde weergawe van die Standaard Regulasies vir die Bedrading van persele.

E. E. de VILLIERS, Pr.Ing. B.Sc.(Ing.)
Elektrotegniese Ingenieur.

ANNUAL REPORT ON THE C.S.I.R. ADVISORY COMMITTEE FOR ELECTRICAL ENGINEERING

Mr. G. C. Theron reports as follows:

"During the morning the committee was introduced by means of lectures and a tour of the laboratories to the research projects in progress. This was a most informative tour and a practical means of preparing the committee for the more formal meeting in the afternoon.

The formal session dealt with the annual report of the director and the proposed research programme for the period 1973/74 and covers the following divisions under the heads indicated:—

Applied electronics	Mr. J. G. Joubert
Automation	Dr. G. J. Kühn
Electronic instrumentation	Mr. Z. F. Joubert
Power electrical engineering	Mr. R. B. Anderson
Signal Processing	Mr. J. H. J. Filter
Solid State electronics	Dr. A. G. K. Lutsch

Apart from the general research programme at least 35% of the available research man hours for the year were allocated to contract work. This placed a heavy burden on the senior staff and on people with certain specialised experience. It was also clear to the members of the committee that lack of accommodation was a very serious problem.

The development of a suitable and reasonably priced device to interupt the current if an overhead conductor of an 11 kV system should break or touch the ground has been on the programme for a number of years and your representative requested the institute to give this matter some attention.

In view of the very large number of electricity and other meters used by local authorities on consumer installations, the manpower shortage and cost of meter reading coupled with the outstanding achievements of the institute in the field of semi conductors and applied elecronics and their application, your representative requested the institute to consider a research project on telemetering in this field.

A break-through here could be of considerable economic value to the country and the electricity undertakings in particular.

The meeting is conducted alternatively in Afrikaans and English and the vice-president and the director must be congratulated on the efficient arrangements and chairmanship and very excellent annual report.

I wish to thank Mr. C. C. Theron for attending the meeting on behalf of the A.M.E.U. and for the information contained in this report.

J. VON AHLFTEN,
Representative.

JAARVERSLAG OOR DIE W.N.N.R. SE ADVIESKOMITEE INSAKE ELEKTROTEGNIESE INGENIEURSWESE

Mnr. G. C. Theron rapporteer soos volg:

„Gedurende die oggend is die Komitee by wyse van lesings en 'n toer van die laboratoriums met navorsingsprojekte wat aan die gang is, bekend gestel. Dit was 'n uiters insiggewende toer en 'n praktiese voorbereiding van die Komitee vir die meer formele vergadering in die namiddag.

Die formele sitting het gehandel oor die jaarverslag van die Direkteur en die voorgestelde navorsingsprogram vir die tydperk 1973/74 en het die volgende afdelings onder die aangeduide hoofde gedek:

Toegepaste elektronika	Mnr. J. G. Jobert
Outomatisasie	Dr. G. J. Kühn
Elektroniese instrumentasie	Mnr. Z. F. Joubert
Elektriese krag-ingenieurswese	Mnr. R. B. Anderson
Sinjaal-prosessering	Mnr. J. H. J. Filter
Elektronika in die soliede staat	Dr. A. G. K. Lutsch

Afgesien van die algemene navorsingsprogram, is ten minste 35% van die man-ure wat gedurende die jaar vir navorsingswerk beskikbaar is, aan kontrakwerk toegesê. Dit het 'n swaar las op die senior personeel en op mense met sekere gespesialiseerde ervaring geplaas. Dit was ook vir lede van die Komitee duidelik dat gebrek aan akkommodasie 'n baie ernstige probleem is.

Die ontwikkeling van 'n apparaat teen 'n billike prys om die stroom te onderbreek indien 'n bogrondse geleie van 'n 11kV-stelsel sou breek of aan die grond sou raak, is al 'n aantal jare op die program en u verteenwoordiger het die instituut versoek om aandag aan hierdie saak te gee.

Met die oog op die baie groot elektrisiteits- en ander meters wat deur plaaslike besture in verbruikersinstallasies gebruik word, die mannekrag-tekort en die koste van die lees van meters, tesame met die uitstaande prestasies van die instituut op die gebied van semigeleiers en toegepaste, elektronika en die aanwending daarvan, het u verteenwoordiger die instituut versoek om oorweging te skenk aan 'n navorsingsprojek insake telemetering op hierdie gebied.

'n Deurbraak in hierdie verband sal van aansienlike ekonomiese waarde vir die land en veral vir die elektrisiteitsondernemings wees.

Die vergadering word om die beurt in Afrikaans en Engels gehou en die vise-president en die direkteur moet gelukgewens word met die doeltreffende reëlings en 'n besonder voortreflike jaarverslag."

Ek wil Mnr. G. C. Theron bedank vir die bywoning van die vergadering namens die VMEO en vir die inligting wat in hierdie verslag vervat is.

J. VON AHLFTEN,
Verteenwoordiger.

ANNUAL REPORT 1972

ELECTRICAL WIREMEN'S REGISTRATION BOARD

The Board was constituted as follows for 1972:—

Chairman: Mr. J. G. Wannenburg.

Members: Messrs. J. M. Fraser, F. Leemans, A .H. M. Drysdale, J. K. von Ahlften.

In an advisory capacity, Mr. Hare of the Central Organisation for Trade Testing, Olifantsfontein, attended all the meetings of the Board.

Meetings of the Board and Application for Registration.

The Electrical Wiremen's Registration Board held 12 meetings during 1972 and considered applications for registration in respect of 1658 persons. Of these applicants 1618 were accepted for the prescribed examinations or were exempted therefrom in part or in full and 40 applications were refused. The Board also granted provisional registration certificates or approved the renewal of such certificates in respect of 2815 applicants.

Examinations.

Three written examinations were held at 41 examination centres and 1318 candidates were entered. The results were as follows:—

Part 1.—(On the Standard Regulations for the Wiring of Premises):

Failed	405
Passed	193

Part 2.—(On Electrical Theory):

Failed	212
Passed	65
Absentees	443
Total	1318

A number of candidates who, for various reasons, were unable to undergo or pass the written examinations, were allowed to undergo oral examinations.

During the year under review 298 practical examinations were held in the ten principal centres. Test arrangements were made in respect of 3124 candidates of which 610 passed, while 551 were absent.

Of the 1963 who failed, a number of candidates passed in certain tasks of the tests and they were granted exemption from these in subsequent tests. The pass mark for each test is 60%.

The abovementioned totals of 1318 and 3124 include candidates who had failed in previous years.

JAARSVERSLAG VIR 1972

REGISTRASIERAAD VIR ELEKTROTEGNIESE DRAADWERKERS

Die Raad vir 1972 was as volg saamgestel:—

Voorsitter: Mnr. J. G. Wannenburg.

Lede: Menere J. M. Fraser, F. Leemans, A. H. M. Drysdale, J. K. von Ahlften.

Mnr. Hare van die Sentrale Organisasie vir Ambagstoetse, Olifantsfontein, het die vergaderings van die Raad in 'n raadgewende hoedanigheid bygewoon.

Vergaderings van die Raad en Aansoeke vir Registrasie.

Die Registrasieraad vir Elektrotegniese Draadwerkers het gedurende 1972 12 vergaderings gehou en oorweging verleen aan 1658 nuwe aansoeke vir registrasie. Hiervan is 1618 of tot die eksamens toegelaat of geheel of gedeeltelik daarvan vrygestel en 40 eensoeke is geweier. Die Raad het ook voorlopige registrasie-sertifikate of die hernuwing van sulke sertifikate ten opsigte van 2815 applikante toegestaan.

Eksamens.

Drie geskrewe eksamens is by 41 eksamensentra gehou, 1318 kandidate was daarvoor ingeskryf. Die uitslae was as volg:—

Deel 1: (Bedradingsregulasies)

Druip	405
Slaag	193

Deel 2: (Elektriese Teorie)

Druip	212
Slaag	65
Afwesig	443
Totaal	1318

'n Aantal kandidate wat om verskillende redes nie die skriftelike eksamens kon aflê of slaag nie, is toegelaat om mondelikse eksamens te ondergaan.

Gedurende die verslagjaar is 298 praktiese eksamens in die tien vernaamste sentra gehou. Toetsreëlings is ten opsigte van 3124 kandidate getref van wie 610 geslaag het en 551 was afwesig. Van die 1963 wat gedruip het, het 'n hele aantal in sommige van die take geslaag en is vrystelling in latere toetse toegestaan. Die slaagmerk vir elke toets is 60%. Bogenoemde totale van 1318 en 3124 sluit kandidate in wat in die vorige jaar gedruip het.

Registration Certificates.

Particulars of registration certificates issued since the Act came into operation are reflected hereunder :

REGISTRATION CERTIFICATES ISSUED

Year	To Applicants exempted from the examinations	To Applicants who passed the Examinations during 1971 or in previous years	Totals
1940/67	2 651	7 155	9 806
1968	50	169	219
1969	74	293	367
1970	89	371	460
1971	133	460	593
1972	94	546	640
	3 091	8 994	12 085

Particulars of the number of provisional registration certificates issued over the last six years (excluding renewals thereof) are as follows :—

Year	Number
1967	371
1968	386
1969	465
1970	702
1971	1 027
1972	1 288

Proposed Amendments to the Act.

The revision of the Act is still under consideration and it is anticipated that all the proposals received will be circulated for final comment to all interested parties in due course.

General.

It will be noted that the number of provisional registration certificates issued has increased substantially during 1971 and 1972 which was due to the temporary concession of the Board to exempt artisans with long experience, from the written examinations and to require them to only pass the practical test to qualify for full registration. The results of the practical tests have however been disappointing and candidates were advised to undergo further practical training. It was however successful in getting as many practising wiremen to register who otherwise would be doing wiring work illegally and the co-operation of member undertakings of the A.M.E.U. is requested to ensure that no unregistered wiremen undertake wiring work other than determined in Section 20 of the Act.

In conclusion I wish to thank the Board for the information provided in this report and for permission to submit it to the Convention.

J. K. VON AHLFTEN,
Representative.

Registrasie-Sertifikate.

Besonderhede van registrasie-sertifikate wat sedert die inwerkingtreding van die Wet uitgereik is word hieronder weer-gegee :—

Jaar	Aan Applikante wat van die eksamens vrygestel is.	Aan Applikante wat gedurende 1971 of in vorige jare in die eksamens geslaag het.	Totaal
1940/67	2 651	7 155	9 806
1968	50	169	219
1969	74	293	367
1970	89	371	460
1971	133	460	593
1972	94	546	640
	3 091	8 994	12 085

Besonderhede van die aantal voorlopige registrasie-sertifikate wat gedurende die afgelope 6 jaar uitgereik is (hernuwings uitgesluit) is soos volg:—

Jaar	Nommer
1967	371
1968	386
1969	465
1970	702
1971	1 027
1972	1 288

Voorgestelde wysigings aan die wet.

Die hersiening van die Wet is tans nog onder oorweging en dit word verwag dat alle voorstelle wat ingedien is binnekort uitgestuur sal word vir finale kommentaar aan alle belanghebbende instansies.

Algemeen.

Daar sal opgelet word dat die aantal voorlopige registrasie-sertifikate wat uitgereik is geweldig toegeneem gedurende 1971 en 1972 wat tewyte is aan die tydelike toegewings van die Raad om ambagsmanne met jarelange ondervinding vry te stel van die geskrewe eksamens en slegs te vereis dat hulle die praktiese toetse moet slaag om te kwalifiseer vir volle registrasie. Die resultate van die praktiese toetse was egter teleurstellend en was kandidate aangeraai om hulle verder te bekwaam deur praktiese opleiding. Daar is egter in geslaag om soveel moontlik van die praktiserende draadwerkers te laat registreer wie andersins nie wettiglik draadwerk sou onderneem nie en die samewerking van Lidondernemings van die V.M.E.O. word gevra om spesifiek toe te sien dat geen draadwerk onderneem word deur ongeregistreerde draadwerkers nie anders as bepaal in artikel 20 van die Wet.

Ten slotte wil ek graag die Raad bedank vir die inligting wat in hierdie verslag vervat is, sowel as vir die nodige toestemming om dit aan die Konvensie voor te lê.

J. K. VON AHLFTEN,
Verteenwoordiger.

TECHNICAL TRAINING OF STAFF

REPORT TO THE EXECUTIVE COUNCIL at its Meeting held on the 24th May, 1972 at the Holiday Inn, Jan Smuts Airport, Johannesburg.

A meeting of the Sub-Committee appointed to investigate the Training of Technical Staff was held in the offices of the Johannesburg Electricity Department on the 19th May, 1972. There were present Messrs. Barton, de Villiers, Pretorius and Plowden. Mr. Robson of East London was unable to attend.

At this meeting the following considerations were discussed :—

1.—Questionnaire.

Copies of a questionnaire designed to elicit information on the numbers and categories of apprentices and technicians for whom training is required were sent to all members of the Association. By the end of March, 1972, 54 replies had been received, representing a 40% return. This, by normal standards, would be regarded as satisfactory but, in the light of the information required—particularly in regard to numbers involved—was disappointing. It is appreciated that a number of Member Undertakings do not train apprentices or technicians, but returns from such Undertakings would have assisted materially in determining the location of training centres.

An analysis schedule of the questionaires returned was prepared and copies were given to the members of the Sub-Committee. Further analysis on a Regional or Provincial basis must now be made.

2.—Achievement of Professional Status.

At its meeting in East London on 12 February, 1971, the Executive Council resolved inter alia :—

(a) "That the Committee also investigate through the Professional Engineers Council the avenue by which certain categories can achieve professional status."

This was discussed with a member of the Professional Engineers Advisory Committee of the South African Council for Professional Engineers (S.A.C.P.E.) with the following outcome which must be regarded as confidential to members of the Executive Council:—

A. **Technician Status**

(i) The Federation of Societies of Professional Engineers (F.S.P.E.) is actively investigating the establishment of status for Technicians. Possible solutions are to create a Class for Technicians within the existing Professional

TEGNIESE OPLEIDING VAN PERSONEEL

RAPPORT AAN DIE UITVOERENDE RAAD by sy vergadering gehou op 24 Mei 1972 in die Holiday Inn, Jan Smuts Lughawe, Johannesburg.

'n Vergadering van die subkomitee wat benoem was om die opleiding van tegniese personeel te ondersoek was gehou in die kantore van die Johannesburgse Elektrisiteitsdepartement op 19 Mei 1972.

Aanwesig was Mnre. Barton, de Villiers, Pretorius en Plowden. Mnr. Robson van Oos-Londen kon nie teenwoordig wees nie.

Die vergadering het die volgende punte bespreek:—

1.—Vraelys.

Eksemplare van 'n vraelys wat bedoel is om inligting uit te lok omtrent die getalle en kategorieë van vakleerlinge en tegnici wat opleiding nodig het, was na alle lede van die Vereniging uitgestuur.

Aan die einde van Maart 1972 was 54 antwoorde ontvang wat 40% opgawe verteenwoordig. Die opgawe kan volgens normale maatstaf as bevredigend beskou word maar gebaseer op die inligting wat benodig is—spesiaal m.b.t. die vereiste getalle—was dit teleurstellend.

Dit word aanvaar dat 'n aantal Lid-Ondernemings vakleerlinge of tegnici oplei, maar opgawes van sulke Ondernemings sou 'n belangrike hulp gewees het om die plek van opleidingssentrums te bepaal.

'n Ontleding van die ontvange vraelyste was opgestel en aan Subkomiteelede gestuur. 'n Verdere analise op 'n Streek- of Provinsiale basis moet nou gemaak word.

2.—Bereiking van Professionele Status.

By sy vergadering te Oos-Londen on 12 Februarie 1971 het die Uitvoerende Raad onder andere besluit:—

(a) „Dat die komitee 'n ondersoek doen in samewerking met die Professionele Ingenieurs Raad ingevolge waardeur sekere kategorieë professionele status kan bereik."

Dit was bespreek met 'n lid van die Professionele ingenieurs Raadgewende Komitee van die Suid-Afrikaanse Raad vir Professionele Ingenieurs (S.A.R.P.I.) met die volgende resultaat was as vertroulik beskou moet word vir die lede van die Uitvoerende Raad.

A. **Tegnikus Status**

(i) Die Federasie van die Vereniging van Professionele Ingenieurs (F.V.P.I.) stel aktief ondersoek in na die verkryging van status vir Tegnici.
Moontlike oplossings is om 'n graad vir

Engineer Institutes or to establish an independent Association/Institute for Technicians. The latter procedure would appear to be more satisfactory for Technicians, since the former would result in depressed status in relation to other grades of membership in a Professional Engineers Institute.

(ii) F.S.P.E.'s next Conference, to be held in August, 1973, is to be devoted to Technicians to assess the position regarding the education, training, employment and recognition of engineering technicians in all grades and branches of engineering.

A questionnaire will be sent to all large employers of technicians, Engineer Institutions, etc., with a return date of February, 1973. These will be analysed and the results presented to delegates before commencement of the above Conference. A recommendation will be made to F.S.P.E. to send copies of the questionnaire to the Secretaries of the A.M.E.U. for transmission to Member Undertakings.

B. **Professional Status**

(i) S.A.C.P.E. is presently discussing with the Department of Education possible ways by which holders of the National Diploma for Technicians (NDT) can qualify for registration as Professional Engineers. Proposals now under consideration involve a 3-stage programme of which the first two stages comprise the passing of examinations equivalent to the 2nd and 3rd year standards of a University Engineering Course. The third stage will comprise an interview by the Council for Professional Engineers.

(ii) S.A.C.P.E. **will not** accept for registration persons who do not comply with the educational requirements laid down except as provided for in Section 18(4) (a) and 18(4) (b) of the Act. In the provisos of these Sections, educational standards are of no consideration and stress is laid on the scope of engineering work performed by the applicant. The period of 12 months from commencement of the Act within which such persons should have applied for registration is now under consideration and may be extended.

3.—Artisan and Technician Training.

The following is a summary of discussions held

Tegnici in die lewe te roep binne die bestaande Professionele Ingenieurs Genootskappe of om 'n onafhanklike Vereniging/Genootskap vir Tegnici te stig.

Laasgenoemde prosedure sou meer bevredigend blyk te wees vir Tegnici, aangesien eersgenoemde reëling 'n vernederende status ten aansien van ander grade van lidmaatskap in 'n Professionele Ingenieurs Genootskap kan teweegbring.

(ii) Die volgende Konferensie van die F.V.P.I. sal gehou word in Augustus 1973 en sal gewy word aan Tegnici om die posisie in oënskou te neem in verband met die onderwys, opleiding, werk en erkenning van die ingenieurswese tegnici in alle grade en takke van ingenieurswese.

'n Vraelys sal uitgestuur word aan alle groot werkgewers van tegnici, Ingenieur Genootskappe, ens., met 'n terugkeer datum van Februarie 1973. Die lyste sal ontleed word en die resultate sal voorgelê word aan afgevaardigdes voor die aanvang van bogenoemde Konferensie.

'n Aanbeveling sal aan die F.V.P.I. gedoen word om afskrifte van die vraelyste beskikbaar te stel aan die Sekretariaat van die V.M.E.O. vir deurstuur aan Lid Ondernemings.

B. **Professionele Status**

(i) Tans bespreek S.A.R.P.J. met die Departement van Onderwys die moontlikhede waar volgens houers van die Nasionale Diploma vir Tegnici (NDT) kan kwalifiseer vir registrasie as Professionele Ingenieurs.

Voorstelle wat nou oorweeg word sluit in 'n 3-fase program waarvan die eerste twee fase die slaag van eksamens wat gelykwaardig is aan die 2de en 3de jaar standaarde van 'n Universiteits Kursus in Ingenieurswese bevat.

Die derde fase sal 'n onderhoud insluit deur die Raad vir Professionele Ingenieurs.

(ii) S.A.R.P.I. **wil nie** persone vir registrasie aanvaar wat nie voldoen aan die onderwysvereistes soos neergelê nie, behalwe soos bepaal in Seksie 18(4) aa) en 18(4) (6) van die Wet. In die bepalings van hierdie seksies is onderwys standaarde van geen belang nie en nadruk word gelê op die veld van ingenieurswerk wat deur die applikant verrig word.

Die tydperk van 12 maande vanaf die aanvang van die Wet—waar sulke persone binne die periode applikasie vir registrasie moes gedoen het—word nou oorweeg en mag moontlik verleng word.

3.—Ambagsman en Tegnikus Opleiding

Die volgende is 'n opsomming van die besprekings

with Mr. I. R. G. Stephen, Deputy Director (Technology), Witwatersrand College for Advanced Technical Education :—

(i) The possibility of whether Basic Training Centres for Municipal apprentices could be established by the Department of Education at selected Technical Colleges together with hostel accomodation was raised. This was a new concept, and Mr. Stephen undertook to discuss it at higher level. The thought prompting this proposal stems from the fact that the A.M.E.U. might find serious difficulty in establishing and administering 3 to 4 such centres, and also the A.M.E.U. only represents the electricity undertakings of local authorities, who have other departments employing and training artisans. Financial aspects would also be simplified. Mr. Stephen commented that, if this suggestion was adopted, Technical College Basic Training Centres would probably not be established solely for local authority apprentices.

(ii) Mr. Stephen drew attention to a new subject in syllabuses for Technician courses, viz. 'Applied Technology,' which can be introduced at the request of particular organisations to cover their specific fields of activity. Such organisations have to participate in formulating the subject matter and the A.M.E.U. could ask for the inclusion of such a subject in the course of training for Technicians sponsored by local authority supply undertakings. This would necessitate a very close degree of co-operation between Member Undertakings.

4.—Requirements for Registration of Professional Engineers.

The following information was obtained from the same source as referred to under Section 2 of this report :—

(i) The Act—Section 18(2) (c)—requires a minimum of 3 years post-graduate experience of a kind prescribed in terms of Section 7 (3) (c).

(ii) From 1975, the programme of training offered by any employer for the 3 year "engineer-in-training" period will have to be approved by S.A.C.P.E.

This will be to the advantage of organisations which comply, because they will naturally attract graduate engineers to their service. It is therefore an aspect to which organisations sponsoring the uni-

gehou met Mnr. I. R. G. Stephen, Adjunk-Direkteur (Tegnologie), Witwatersrandse Kollege vir Gevorderde Tegniese Onderwys :—

(i) Die moontlikheid was geopper of Basiese Opleidingssentrums vir Munisipale vakleerlinge gevestig kon word deur die Departement van Onderwys by uitgesoekte Tegniese Kolleges saam met koshuis akkommodasie, Dit is 'n nuwe konsep, en Mnr. Stephen het onderneem om dit op hoër vlak te bespreek. Die inspirasie vir hierdie voorstel is gebaseer op die feit dat die V.M.E.O. groot moeilikheid sou ondervind met die stigting en administrasie van 3 of 4 sulke sentra, en voorts verteenwoordig die V.M.E.O. net die elektrisiteitsondernemings van plaaslike owerhede, wat nog ander departemente het wat ambagsmanne in diens het en oplei. Finansiele aspekte sou ook vereenvoudig word.

Die kommentaar van Mnr. Stephen was dat indien die voorstel aangeneem word, sou Tegniese Kollege Basiese Opleidingsentra waarskynlik nie net vir plaaslike owerheids vakleerlinge opgerig word nie.

(ii) Mnr. Stephen het die aandag gevestig op 'n nuwe vak in die leerplanne vir Tegnikus kursusse, naamlik „Toegepaste Tegnologie," wat ingestel kan word op versoek van besondere organisasies om hulle spesifieke veld van werksaamhede te behandel.

Sulke organisasies moet deelneem in die formulering van die vakinhoud en die V.M.O.E. kan die insluiting van daardie vak versoek in die opleidingskursus vir tegnici wat deur voorsieningsondernemings van plaaslike owerhede gesteun word.

'n Noue samewerking tussen Lid-Ondernemings sou hier 'n vereiste wees.

4.—Eise vir Registrasie van Professionele Ingenieurs.

Die volgende inligting word verkry van dieselfde bron soos vermeld onder Seksie 2 van die rapport :—

(i) Die Wet—Seksie18(2) (c)—eis 'n minimum van 3 jaar na-graadse ervaring van die soort wat voorgeskryf is in Seksie 7(3) (c).

(ii) Vanaf 1975 sal die program van opleiding wat deur enige werkgewer aangebied word vir die 3 jaar „ingenieur-in-opleiding" periode goedgekeur moet word deur die S.A.R.P.I.

Dit sal tot voordeel wees van organisasies wat hieraan voldoen want hulle sal natuurlik gegradueerde ingenieurs na hul dienste lok.

Dit is daarom 'n aspek vir organisasies

versity training of engineers must give early attention, since students now in their 2nd year of training will be affected thereby.

5.—General.

In the light of the foregoing, and to enable the Technical Training Sub-Committee to make further progress, the following proposals, together with their motivation where relevant, are submittted for the approval of the Executive Council. Resolutions quoted are those taken by the Executive Council at its meeting in East London on the 12 February, 1971 :—

(i) The time is now appropriate to implement the recommendation of the U.M.E. that the Department of National Education be invited to appoint a representative to the Technical Training Sub-Committee. **It is recommended** that Mr. I. R. G. Stephen also be invited to join the Sub-Committee and that the Convener put this in hand (Resolution (a)).

(ii) In general, the type of apprentice training given by private Industrial organisations is not suited to the requirements of the power supply industry and co-operation would, in any case, have to be on an individual basis. **It is therefore recommended** that no further action be taken in respect of the last part of Resolution (a). It is to be noted, however, that in smaller undertakings apprentices rarely have the opportunity to gain experience in the repair of major items of distribution equipment such as transformers and switchgear; to overcome this, individual municipal undertakings might approach relevant private organisations with a view to arranging, at their own cost and responsibility, for their apprentices to spend a few weeks in the workshops of such organisations.

(iii) In view of the facilities for adult training provided by the Department of National Education at Westlake, Western Province, **it is recommended** that no further action be taken in regard to Resolution (b).

(iv) Since it is certain that, in the ultimate establishment of status for Technicians, a nationally accepted designation for them will be determined, **it is recommended** that action in respect of Resolution (d) be deferred sine die.

wat die universiteits opleiding van ingenieurs ondersteun om spoedig aandag te skenk aangesien studente vat nou in hul 2de jaar van opleiding is daardeur geraak word.

5.—Algemeen.

Na aanleiding van die voorgaande, en om die Tegniese Opleiding Subkomitee in staat te stel om verdere vordering te kan maak, word die volgende voorstelle, tesame met hulle motivering waar toepaslik, voorgelê ter goedkeuring van die Uitvoerende Raad.

Besluite hier aangehaal is die wat geneem is deur die Uitvoerende Raad tydens sy vergadering in Oos-Londen op 12 Februarie 1971 :—

(i) Dit is nou die aangewese tyd om die aanbeveling van die O.M.E. dat die Departement van Nasionale Onderwys uitgenooi word om 'n verteenwoordiger op die Tegniese Opleiding Subkomitee te benoem, ten uitvoer te bring. Dit word aanbeveel dat Mnr. I. R. G. Stephen ook uitgenooi word om aan te sluit by die Subkomitee en dat die Sameroeper nou met die saak moet voort gaan (Besluit (a)).

(ii) Die soort van vakleerling opleiding wat deur privaat nywerheidsorganisies in die algemeen gegee word is ongeskik vir die eise van die kragvoorsiening industrie en samewerking sal in elk geval dan op 'n individuele basis geskied.

Derhalwe word aanbeveel dat nie verder gehandel word insake die laaste deel van Besluit (a) nie.

Daar moet egter opgelet word dat in kleiner ondernemings vakleerlinge selde die kans kry om ervaring op te bou in die herstel van groot distribusietoerusting soos transformators en skakeltuig; om dit te bowe te kom behoort individuel munisipale ondernemings met die betrokke privaat organisasies in verbinging te tree teneinde, op hulle eie koste en verantwoordelikheid, 'n reëling te tref dat hulle vakleerlinge 'n paar weke in sodanige werkwinkels kan werk.

(iii) In verband met die geriewe vir opleiding van volwassenes wat verstrek word deur die Departement van Nasionale Onderwys te Westlake, Westelike Provinsie, word aanbeveel dat nie verder gehandel moet word insake Besluit (b) nie.

(iv) Aangesien dit seker is dat by die uiteindelike vasstelling van die status vir Tegnici 'n nasionaal erkende naam vir hulle bepaal sal word, word aanbeveel dat aksie ten opsigte van besluit (d) vir 'n onbepaalde tyd uitgestel word.

(v) In the light of the information given in Section 2B of the above report, **it is accepted** that the Sub-Committee has now completed its investigations in respect of Resolution (e).

(vi) **It is recommended** that the provisions of Resolution (f) be now implemented, viz. that full time assistance be sought from suitably qualified individuals to expedite the work of the Sub-Committee. Possibilities are Mr. Simpson, ex City Electrical Engineer, Durban, or Mr. Aspinall, previously with the Witwatersrand College for Advanced Technical Education (Note from Convener: It has subsequently been learned that Mr. Aspinall feels that at his age he could not undertake such an arduous assignment.)

(vii) That the Secretaries write to the Department of Labour to obtain full information on the pros and cons of indenturing apprentices in terms of the provision of Common Law. (Note from Convener: In the light of the discussion on this subject during the Technical Meeting at Holiday Inn on the 25 and 26 May 1972, it does not appear that this will be a fruitful line of investigation.)

D. C. PLOWDEN,
Convener,
Technical Training Sub-Committee

(v) Gebaseer op die inligting wat in Seksie 2B van bovermelde rapport gegee is **moet aangeneem word** dat die Subkomitee nou sy ondersoeke in verband met Besluit (e) voltooi het.

(vi) **Dit word aanbeveel** dat die inhoud van Besluit (f) nou uitgevoer word, naamlik dat voltydse hulp gesoek moet word van behoorlik gekwalifiseerde persone om die werk van die Subkomitee te bespoedig. Moontlikhede is Mnr. Simpson, oud Stads-Elektrotegniese Ingenieur, Durban of Mnr. Aspinall, voorheen by die Witwatersrandse Kollege vir Gevorderde Tegniese Onderwys. (Aantekening van Sameroeper: Dit was daarna verneem dat Mnr. Aspinall voel dat weens sy gevorderde leeftyd hy nie die moeilike taak kan onderneem nie.)

(viii) Dat die Sekretariaat 'n skrywe rig aan die Departement van Arbeid om volledige inligting te bekom omtrent die voor- en nadele vir kontraktering van vakleerlinge onder die bepalings van die Gemene Reg. (Aantekening van Sameroeper: Met verwysing na die bespreking oor die onderwerp tydens die Tegniese Vergadering by Holiday Inn op 25 en 26 Mei 1972, lyk dit asof dit nie 'n vrugbare rigting van ondersoek sal wees nie.)

D. C. PLOWDEN,
Sameroeper,
Tegniese Opleiding Subkomitee.

REPORT ON THE TECHNICAL TRAINING OF STAFF

The Sub-Committee appointed by the Executive Council at its meeting on the 22 October 1971 to investigate the technical training of staff comprises Messrs. R. W. Barton, E. E. de Villiers, D. C. Plowden (Convener), E. de C. Pretorius and K. G. Robson. The membership of the Sub-Committee was later increased by the addition of Mr. W. H. Rogers, representing the Department of National Education, and Mr. I. R. G. Stephen, Deputy Director (Technology), Witwatersrand College for Advanced Technical Education.

The terms of reference for the Sub-Committee, although published in Volume 1 of the Proceedings for the Technical Meeting held in Kempton Park on the 25 and 26 May 1972, are briefly repeated here for convenience :—

(a) To request the U.M.E. to approve of the appointment by the AMEU of a sub-committee to investigate the feasibility of introducing suitable training facilities and financing these by contributions from local authorities who cannot provide such facilities individually; also to co-ordinate on these lines with private industrial concerns similarly placed.

(b) To investigate the introduction of adult training schemes on a national basis.

(c) To request the Provincial Education Departments to publicise the value of the sandwich course of training available for Engineering Technicians at Colleges for Advanced Technical Education.

(d) That all Supply Authorities adopt the designation of "Engineering Technician" for persons holding the qualifications of National Technical Diploma for Technicians.

(e) To investigate through the S.A. Council for Professional Engineers the avenue by which certain categories can achieve professional status.

(f) To investigate the full-time appointment of a suitably qualified person to assist in expediting the work of the sub-committee.

A memorandum on the foregoing objectives was submitted to the UME, who approved in principle of the appointment by the AMEU of an investigating sub-committee and suggested that the co-operation of National Education be sought and that the Department be invited to appoint a representative to the sub-committee.

VERSLAG OOR DIE TEGNIESE OPLEIDING VAN PERSONEEL

Die sub-komitee wat deur die Uitvoerende Raad op sy vergadering van 22 Oktober 1971 aangestel is om ondersoek in te stel na die tegniese opleiding van personeel bestaan uit mnre. R. W. Barton, E. E. de Villiers, D. C. Plowden (Saamroeper), E. de C. Pretorius en K. G. Robson. Die lidmaatskap van die subkomitee is lateraan uitgebrei deur die toevoeging van mnr. W. H. Rogers, wat die Departement van Nasionale Onderwys verteenwoordig en mnr. I. R. G. Stephen, Adjunk-Direkteur (Tegnologie), Witwatersrandse Kollege vir Gevorderde Tegniese Onderwys.

Die opdrag aan die sub-komitee, alhoewel gepubliseer in die Handelinge van die Tegniese Vergadering gehou te Kempton Park op 25 en 26 Mei 1972, word hier kortliks aangehaal vir gerief :—

(a) Om die VMR te versoek om goedkeuring te heg aan die aanstelling deur die VMEO van 'n subkomitee om die doenlikheid van die instelling van geskikte opleidingsgeriewe en die finansering daarvan deur bydraes van plaaslike owerhede wat nie sulke geriewe afsonderlik kan voorsien nie, te ondersoek; asook om soos hierbo aangedui, te skakel met private industrieële besighede in soortgelyke omstandighede.

(b) Om die instelling van volwasse opleidings-skemas op 'n nasionale grondslag te ondersoek.

(c) Om 'n versoek te rig aan die Provinsiale Onderwys Departemente om reklame te maak vir die stapelkurkus van opleiding wat beskikbaar is vir Ingenieurs-tegnici by Kolleges vir Gevorderde Tegniese Onderwys.

(d) Dat alle voorsienings-owerhede die ampsbenaming van „Ingenieurs-tegnikus" aanneem vir persone wat die kwalifikasie van Nasionale Tegniese Diploma vir Tegnici verkry het.

(e) Om, deur die S.A. Raad vir Professionele Ingenieurs, ondersoek in te stel na weë waardeur bepaalde kategorië professionele status kan verkry.

(f) Om die aanstelling van 'n voltydse, ten volle gekwalifiseerde persoon tot hulp ter bespoediging van die sub-komitee se werk, te ondersoek.

'n Memorandum oor die bovermelde doelstellings is aan die VMR voorgelê, wat in beginsel die aanstelling deur die VMEO van 'n sub-komitee vir ondersoek goedgekeur het en voorgestel het die samewerking van die Departement van Nasionale Onderwys aangevra word en dat dié Departement gevra word om 'n verteenwoordiger op die sub-komitee aan te stel.

On invitation, the Department of National Education appointed Mr. W. H. Rogers as its representative on the sub-committee, to which Mr. I. R. G. Stephen was also co-opted with the approval of the Executive Council.

In an endeavour to obtain some indication of the numbers of trainees likely to be involved in the various categories and also of the extent to which local authorities would support the provision of training facilities, a questionnaire was sent to all Member Undertakings of the Association. Fifty-three replies were received, representing a 40% return. This, in other spheres, could be regarded as satisfactory but, in view of the information required, particularly in regard to numbers involved, was disappointing. However, an analysis of the replies on a regional basis gave some indication of the areas in which training centres might be established.

At its meeting in Kempton Park on the 24 May 1972, the Executive Council discussed an interim report on the progress made by the Technical Training Sub-Committee and took the decisions indicated in the following paragraphs which are indexed to correspond with the terms of reference quoted at the beginning of this report.

(a) In general the apprentice training requirements of private industrial organisations do not conform to those of the power supply industry and it was therefore agreed that the Sub-Committee should take no further action in seeking the co-operation of these organisations in the full-scale training of apprentices. It was noted, however, that in smaller undertakings apprentices may not have the opportunity to gain experience in the repair of major items of distribution equipment such as transformers and switchgear; to overcome this, individual municipal undertakings could approach relavent private organisations with a view to arranging, at their own cost and responsibility, for their apprentices to spend appropriate periods in the workshops of such organisations.

(b) Bearing in mind the facilities for adult training provided by the Department of National Education at Westlake, Western Province, it was agreed that it be left to individual municipal undertakings to formulate their own policy with regard to adult training schemes.

(c) The Sub-Committee ascertained that provision already exists for giving wide publicity to the courses available at Advanced Colleges of Technical Education, including those for Technicians.

(d) The Federation of Societies of Professional Engineers is actively investigating the training of,

Op dié uitnodiging het die Departement van Nasionale Onderwys vir mnr. W. H. Rogers aangestel as sy verteenwoordiger op die sub-komitee waarin mnr. I. R. G. Stephen ook gekoöteer is met die goedkeuring van die Uitvoerende Raad.

In 'n poging om 'n mate van aanduiding te kry omtrent die getal kwekelinge wat waarskynlik uit die verskillende kategorieë gemoeid sal wees asook van die mate waartoe plaaslike owerhede die voorsiening van opleidingsfasiliteite sal ondersteun, is 'n vraelys aan al die Lid-Ondernemings van die Vereniging gestuur. Drie-en-vyftig antwoorde is ontvang wat 'n 40% terugkeer weerspieël. Dit op ander gebiede, kon as bevredigend beskou word maar, in die lig van die benodigde inligting, en in besonder met betrekking tot die verwagte getalle, was dit teleurstellend. Nogtans het 'n analise op 'n streeksgrondslag tog 'n mate van aanduiding gegee omtrent die gebiede waar opleidingssentra opgerig kon word.

Op sy vergadering te Kempton Park op 24 Mei 1972, het die Uitvoerende Raad 'n tussentydse vorderingsverslag van die Tegniese Opleidings Sub-Komitee bespreek en die besluite geneem soos aangedui in die volgende paragrawe, wat gemerk is om ooreen te kom met die opdrag soos aan die begin van hierdie verslag gegee :—

(a) In die algemeen kom die behoeftes van private industrieële ondernemings nie ooreen met dié van die kragsvoorsieningsindustrie nie en daar is derhalwe ingestem dat die sub-komitee nie verder sal gaan om samewerking van dié ondernemings vir die volskaalse opleiding van vakleerlinge te soek nie. Daar is nogtans opgelet dat, in kleinere ondernemings, vakleerlinge moontlik nie die geleentheid mag kry om ervaring op te doen in die herstel van belangriker groot items van verspeidingstoerusting soos transformators en skakeltoerusting nie; om dit te bowe te kom, kan individuele munisipale ondernemings met die oog daarop, op hulle eie koste en verantwoordelikheid, reel dat hulle vakleerlinge toespaslike tydperke in die werkswinkels van sodanige organisasies deurbring.

(b) Gedagtig aan die geriewe vir volwasse opleiding soos voorsien deur die Departement van Nasionale Onderwys te Westlake, Westelike Provinsie, is saamgestem dat dit aan individuele munisipale ondernemings self oorgelaat word om hulle eie beleid te formuleer aangaande opleidingskemas.

(c) Die Sub-Komitee het vasgestel dat daar alreeds voorsiening bestaan vir uitgebreide publisiteit van die kursusse wat beskikbaar is by Gevorderde Kolleges vir Tegniese Onderwys, insluitende dié vir Tegnici.

(d) Die Federasie van Verenigings vir Professionele Ingenieurs is aktief besig met die ondersoek oor

and establishment of status for, Technicians and has arranged to devote its 1973 Conference to these matters. In preparation for this Conference, FSPE has sent a questionnaire to all the relevant organisations and bodies, including larger municipal electricity undertakings through the Secretaries of the AMEU. The most suitable designations for Technicians in various fields will also receive consideration and it was therefore decided that the Sub-Committee should not pursue this aspect further at the present time.

(e) The Sub-Committee's investigations into possible avenues by which certain categories of engineering personnel could achieve professional status revealed that the South African Council for Professional Engineers cannot accept for registration persons who do not comply with the educational requirements laid down, except as provided for in Sections 18(4)(a) and 18(4)(b) of the Act. These sections make no stipulations in regard to academic qualifications and are only concerned with scope of engineering work performed by the applicant. Notwithstanding the fact that the prescribed period for making application for registration in terms of these Sections of the Act has expired, SACPE will still consider applications from persons who have an acceptable reason for not having submitted their applications within the prescribed period.

It is understood that the SACPE is discussing with the Department of Education possible avenues by which holders of the National Diploma for Technicians might qualify for registration.

(f) The appointment of a suitably qualified person to give full-time assistance to the Sub-Committee is still receiving consideration.

Having disposed of the foregoing matters, the Sub-Committee was able to give more attention to the training of apprentices. Although municipal electricity undertakings can, in general, provide adequate on-the-job training for apprentices, the trade test failure rate is nevertheless alarmingly high. Figures for the whole of the Republic showed a 38% pass in all trades and a 37% pass for electricians. From the experience of larger organisations which are able to provide the facilities, it is abundantly clear that Basic Training Centres are essential if satisfactory trade test results are to be achieved.

As seen by the Sub-Committee, difficulties confronting the AMEU in establishing and administering basic training centres include :—

die opleiding van en die daarstelling van status vir Tegnici en het gereël om sy 1973 Konferensie aan die sake te wy. In voorbereiding vir die konferensie het die FVPI 'n vraelys aan al die betrokke organisasies gestuur, met inbegrip van die grotere munisipale elektrisiteitsondernemings, deur die sekretarisse van die VMEO. Die mees gepaste ampsbenaming vir Tegnici in die verskillende sektore sal ook aandag geniet en dit is derhalwe besluit dat die Sub-Komitee vir die huidige geen verdere aandag aan die kant van die saak sal gee nie.

(e) Die ondersoek van die Sub-Komitee aangaande moontlike weë waarlangs sekere kategorieë van ingenieurspersoneel professionele status kan bereik het laat blyk dat die S.A. Raad vir Professionele Ingenieurs nie persone vir registrasie kan aanvaar, tensy hulle voldoen aan die gespesifiseerde opvoedkundige kwalifikasies nie, behalwe soos daar voorsiening gemaak word in seksies 18(4)(a) en 18(4)(b) van die Wet. Hierdie seksies maak geen vasstellings in verband met akademiese kwalifikasies nie en is alleen maar gemoeid met die bestek van ingenieurswerk wat deur die applikant gedoen is. Desnieteenstaande die feit dat die voorgeskrewe tydperk vir applikasie deurmiddel van dié Seksies van die Wet reeds verstreke is, sal die SARPI nog applikasies van persone oorweeg wat 'n aanneemlike rede het waarom hulle applikasies nie gedurende die voorgeskrewe tydperk ingedien is nie.

Dit word verstaan dat die SAPRI besprekings voer met die Departement van Onderwys aangaande moontlike weë waarlangs houers van die Nasionale Diploma vir Tegnici vir registrasie kan kwalifiseer.

(f) Die aanstelling van 'n geskikte gekwalifiseerde persoon om voltydse hulp aan die Sub-Komitee te verleen, geniet nog steeds aandag.

Nadat bogenoemde sake afgehandel is, kon die Sub-Komitee meer aandag gee aan die opleiding van vakleerlinge. Alhoewel munisipale elektrisiteitsondernemings daartoe in staat is om genoegsame in-die-werk opleiding vir vakleerlinge te verskaf en dit ook doen, is die druipsyfer in vaktoetse nogtans sorgbarend hoog. Syfers vir die Republiek as 'n geheel het 'n 38% slaagsyfer getoon in alle vakrigtings en 'n 37% slaagsyfer vir elektrisiëns. Uit die ondervinding van grotere ondernemings wat in staat is om die opleidingsgeriewe te voorsien, het dit baie duidelik geblyk dat Basiese Opleidingssentra noodsaaklik is indien bevredigende vaktoets slaagsyfers behaal wil word.

Soos gesien deur die Sub-Komitee sluit die probleme van die VMEO met die daarstelling en beheer van basiese opleidingssentra die volgende in :—

(i) the fact that the Association only represents the electricity undertakings of Local Authorities, which also have other departments employing artisan labour.

(ii) financing and administering the building and equipping of training centres and hostels.

(iii) the engaging and controlling of training personnel.

It was generally agreed that a practical solution might be for the Department of National Education to establish say five basic training centres, including hostel accommodation, attached to suitably situated Technical Colleges. To ensure that these received adequate support from both municipal undertakings and other organisations training apprentices, it was suggested that the Department of Labour might be requested to make it a requirement through the relevant Apprenticeship Committees that all apprentices must spend six months during their first year of apprenticeship at an approved basic training centre followed by one or two refresher courses of six to eight weeks each in subsequent years.

A delegation appointed by the Sub-Committee discussed this proposal at length with the Chief Inspector of the Department of National Education. However, it emerged that, while the Department was in complete agreement with the need for basic training centres it felt, like the Department of Labour when it was approached on an earlier occasion, that these should be established by industry itself.

Purely as a scheme, and with the approval of the Chief Inspector, the Deputy Director of the Witwatersrand College of Advanced Technical Education offered a course of basic training for about 20 apprentices from municipal undertakings on the Reef in a training centre which has been established for technicians at his College but is not yet fully committed.

Consideration has also been given by the Sub-Committee to the need for technicians at a level between artisan and diplomad technician. The Deputy Director stated that a suitable course could be provided by the Witwatersrand College subject to the following :

(i) A minimum of 12 students would be required.

(ii) Students must have passed matriculation or equivalent standard.

(iii) The AMEU would have to define the training required.

(i) die feit dat die Vereniging slegs die elektrisiteitsonderneming van Plaaslike Owerhede, wat ook ander departmente met ambags-arbeid insluit, verteenwoordig.

(ii) finansering en administrasie van geboue en toerusting vir opleidingssentra en hostels.

(iii) die indiensnemng en krontrole van opleidings personeel.

Daar is in hoofsaak saamgestem dat 'n moontlike praktiese oplossing sal wees dat die Departement van Nasionale Onderwys sê vyf basiese opleidingssentra sou oprig, insluitende hostelgeriewe, en verbonde aan geskikte Tegniese Kolleges. Om te verseker dat hulle genoemde onderneming kry beide van munisipale ondernemings en ander organisasies wat vakleerlinge oplei, is daar voorgestel dat die Departement van Arbeid moontlik deur die betrokke vakleerlingskapkomitees versoek mag word om as voorwaarde te stel dat alle vakleerlinge ses maande gedurende die eerste jaar van hulle leerlingskap by 'n goedgekeurde basiese opleidingssentrum deurbring, gevolg deur een of twee opknappingskursusse van ses tot agt weeklikse tydperke elk in daaropvolgende jare.

'n Afvaardiging, aangestel deur die Sub-Komitee het hierdie voorstel uitvoerig met die Hoofinspekteur van die Departement van Nasionale Onderwys bespreek Dit het egter geblyk dat, alhoewel die Departement ten volle saamgestem het aangaande die behoefte aan basiese opleidingssentra, dit soos die Departement van Arbeid toe dié by 'n vorige geleentheid gepols is, van mening is dat die geriewe deur industrieë self daargestel behoort te word.

Enkel as proefskema, en met die goedkeuring van die Hoofinspekteur, het die Adjunk-Direkteur van die Witwatersrandse Kollege vir Gevorderde Tegniese Onderwys 'n kursus van basiese opleiding aangebied vir ongeveer 20 vakleerlinge van munisipale ondernemings aan die Rand, in 'n opleidingssentrum wat opgerig is vir tegnici aan sy Kollege maar voorasnog nie ten volle benut is nie.

Die Sub-Komitee het ook oorweging geskenk aan die behoefte aan tegnici op 'n standaard tussen ambags- en gediplomeerde tegnikus. Die Adjunk-Direkteur het dit gestel dat 'n gepaste kursus aan die Witwatersrandse Kollege voorsien kon word op voorwaarde dat :—

(i) 'n Minimum van 12 studente vereis sal word.

(ii) Studente moet matrikulasie of gelykwaardige kwalifikasie behaal het.

(iii) Die VMEO sal die vereiste opleiding moet omskrywe.

Since advantage of this course and of the pilot scheme of basic training can only be taken by trainees living within reasonable travelling distance of Johannesburg, the Executive Council requested the Highveld Branch to appoint its own sub-committee to collaborate with the Deputy Director in developing the proposals. Success of the "intermediate technician" training scheme could lead to the introduction of similar courses in Colleges for Advanced Technical Education situated elsewhere in the Republc.

D. C. PLOWDEN,
Convener.

Aangesien die kursus, sowel as die proefskema van die basiese opleiding, slegs benut sal kan word deur kwekelinge wat binne 'n redelike reisafstand van Johannesburg bly, het die Uitvoerende Raad die Hoëveldse Tak versoek om sy eie sub-komitee aan te stel om met die Adjunk-Direkteur te skakel ten einde die voorstelle te oorwees. Sukses in die „middelbare tegnikus" opleidingsskema mag lei tot die instelling van soortgelyke kursusse in Kolleges vir Gevorderde Onderwys, geleë in ander dele van die Republiek.

D. C. PLOWDEN,
Saamroeper.

CO-ORDINATING COMMITTEE FOR HIGH-VOLTAGE RESEARCH AND TESTING FACILITIES

The seventh meeting of the Committee, which was an informal meeting, was held on the 27 April 1972, in the Administrative building of the University of Cape Town.

Due to the informal nature of the meeting and the fact that it was held in Cape Town the AMEU was not represented at this meeting.

The following are the main points arising from the meeting :—

1. **Lighting Research**

Mr. Anderson (CSIR) reported on plans to continue and extend the research into the physics of lighting in South Africa.

After the ensuing discussion the Committee expressed their wholehearted support and co-operation of their respective organisations for the proposed research programme.

2. **CIGRE SC No. 33 Working Group on Insulator Pollution.**

The question was raised of a more formal representation from South Africa on the above working group.

It was resolved that, for the interim, the Committee expresses support for such an association, but would await Mr. Randall's (Escom) return and his report at the October meeting.

3. **Visit of Dr. Fischer to South Africa.**

Mr. Anderson reported that Dr. A. Fischer, an acknowledged high voltage expert from Germany, would be making a sponsored visit to South Africa during October 1972 and suggested that discussion with him could be very fruitful. It was proposed that Mr. Anderson make arrangements accordingly.

4. **Escom National EHV Research Centre.**

Mr. Randall reported that Escom were hoping to issue equipment enquiries later in the year.

The eighth meeting of the Committee was held in the Board Room, Head Office, Scientiae on Friday, 20 October 1972.

The following are the main points arising from the meeting :—

KO-ORDINERENDE KOMITEE VIR HOOG-SPANNINGS-NAVORSINGS- EN TOETSFASILITEITE

Die sewende vergadering van die Komitee, wat 'n informele een was, is gehou op 27 April 1972 in die Administratiewe Gebou van die Universiteit van Kaapstad.

Vanweë die informele aard van die vergadering en die feit dat dit te Kaapstad gehou is, was die VMEO nie op die vergadering verteenwoordig nie.

Die volgende is die hoofsake wat uit die vergadering voortgespruit het :—

1. **Weerligsnavorsing.**

Mnr. Anderson (WNNR) het verslag gedoen insake planne om die navorsing oor die fisika van weerlig in Suid-Afrika uit te brei.

Volgende op die voortspruitende bespreking, het die Komitee sy heelhartige steun en samewerking van hulle verskillende organisasies vir die voorgestelde navorsingsprojek uitgespreek.

2. **CIGRE SC Nr. 33 Werksgroep op Isolator-besoedeling.**

Die kwessie van meer formele verteenwoordiging vanuit Suid-Afrika op die bogenoemde werksgroep, is geopper.

Daar is besluit dat, vir die huidige, die Komitee sy steun aan so 'n bond uitspreek, maar dat daar gewag word op mnr. Randall (EVKOM) se terugkeer en sy verslag aan die Oktober se vergadering.

3. **Besoek van Dr. Fisher aan Suid-Afrika.**

Mnr. Anderson het berig dat Dr. A. Fischer, 'n erkende hoogspannings-deskundige vanuit Duitsland, 'n geborgde besoek aan Suid-Afrika sal bring gedurende Oktober 1972 en het aangevoer dat besprekings met hom baie vrugbaar mag wees. Daar is voorgestel dat mnr. Anderson dienooreenkomstig reëlings sal tref.

4. **Evkom Nasionale EHS Navorsingssentrum.**

Mnr. Randall het berig dat Evkom hoop om later in die jaar toerustingsnavrae uit te reik.

Die agste vergadering van die Komitee is gehou in die Raadskamer, Hoofkantoor, Scientiae, op Vrydag 20 Oktober 1972.

Die volgende is die hoofsake wat uit die vergadering voortgespruit het :—

1. **Research and Development by Industry**

Mr. Rosen reported that, in the opinion of SEIFSA members, any research that was necessary was done by overseas parent companies.

Members considered that there was a very definite need for local research, particularly due to the altitude and temperature conditions in this country.

It was resolved to form a working group to review the situation in the high voltage engineering field, with particular regard to the problems encountered by South African industry in meeting the needs of the South African consumer. The working group would also attempt to identify the problem areas existing in the high voltage field and would make recommendations on research to be undertaken.

2. **Research Manpower.**

Dr. Fisher described the situation as it exists at present in Germany indicating a general shortage of highly qualified staff for research at the Universities themselves. From this it was apparent that South Africa should consider the local training of personnel for high voltage engineering.

3. **Reports of the Co-ordinators in the specialised fields.**

(a) LIGHTING AND SURGES

Mr. Anderson reported that good progress had been made during the year at the 3 CSIR stations concerned with Lighting research.

A significant development in the Lighting programme in South Africa had been a decision to proceed with direct measurement of lighting parameters.

There are three main surge recording projects at present in operation, namely at Apollo on the Escom 400kV system, the Olifantsfontein SAR surge recording station and the CSIR 11kV recording caravan at Silverton. Professor Heymann of the University of Pretoria has carried out a comprehensive programme of measurements of surge propagation effects on the 400kV lines at the Apollo recording station and interesting results have been obtained. Preliminary details have been published in a paper at the International Symposium of High Voltage Technology held at Munich in March 1972.

(b) CORONA AND PROPERTIES OF ARCS.

Professor Heymann (Pretoria University) tabled his report on these two aspects of the work The field studies of Radio Interference Voltage

1. **Navorsing en Ontwikkeling deur die Nywerheid.**

Mnr. Rosen het berig dat, volgens die mening van SEIFSA se lede, enige navorsing wat nodig is deur die oorseese moedermaatskappye gedoen word.

Lede was van mening dat daar 'n baie besliste leemte bestaan in plaaslike navorsing veral as gevolg van die hoogte bo seespieël — en temperatuursomstandighede hier te lande.

Daar is besluit om 'n werksgroep saam te stel om die toestand op die terrein van hoogspannings ingenieurswese in hersiening te neem, met spesiale aandag gewei aan die probleme wat ondervind word deur die Suid-Afrikaanse nywerheid om in die behoeftes van die Suid-Afrikaanse verbruiker te voorsien. Die werksgroep sal ook probeer om probleemgebiede wat in die hoogspanningsveld bestaan, uit te ken en sal aanbevelings doen oor navorsing wat gedoen moet word.

2. **Navorsings — Mannekrag.**

Dr. Fisher het die huidige toestand in Duitsland beskryf, wat 'n algemene tekort aan hoogs gekwalifiseerde personeel vir navorsing aan die Universiteite self aandui. Hieruit was dit duidelik dat Suid-Afrika die opleiding van personeel vir hoogspannings-ingenieurwese sal moet oorweeg.

3. **Verslae van die Koördineerders in die gespesialeerde gebiede.**

(a) WEERLIG EN STUWINGE.

Mnr. Anderson het berig dat goeie vordering gedurende die jaar gemaak is aan die drie WNNR stasies wat gemoeid is met weerligsnavorsing.

'n Betekenisvolle ontwikkeling in die weerligsprogram in Suid-Afrika was dat 'n besluit geneem is om voort te gaan met direkte meting van weerligsparameters.

Daar is drie hoof stuwingsoptekenings projekte op die oomblik in werking, naamlik te Apollo op die Evkom 400kV stelsel, die Olifantsfonteinse SAS stuwingsoptekenings stasie en die WNNR 11kV optekenings karavaan te Silverton. Professor Heyman van die Universiteit van Pretoria het 'n omvattende program van metinge van stuwingsvoortplantingseffekte op die 400kV leidinge te Apollo optekeningsstasie uitgevoer en interessante resultate is verkry. Voorlopige uitslae is geplaas in 'n verhandeling voor die Internasionale Simposium van Hoogspanningstegnologie gehou te Munich in Maart 1972.

(b) KORONA EN EIENSKAPPE VAN BOË.

Professor Heyman (Pretoria Universiteit) het sy verslag oor dié twee aspekte van die werk ter tafel gelê. Die veldstudies van Radio Steurspannings in

levels in the vicinity of 400kV lines had been continued and recently the corona measurements at the Apollo station had also been brought into operation. Dr. Fischer briefly described some of the work of the international group at the laboratories of Electricité de France.

Mr. Randall mentioned that a CIGRE working group had recently been active in the field of corona measurements and standardized measurement techniques had been evolved. Escom was at present in the process of introducing these into South Africa.

(c) INSULATION.

In summarising his report, Professor Hellawell (Natal University) pointed out that, in general, the past year had been more a year of preparation and, in some cases, of consolidation of facilities, rather than of expansion and commencement of new projects. Progress was reported on the contract project between the Rand Water Board and the CSIR, and the South African Railways surge comparison testing of 3kV motor insulation project. Also the University of Natal had been active in work in connection with the pollution of insulation.

Professor Hellawell also tabled the minutes of the working groups on insulation and internal discharges and on external insulation and pollution.

(d) EARTHING.

Mr. van Alphen (SABS) summarised Mr. Middlecote's report detailing which research projects were at present in progress in the country and it appeared in fact that very little activity was currently in progress.

4. **Co-operative Research Projects..**

Mr. Anderson reported on the two co-operative research projects, namely at Apollo and at the Olifantsfontein SAR Surge Recording Station.

5. **Programme of Lighting Research in South Africa.**

Mr. Anderson reported on the work of the subcommittee under the chairmanship of Dr. Carte of NPRL.

6. **Fault Reporting.**

Mr. Randall advised that he would be able to produce his report early next year in which he would summarise and make recommendations for cataloguing faults in South Africa. Dr. Troost, in discussing the

die omgewing van 400kV leidings was voortgesit en onlangs is die koronametings by die Apollo stasie ook in werking gestel. Dr. Fischer het kortliks sommige aspekte van die werk van die internasionale groep by die laboratoriums van die Electricité de France, beskryf.

Mnr. Randall het gemeld dat 'n CIGRE werksgroep onlangs bedrywig was in die gebied van koronametings en dat gestandaardiseerde metingstegnieke onwikkel is. Evkom is tans besig om hulle in Suid-Afrika in te voer.

(c) ISOLASIE.

In die opsomming van sy verslag het Professor Hellawell (Natalse Universiteit) daarop gewys dat, in die algemeen, die afgelope jaar meer 'n jaar van voorbereiding en, in sommige gevalle, van konsolidasie van fasiliteite was, meer so as van uitbreiding en aanvoering van nuwe prijekte.

Vordering aan die kontrak projek tussen die Randse Waterraad en die WNNR en die SAS stuwingsvergelykingstoetsing van 3kV motorisolasie projek, is berig. Verder was die Natalse Universiteit bedrywig met werk in verband met die besoedeling van isolering.

Professor Hellawell het ook die notule van die werksgroepe oor isolasie en interne ontladings en oor externe isolasie en besoedeling te tafel gelê.

(d) AARDING.

Mnr. van Alphen (SABS) het mnr. Middlecote se verslag opgesom en besonderhede gegee oor welke navorsingsprojekte op die oomblik in die land aan die gang is en dit het geblyk dat daar in werklikheid baie min werksaamhede bedrywig is.

4. **Koöperatiewe Narvorsingsprojekte.**

Mnr. Anderson het verslag gedoen oor twee koöperatiewe navorsingsprojekte, naamlik te Apollo en aan die Olifantsfonteinse SAS Stuwingsopmetings Stasie.

5. **Program van Weerligsnavorsing in Suid-Afrika.**

Mnr. Anderson het verslag gedoen oor die werk van die sub-komitee onder die voorsitterskap van Dr. Carte van NPRL.

6. **Foutberiggewing.**

Mnr. Randall het meegedeel dat hy in staat sal wees om sy verslag, waarin hy sal opsom en aanbevelings maak vir kataligisering van foute in Suid-Afrika vroeg aanstaande jaar voor te lê. Dr. Troost het, in

work of a CIGRE study committee, reported that this committee had highlighted the fact that there were no comprehensive statistics available for AC transmission lines at present.

7. **The Escom National EHV Research Centre.**

Mr. Randall reported that it now appeared that the National EHV Research Centre would be situated at Rosherville and not at Apollo.

8. **High Voltage Facilities for the CSIR.**

Mr. van Wyk (CSIR) reported that his matter was still under consideration and that the CSIR had taken advantage of Dr. Fischer's visit to this country and had had discussions with him concerning the nature of facilities, the type of work that should be carried out as well as the location of the new buildings for the National Electrical Engineering Institute.

D. C. PLOWDEN,
Representative.

bespreking van die werk van 'n CIGRE studiekomitee, berig dat hierdie komitee nadruk gelê het op die feit dat daar geen omvattende statistieke vir WS oorbrenging op die oomblik beskikbaar is nie.

7. **Die Evkomse Nasionale EHS Narvorsingssentrum.**

Mnr. Randall het berig dat dit nou wil blyk dat die Nasionale EHSNavorsingssentrum te Rosherville geplaas sal word en nie te Apollo nie.

8. **Hoogspanningsgeriewe vir die WNNR.**

Mnr. van Wyk (WNNR) het berig dat hierdie aangeleentheid nog steeds onder oorweging is en dat die WNNR die geleentheid van Dr. Fischer se besoek gebruik het en besprekings met hom gevoer het aangaande die aard van geriewe, die tipe werk wat behoort gedoen te word sowel as die plasing van die nuwe geboue vir die Nasional Elektrotegniese Ingenieurs-instituut.

D. C. PLOWDEN,
Verteenwoordiger.

SOUTH AFRICAN ELECTROLYTIC CORROSION COMMITTEE

The sixth meeting of the Main Committee was held in Johannesburg on the 2 August, 1972, and the following is a summary of the proceedings :—

1. TECHNICAL REPORTS

The Chairman stated that Technical Reports Nos. 1 and 2 had been sent to members of the Regional Field Committee during the past year and he considered these had fulfilled their purpose of disseminating technical information.

2. SPECIFICATION FOR DIODES FOR DRAINAGE PURPOSES

The representative of the South African Railways reported that :—

(i) Work on this specification had been held in abeyance, but that a summary of present day practice in the use of diodes for drainage purposes had been presented in Technical Report No. 1.

(ii) The S.A.R. Administration, together with the C.S.I.R., was undertaking surge recordings on its overhead equipment relative to rail with a view to compiling information valuable in the design of measures to protect diodes.

3. REGIONAL FIELD COMMITTEES

The representative of the Witwatersrand and O.F.S. Regional Field Committee asked for consideration to be given to the following matters :—

(i) A proposal that a Regional Field Committee be established in the Pretoria area because of increased activity resulting from pipeline extension into this area.

It was decided, however, that, as had been done in the Sasolburg area, a sub-committee to the Witwatersrand and O.F.S. Regional Field Committee should be appointed in the Pretoria area, with consideration being given to the formation of a separate Field Committee at a later stage if justified.

(ii) A suggestion that, because many municipalities were apparently unaware of the existence and/or functions of the Regional Field Committees, steps should be taken to make these known, including the insertion of a notice in the Government Gazette.

The representative of the A.M.E.U.

SUID-AFRIKAANSE KOMITEE INSAKE ELEKTROLITIESE VERWERING

Die sesde vergadering van die Hoofkomitee is op 2 Augustus 1972 in Johannesburg gehou en die volgende is 'n opsomming van die verrigtinge :

1. TEGNIESE VERSLAE.

Die Voorsitter doen verslag dat Tegniese Verslae Nr.'s 1 en 2 gedurende die afgelope jaar aan die lede van die Streekskomitees gestuur is en dat hy van mening is dat hierdie verslae hul doel gedien het, naamlik om tegniese inligting te dissemineer.

2. SPESIFIKASIE VIR DIODES VIR DREINERINGSDOELEINDES.

Die verteenwoordiger van die S.A. Spoorweë doen verslag dat :—

(i) Werk in verband met hierdie spesifikasie is terruggehou, dog 'n opsomming van hedendaagse praktyke in die gebruik van diodes vir dreineringsdoeleindes, is in Tegniese Verslag nr. 1 vervat.

(ii) Die S.A.S.-administrasie, tesame met die WNNR, is besig om stuwingsopnames in sy bogrondse toerusting te maak met die oog daarop om inligting saam te stel wat van waarde sal wees by die ontwerp van maatreëls ter beskerming van diodes.

3. STREEKSKOMITEE :

Die verteenwoordiger van die Witwatersrandse en Oranje-Vrystaatse Streekskomitee vra dat oorweging aan die volgende sake verleen word.

(i) 'n Voorstel dat 'n Streekskomitee in die Pretoria-gebied gestig word met die oog op die verhoogde bedrywigheid wat volg op die uitbreiding van pyplyne in hierdie gebied.

Daar is egter besluit dat, soos in die Sasolburg-gebied gedoen is, 'n subkomitee van die Witwatersrandse en Oranje-Vrystaatse Streekskomitee in die Pretoria-gebied aangestel moet word en dat oorweging in 'n latere stadium, indien dit geregverdig sou blyk te wees, aan die stigting van 'n aparte streekskomitee verleen word.

(ii) 'n Voorstel dat, aangesien baie Munisipaliteite skynbaar onbewus is van die bestaan en/of die funksies van die Streekkomitees, stappe gedoen word om hierdie feite bekend te stel, met inbegrip van die plasing van 'n kennisgewing in die Staatskoerant.

Die verteenwoordiger van die VMEO sê

stated that he had brought this matter to the attention of delegates at the Technical Meeting of the A.M.E.U. held at Kempton Park during 1972 and undertook to discuss more positive representation on the various Field Committees with the Association's Executive Council. It was agreed that this action should resolve the problem adequately.

4. CODES OF PRACTICE

(i) **Proposed S.A.B.S. Code for Protection of Steel Pipelines :**

It was reported that the S.A.B.S. had sub-divided the Drafting Committee into the following working groups :—

A—to prepare documents relating to filled coal tar and bitumen, primers, paint and organic powder coating.

B—to prepare documents relating to glass fibre, asbestos and paper wraps.

C—to prepare documents relating to plastic wrapping.

D—to prepare documents on aspects of cathodic protection in so far as they affect coating and laying of pipelines.

E—to investigate paints and power coatings.

It is expected that the final draft of this code will be ready for comment by the end of 1972.

(ii) **Proposed S.A.B.S. Code for Cathodic Protection of Underground Structures.**

The Drafting Committee has only met once to date, but has agreed on the basic requirements of this code and its drafting is now in hand.

(iii) **Standard Colour Code for Identification of Services**

The representative of the Witwatersrand and O.F.S. Regional Field Committee reported that details of the colour code adopted by his committee in October 1971 had been made available to members of the other Regional Field Committees.

It was proposed and agreed that the

dat hy hierdie saak onder die aandag van afgevaardigdes by die Tegniese Vergadering van die VMEO wat gedurende 1972 in Kempton Park gehou is, gebring het en onderneem om meer positiewe verteenwoordiging in die verskillende streekskomitees met die Uitvoerende Raad van die Vereniging te bespreek. Daar word ooreengekom dat dit die probleem heeltemal bevredigend behoort op te los.

4. GEBRUIKSKODES.

(i) **Voorgestelde SABS-kode vir die Beskerming van Staalpyplyne.**

Daar word verslag gedoen dat die SABS die Formuleringskomitee in die volgende werksgroepe ingedeel het :

A—om dokumente met betrekking tot gevulde koolteer en bitumen, onderlae, verf en organiese poeier-deklae voor te berei.

B—om dokumente met betrekking tot veselglas-, asbes en papieromhulsels voor te berei.

C—om dokumente in verband met plastiekomslae voor te berei.

D—om dokumente insake aspekte van katodiese beskerming insoverre hullle die bekleiding en die lê van pyplyne raak, voor te berei.

E—om ondersoek in te stel na verwe en poeier-deklae.

Daar word verwag dat die finale konsep van hierdie kode teen die einde van 1972 vir kommentaar gereed sal wees.

(ii) **Voorgestelde SABS-kode vir die Katodiese Beskerming van Ondergrondse strukture.**

Die Formuleringskomitee het tot dusver nog net eenkeer vergader, dog het oor die basiese vereistes van hierdie kode ooreenstemming bereik en daar word tans met die formulering daarvan voortgegaan.

(iii) **Standaard-kleurkode vir die Identifikasie van Dienste.**

Die verteenwoordiger van die Witwatersrandse en Oranje-Vrystaatse Streekskomitee rapporteer dat besonderhede van die kleurkode wat in Oktober 1971 deur sy Komitee aanvaar is, aan lede van die ander Streekskomitees beskikbaar gestel is.

Daar word voorgestel en ooreengekom

S.A.B.S. be requested to consider including details of this colour code in the proposed "Code of Practice for Cathodic Protection of Buried Structures."

5. AMENDMENTS TO CONSTITUTION.

The Chairman stated that a proposal had been made to amend the Main Committee's Constitution to provide for meetings to be held every two years instead of once a year as presently provided for in the Constitution.

After considerable discussion, in which it was agreed that the proposal had some merit, it was decided to hold the matter in abeyance until the next meeting of the Committee.

D. C. PLOWDEN,
A.M.E.U. Representative.

dat die SABS versoek word om oorweging daaraan te skenk om besonderhede van hierdie kleurkode in die voorgestelde „Gebruikskode vir die Katodiese Beskerming van Ondergrondse Strukture" in te sluit.

5. WYSIGING VAN DIE GRONDWET.

Die voorsitter sê dat 'n voorstel gemaak is om die grondwet van die Hoofkomitee te wysig ten einde daarvoor voorsiening te maak dat vergaderings elke twee jaar gehou word in plaas van elke jaar, soos wat die grondwet nou bepaal.

Na langdurige bespreking, waartydens daar ooreengekom word dat die voorstel wel meriete het, word daar besluit om die saak oor te hou vir bespreking op die volgende vergadering van die Komitee.

D. C. PLOWDEN,
VMEO-Verteenwoordiger.

I.E.C. MEETING—ATHENS 1972

At the meeting of the Executive Council held in Kempton Park in May 1972, the Council resolved that Mr. J. K. von Ahlften and Mr. E. E. de Villiers be appointed the A.M.E.U. representatives to accompany the S.A.B.S. delegation to the I.E.C. meeting in Athens. This was the second occasion upon which the A.M.E.U. was represented at an I.E.C. meeting, the previous meeting in Brussels was attended by Mr. G. C. Theron. Mr. Theron had come to the conclusion that the A.M.E.U. should endeavour to send delegates to I.E.C. meetings to cover local authority and consumer interests as well as to support the S.A.B.S. as much as possible in the face of very strong manufacturers' delegations.

The main purpose in sending two A.M.E.U. delegates with the South African delegation was to fully cover the activities of Technical Committee 64: Electrical Installations of Buildings—in view of the revision of the South African Wiring Regulations—and the activities of Technical Committee 61: Safety of Household Electrical Appliances—of prime importance to consumers. In addition to these main committees the activities of the following sub-committees were also covered by your delegates, namely, 23B—Plugs, socket outlets and switches, 23C—Worldwide plug and socket outlet systems, 59B—Cooking appliances and 23E—Circuit breakers and similar equipment for household use.

Mr. E. E. de Villiers mainly covered the activities of TC 64—being the A.M.E.U. representative on the Local Wiring Regulations Re-drafting Committee—and will submit a separate report thereon. I was invited by the leader of the South African delegation, Mr. Middlecote, to attend one cession of the Committee of Action (Executive Council) of the I.E.C. composed of 9 National Committees which includes South Africa as well as a full Council Meeting comprising all the National Committees represented at the I.E.C. Meeting. This was a most interesting experience and gave your delegate the opportunity to fully realise the work being done by the I.E.C. as far as international electrical standards are concerned and here I will briefly quote from the report of the Treasurer of the I.E.C. which should be of interest to the A.M.E.U.

> "Pressure continues both from within the I.E.C. and from Governmental and inter-Governmental organisations for more international

I.E.K. VERGADERING—ATHENS 1972

Op die vergadering van die Uitvoerende Raad wat in Mei 1972 te Kempton Park gehou is, het die Raad besluit dat Mnr. J. K. von Ahlften en Mnr. E. E. de Villiers aangewys word as die V.M.E.O. se verteenwoordigers om die S.A.B.S.-afvaardiging na die I.E.K.-vergadering in Athene te vergesel. Dit was die tweede geleentheid waarby die V.M.E.O. op 'n I.E.K.-vergadering verteenwoordig was. Die vorige vergadering in Brussels is deur Mnr. G. C. Theron bygewoon. Mnr. Theron het tot die gevolgtrekking gekom dat die V.M.E.O. moet probeer om afgevaardigdes na die vergaderings van die I.E.K. te stuur om die belange van plaaslike besture en verbruikers te behartig, sowel as om die S.A.B.S. se hande soveel moontlik te versterk ten aansien van die baie sterk verteenwoordiging van die vervaardigers.

Die hoofdoel waarmee twee afgevaardigdes van die V.M.E.O. saam met die Suid-Afrikaanse afvaardiging gestuur is, was om volledige dekking te verkry van die bedrywighede van Tegniese Komitee 64: Elektriese Installasies van Gebou—met die oog op die hersiening van die Suid-Afrikaanse Bedradingsregulasies — en die bedrywighede van Tegniese Komitee 61: Die Veiligheid van Huishoudelike Elektriese Toestelle, wat van primêre belang vir verbruikers is. Bo en halwe hierdie hoofkomitees is die bedrywighede van die volgende subkomitees ook deur u afgevaardigdes gedek, nl.: 23B—Proppe, sok-uitlate en skakelaars; 23C—Wêreldwye prop- en sok-uitlaatstelsels; 59B—Kooktoestelle; en 23E—Stroomonderbrekers en soortgelyke toerusting vir huishoudelike gebruik.

Mnr. E. E. de Villiers het hoofsaaklik die bedrywighede van TK.64 gedek aangesien hy die V.M.E.O. se verteenwoordiger in die Plaaslike Komitee vir die Herformulering van die Bedradingsregulasies is, en hy sal 'n aparte verslag daaromtrent indien. Ek is deur die leier van die Suid-Afrikaanse afvaardiging, Mnr. Middlecote, uitgenooi om een sitting by te woon van die Komitee van Aksie (Uitvoerende Raad) van die I.E.K., bestaande uit 9 Nasionale Komitees, wat Suid-Afrika insluit, sowel as 'n volle Raadsvergadering bestaande uit al die Nasionale Komitees wat by die I.E.K.-vergadering verteenwoording was. Dit was 'n uiters interessante ondervinding en het aan u afgevaardigde die geleentheid gebied om 'n volledige denkbeeld te vorm van die werk wat deur die I.E.K. gedoen word vir sover dit internasionale elektrotegniese standaarde aanbetref, en hier wil ek graag kortliks aanhaal uit die verslag van die Tesourier van die I.E.K., wat vir die V.M.E.O. van belang behoort te wees.

> „Daar word steeds druk ondervind van binne die geledere van die I.E.K. en van Regerings- en inter-regerringsorganisasies vir meer internasionale

standardisation. In the electrical industries the pressure is the more widespread because of the extensive range, advance international standardisation and rapidly evolving techniques of our industries.

The IEV

These evolving techniques continuously expand the electrical terminology to be standardised. In 1970 the Second Edition of the International Electrotechnical Vocabulary (IEV) was completed by the issue of the last two of its 24 planned chapters of definitions and an index to its 8 500 electratechnical terms with agreed translations in eight languages. Now 23 of the IEC's Technical Committees have undertaken work on new or revised chapters, in addition to 11 Preparatory Working Groups set up by TC 1. Revision of the 17 Telecommunications chapters also needs 18 Terminology Working Groups of experts chosen by the IEC, International Telecommunication Union (ITU), International Radio Consultative Committee (CCIR) and International Telegraph and Telephone Consultative Committee (CCITT) to deal with its 100 sections.

The "Heavy" Electrical Industries

It may be thought that rapidly changing techniques only affect to any considerable extent the electronic sections of the electrical industries. Technical practice in the "heavy" electrical industries is however by no means stabilised. In Power Supply and Distribution new and revised international standards are required for many new techniques. It is not practical to list them all here. They include, among other matters, the use of still higher transmission voltages and their appropriate systems, new insulations for transformers and power capacitators, the operation of protective relays, new forms of power conversion, supervisory control of larger networks, the jointing of aluminium in cables and rules for factory and domestic installations.

The increased activity of the "heavy" electrical industries is shown by the fact that the number of Working Documents circulated in IEC Technical Committees concerned with electrical power and distribution was over 20% more in 1971 than in 1970.

Power Applications

It used to be considered that "power applica-

standaardisasie. In die elektritegniese nywerheid is die druk wyer verspreid weens die uitgebreidheid van die veld, vooruitgeskowe internasionale standaardisasie en die snel-on wikkelende tegnieke van ons nywerhede.

Die I.E.W.:

Hierdie ontwikkelende tegnieke lei tot 'n voortdurende uitbreiding van die elektrotegniese terminologie wat gestandardiseer moet word. In 1970 is die Tweede uitgawe van die Internasionale Elektrotegniese Woordelys (I.E.W.) voltooi by geleentheid van die publikasie van die laaste twee van die 24 beplande hoofstukke van woordomskrywings en 'n inhoudsopgawe van sy 8 500 elektrotegniese terme met goedgekeurde vertalings in 8 tale. Nou is daar 23 van die I.E.K. se tegniese komitees wat besig is om te werk aan nuwe of hersiene hoofstukke, bo en behalwe die 11 Voorbereidende Werksgroepe wat deur TK.1 aangestel is. Die hersiening van die 17 hoofstukke insake Telekommunikasie het ook die dienste nodig van 18 Terminologiese Werksgorpe bestaande uit deskundiges wat deur die I.E.K., die Internasionale Telekommunikasieunie (I.T.U.), die Internasionale Radio-advieskomitee (I.R.A.) en die Internasionale Telegraaf-en Telefoonadvieskomitee (I.T.T.A.) aangewys is om met die 100 afdelings wat daarby betrokke is, te handel.

Die „Swaar" Elektrotegniese Nywerhede :

Daar mag moontlik gedink word dat die snel-veranderende tegnieke slegs die elektroniese afdelings van die elektrotegniese nywerhede in 'n aansienlike mate sal beïnvloed . Die tegniese partyke in die „swaar" elektrotegniese nywerhede is egter nog geensins gestabiliseer nie. Op die gebied van kragvoorsiening en -distribusie word nuwe en hersiene internasionale standaarde vir baie van die nuwe tegniese vereis. Dit is nie prakties moontlik om 'n lys daarvan hier weer te gee nie. Hulle sluit onder andere in die gebruik van nog hoër transmissie-stroomspannings en die daarby passende stelsels, nuwe isolasies vir transformators en kragkapasitore, die werking van beskermende relês, nuwe vorme van kragomskakeling, toesighoudende beheer van groter netwerke, die las van aluminium in kabel/s en reëls ten opsigte van fabrieks- en huishoudelike installasies.

Die toenemende bedrywigheid van die „swaar" elektrotegniese nywerhede blyk uit die feit dat die aantal werksdokumente wat in die Tegniese Komitees van die I.E.K. wat by elektriese krag en distribusie betrokke is, gesirkuleer is, in 1971 meer as 20% hoër was as in 1970.

Die aanwending van krag:

Die mening was altyd gehuldig dat elek-

tions" only involved electronic techniques to a very minor degree. This is no longer true. Variable speed drives, for instance, now concern not only d.c. motors or Ward-Leonard sets or even mercury arc rectifiers. They are now more likely to involve high-power semi-conductors, themselves protected and controlled in many forms of standard and unstandardised circuits. Both in land and in marine installations, lessons have been painfully learnt from early failures in the reliability of automatic control schemes.

These lessons have been accumulated in the specifications issued for future contracts and in Guides to Good Practice. Ships with automated engine-rooms now operate everywhere on the high seas. Petro-chemical plants with newer forms of instrumentation are installed in many countries by companies with international interests. Lines of machine tools and mechanical plant for continuous or "flow" production with many new forms of process control are ordered and installed in many countries.

All these and other electrical power applications need to have standardised specifications written down for their purchase, manufacture and testing. Check lists setting down exactly what performance is required under specified conditions of use can save many headaches if determined early in a contract. Electrical experts needing to cope successfully with the new techniques want to study specifications built up from experience of success and failure in many countries. The IEC is the international technical forum in which they expect to construct adequate standards of good practice.

Telecommunications

Instant communications are now so worldwide that telecommunication is accepted as a normal routine. The techniques of telecommunication, however, have changed and are still hanging rapidly as the wave-lengths in use become shorter and shorter. Each time a new technique in communication passes out of the experimental stage its use has to be stabilised by international standards. The components used become smaller and smaller and merge into integrated circuits. With thousands and millions of small components whose functioning cannot be seen by any physical movement the terms "quality assurance„ and "certification" take on new interpretations which have to be solved internationally.

troniese tegniese slegs in 'n baie klein mate by die aanwending van krag betrokke was. Dit is nie so nie. Wysigbare spoedaandrywings het bv. nou nie meer net te doen met d.s.-motore of Ward-Leonard-stelle of selfs kwik-booggelykrigters nie. Dit is nou meer waarskynlik dat hulle nou te doen sal hê met hoë-krag semigeleiers, terwyl hulle self in baie vorms van standaard- en ongestandardiseerde stroombane beskerm en gekontroleer word. In sowel land- as see-installasies, is daar pynlike lesse geleer uit vroë mislukkings vir sover dit die betroubaarheid van outomatiese beheerstelsels betref. Hierdie lesse is saamgevat in die spesifikasies wat vir toekomstige kontrakte uitgereik is en in die Gidse tot Goeie Praktyk. Skepe met geoutomatiseerde masjienkamers bevaar nou al die oseane. Petrochemiese installasies met nuwere vorms van instrumentasie word in baie lande deur maatskappye met internasionale belange geïnstalleer. Reekse masjiengereedskap en meganiese installasies vir deurlopende of „vloei"-produksie met baie nuwe vorme van prosesbeheer word in baie lande bestel en geïnstalleer.

Al hierdie en ander aanwendinge van elektriese krag vereis dat daar gestandardiseerde spesifikasies ten opsigte van hul aankoop, vervaardiging en toetsing neergeskryf moet word. Kontrolelyste wat presies uiteensit watter werkverrigting onder gespesifiseerde gebruikstoeseande verlang word, kan baie probleme uitskakel indien hulle vroeg in die loop van 'n kontrak vasgestel word. Elektrotegniese deskundiges wat op deskundige wyse die nuwe tegnieke die hoof wil bied, wil graag 'n studie maak van die ondervinding van sukses en mislukking en die spesifikasies wat aan die hand waarvan in baie lande opgebou is. Die I.E.K. is die internasionale tegniese forum waarbinne hulle verwag om toereikende standaarde van goeie gebruike op te bou.

Telekommunikasies:

Vinnige kommunikasies is nou wêreldwyd sodanig aan die orde van die dag dat telekommunikasie as normale roetine aanvaar word. Die tegnieke van telekommunikasie het egter verander en verander nog steeds vinnig soos die golflengtes wat in gebruik is, korter en korter word. Elke keer dat 'n nuwe tegniek in kommunikasie die eksperimentele stadium ontgroei, moet die gebruik daarvan deur internasionale standaarde gestabiliseer word. Die onderdele wat gebruik word, word kleiner en kleiner en smelt saam in geïntegreerde stroombane. Met duisende en miljoene klein onderdele waarna die funksionering nie in die vorm van enige fisiese beweging waargeneem kan word nie, het die terme „gehalteversekering" en „sertifisering" nuwe

Regulations for electrical safety

Increasingly, international attention is being given to regulations regarding the health, safety and environment of the general public. International trade in electrical products is particularly subject to barriers which arise from the various conceptions of different Governmental and other authorities as to what can be accepted as "safe" or of acceptable quality in use, both in home production and in international trade. The IEC is facing a world-wide task of harmonising standards which may be used in reference to electrical products in inspection procedures by Governmental and other authorities.

Trade barriers

There is urgent need for the IEC organisation to be adequate to meet the present rapid advances in electrical techniques while at the same time responding to the inter-Governmental pressures to find solutions to the problems of specifications and test methods which have to be reconciled to remove trade barriers."

This amply emphasises that more international standardisation is conductive to increased international trading and that it is not possible to be competitive without standardisation. This applies within companies with electricity supply undertakings, with in nations as well as internationally with the ultimate aim to improve the service rendered to consumers.

For general information of the Executive Council and members of the A.M.E.U. the South African delegation consisted of Mr. Middlecote of the S.A.B.S. as leader of the delegation, one other member of the bureau, four representatives from S.A. manufacturers, two representatives from ESCOM, one representative from the Department of Public Works, one S.A. Consulting Engineer, one S.A. Electrical Contractor, one representative from the S.A. Electrical Contractors' Association and finally your two representatives from the A.M.E.U. The official list of delegates numbered some 800 representatives and 300 accompanying persons with 22 technical committees meeting in addition to the Committee of Action and full Council meeting. It is a special honour for South Africa to be a member of the Committee of Action and here the sterling work done by Mr. Middlecote needs special mentioning whose opinion is often sought for in lively discus-

betekenisse verkry, wat op 'n internasionale grondslag opgelos sal moet word.

Regulasies vir elektriese beveiliging:

Daar word op 'n toenemende skaal internasionale aandag gewy aan regulasies betreffende die gesondheid, veiligheid en omgewingstoestande van die algemene publiek.

Die internasionale handel in elektriese produkte is in 'n besondere mate onderhewig aan versperrings wat hul oorspron het in die verskillende opvattinge van verskillende Regerings- en ander owerhede met betrekking tot wat aanvaar kan word as „veilig" of van aanneemlike gehalte in gebruik, sowel wat plaaslike produksie as internosionale handel betref. Die I.E.K. word gekonfronteer deur 'n wêreldwye taak om die standaarde te harmoniseer wat met betrekking tot elektriese produkte gebruik kan word in die uitoefening van inspeksieprosedures deur Regerings- en ander owerhede.

Handelsversperrings:

Daar is 'n dringende behoefte vir die I.E.K. -organisasie om in staat te wees om die huidige snelle ontwikkelinge in elektriese tegnieke die hoof te bied en terselfdertyd gehoor te gee aan die tussenstaatlike druk om oplossings te vind vir die probleme van spesifikasies en toetsmetodes wat met mekaar versoen moet word ten einde handelsversperrings uit die weg te ruim."

Hierdie word ruim klem gelê op die feit dat internasionale standaardisasie 'n verhoogde mate van internasionale handel sal bevorder en dat dit nie moontlik is om mededingend te wees sonder standaardisasie nie. Dit is van toepassing binne maatskappye, binne elektrisiteitsvoorsieningsondernemings, binne indiwiduele volkere, sowel as internasionaal, met die uiteindelike doel om die diens wat aan verbruikers gelewer word, te verbeter.

Vir die algemene inligting van die Uitvoerende Raad en lede van die V.M.E.O. kan gemeld word dat die Suid-Afrikaanse afvaardiging bestaan het uit Mnr. Middlecote van die S.A.B.S. as leier, nog 'n lid van die Buro, vier verteenwoordigers van Suid-Afrikaanse vervaardigers, twee verteenwoordigers van EVKOM, een verteenwoordiger va ndie Departement Openbare Werke, een Suid-Afrikaanse raadgewende ingenieur, een Suid-Afrikaanse elektriese aannemer, een verteenwoordiger van die S.A. Vereniging van Elektriese Aannemers en laastens u twee verteenwoordigers van die V.M.E.O. Die amptelike lys van afgevaardigdes het bestaan uit sowat 800 verteenwoordigers en 300 persone wat hulle vergesel het, met 22 tegniese komitees wat vergader het, bo en behalwe die Aksiekomitee en die volle Raadsvergadering. Dit is 'n besondere eer vir Suid-Afrika om 'n lid van die Aksiekomitee te wees en hier moet spesiale melding gemaak

sions between the various European countries, the U.S.A. and the U.K.

The social gatherings were well attended and enjoyed by all and the hospitality of the Greek National Committee was very much appreciated. The President of IEC is Mr. Goodall from the U.K. whom we had the privilege of addressing us at the last A.M.E.U. Convention in Cape Town. He proved to be a most efficient Chairman at the Committee of Action and Council meetings with a special interest in the work done in South Africa towards increased standardisation.

I now wish to summarise my conclusions regarding the attendance of the A.M.E.U. at IEC meetings :—

1. It is a most interesting and rewarding experience for an A.M.E.U. delegate to attend an international meeting of this nature and I must thank the Executive Council for this honour.

2. It is very important for municipal electricity supply undertakings to be fully aware of what is taking place in the field of international standardisation concerning electrical installations and quality specifications.

3. The interests of the users of electricity is our main concern and safety specifications for household appliances and similar equipment needs constant surveilance.

4. The same problem was experienced by your delegates as Mr. G. C. Theron in that many discussions referred to decisions and documents going back many years and due to a lack of background knowledge and continuity it was difficult to fully participate in the discussions and formulate an opinion. Continuity of study and representation appears essential if the A.M.E.U. is to benefit from future participation in IEC meetings.

5. Not all the activities of the various Committees is of importance as far as the A.M.E.U. is concerned and future participation in IEC meetings must depend upon the items on the agenda of direct interest to municipal electricity supply undertakings and consumers in general.

6. Unless participation in IEC meetings imposes a too heavy financial burden on the A.M.E.U. it is

word van die voortreflike dienste wat deur Mnr. Middelcote gelewer word. Sy menings word dikwels gevra in lewendige besprekings tussen die verskillende Europese lande, die V.S.A. en die Verenigde Koninkryk.

Die sosiale byeenkomste is goed bygewoon en deur almal geniet en die gasvryheid van die Griekse Nasionale Komitee is hoog op prys gestel. Die President van die I.E.K. is Mnr. Goodall van die Verenigde Koninkryk, wat ons die voorreg gehad het om as spreker te hê by die vorige V.M.E.O. konvensie in Kaapstad. Hy het 'n uiters doeltreffende Voorsitter by die vergaderings van die Aksiekomitee en die Raad geblyk te wees en het veral belang gestel in die werk wat op die gebied van standaardisasie in Suid-Afrika gedoen word.

Nou wil ek graag my gevolgtekkinge met betrekking tot die bywoning van I.E.K.-vergaderings deur die V.M.E.O. soos volg opsom:—

1. Dit is 'n uiters interessante en vrugbare ondervinding vir 'n V.M.E.O.-afgevaardigde om 'n internasionale vergadering van hierdie aard by te woon en ek wil graag die Uitvoerende Raad vir hierdie eer bedank.

2. Dit is van groot belang vir munisipale elektrisiteitsvoorsieningsondernemings om ten volle op hoogte te wees van wat op die gebied van internasionale standaardisasie met betrekking tot elektriese installasies en gehaltespesifikasies aan die gang is.

3. Die belange van die verbruikers van elektrisiteit is ons vernaamste doelstelling en veiligheidsspesifikasies vir huishoudelike toestelle en soortgelyke toerusting het voortdurend 'n wakende oog nodig.

4. Dieselfde probleem is deur u afgevaardigdes ondervind as wat met Mnr. G. C. Theron die geval was nl. dat 'n groot deel van die besprekinge betrekking gehad het op besluite en dokumente wat baie jare ver teruggaan en, weens 'n gebrek aan agtergrondkennis en kontinuïteit, was dit moeilik om ten volle aan die besprekinge deel te neem en 'n mening te formuleer. Kontinuïteit van studie en verteenwoordiging skyn noodsaaklik te wees indien die V.M.E.O. baat moet vind by toekomstig deelname in I.E.K.-vergaderings.

5. Nie al die bedrywighede van die verskillende Komitees is vir die V.M.E.O. van belang nie en toekomstige deelname in I.E.K.-vergaderings moet afhang van die items op die Sakelys wat van direkte belang vir munisipale elektrisitentsvoorsieningsondernemings en verbruikers oor die algemeen is.

6. Tensy die deelname aan I.E.K.-vergaderings 'n te sware finansiële las op die skouers van die

in the national interest that the A.M.E.U. should maintain continuity in IEC meetings and support the S.A.B.S. in its efforts towards increased standardisation.

The next meeting of IEC will most probably be held in Munich during June 1973 and depending upon the items on the agenda of direct interest to the A.M.E.U. and to consumers in general consideration should be given to sending A.M.E.U. representatives again.

J. VON AHLFTEN,
A.M.E.U. Delegate.

V.M.E.O. plaas, word dit as van nasionale belang beskou dat die V.M.E.O. kontinuïteit in I.E.K.-vergaderings moet handhaaf en dusdoende die S.A.B.S. moet ondersteun in sy poging om toenemende standaardisasie teweeg te bring.

Die volgende vergadering van die I.E.K. sal heel waarskynlik gedurende Junie 1973 in Munich gehou word, en, afhangende van die items op die sakelys wat van direkte belang van die V.M.E.O. en verbruikers oor die algemeen is, behoort oorweging daaraan verleen teword om weer verteenwoordigers van die V.M.E.O. te stuur.

J. VON AHLFTEN,
V.M.E.O.-Afgevaardigde.

Printed by East London Printers (Pty.) Ltd., 8 Argyle Street, East London