

WORKSHOP ON THE AIR POLLUTION SITUATION IN THE EASTERN TRANSVAAL HIGHVELD AND NEIGHBOURING REGIONS

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DEVELOPMENTS LEADING TO THE EASTERN TRANSVAAL HIGHVELD WORKSHOP

The Eastern Transvaal Highveld (ETH) is situated to the east of the Pretoria/Witwatersrand/Vereeniging urban complex at a mean altitude of about 1 700 m above sea level. It covers an area of some 25 000 km² of which it is estimated that 70% is covered by grassland and the remainder used for crop cultivation and animal husbandry. However, it is also the main coal producing region in the RSA where about 80% of the country's electrical power requirement is generated by coal-fired power stations. Besides power stations there are two major petrochemical plants, various smaller industries (eg Ferro alloy smelters, steel works, brickworks, foundries, fertilizer plants, saw mills, paper mills and chemical works), several smouldering coal dumps, domestic cooking and interior heating as well as veld burning which all are important sources of atmospheric pollution. An inventory¹ yielded the following overall emissions in the ETH for the 1983 calendar year:

Particulates: 326 309 tons; sulphur dioxide: 934 604 tons; nitrous oxides: 329 239 tons; carbon dioxide: 102 869 775 tons; carbon monoxide: 111 939 tons; hydrocarbons: 203 567 tons.

The ETH is characterized by climatic conditions which are adverse to the dispersion of pollutants, ie high atmospheric stability, clear skies and low wind speeds generally associated with a high pressure system prevailing over the region. During winter, inversions of temperatures occur almost every night at the surface while elevated inversions occur with high frequency. Moist unstable conditions and rainfall are confined almost exclusively to the summer period. The dry, highly stable winter period is obviously of most significance for potential air pollution problems.

In view of the relatively large pollution emissions and the high atmospheric stability characterizing the ETH, a curb* was placed in 1975 by the central air pollution control authority, the Department of Health and Welfare (presently

*Note: This decision has, in the interim, been revised so that industries which are based on large-scale consumption of coal can be established in the ETH provided adequate control is applied to particulate and gaseous sulphurous emissions.

the Department of National Health and Population Development), on the further erection of power stations in this region. Furthermore, it was recognized because of economic, technological and environmental considerations that air pollution had to be taken into account as a factor in sensible land-use planning. Consequently, the Department of Constitutional Development and Planning contracted the Atmospheric Sciences Division, NPRL, CSIR for a five year period (1979-1983) to undertake a study of the air pollution potential of the ETH. Before the expiry of this contract it was realized that a comprehensive air pollution study was needed to provide the necessary back-up information for future decision making as regards control of pollutant emissions as well as further industrial and town development. The Departments of Health and Welfare, Environment Affairs and Constitutional Development and Planning then requested the FRD, CSIR to plan, initiate and co-ordinate such a study.

During 1983 a strategy was devised by a steering committee to initiate a co-operative air pollution research programme in the ETH under the auspices of the National Programme for Weather, Climate and Atmosphere Research. The main goal of this strategy was to develop a predictive capability for the ETH with regard to

- the required efficiency of methods for controlling pollution emissions,
- the atmospheric pollution levels,
- the impact of emissions on the local climate, inhabitants and the environment.

Appropriate proposals were solicited amongst the local research community and subsequently evaluated in terms of scientific merit for financial support. This enabled the launching in early 1984 of a co-operative air pollution research programme in the ETH.

Since the launching of the ETH research programme a seminar and later a workshop had been arranged by FRD to promote the exchange of ideas and sharpen the focus of the research effort in which various organizations participated. These included the CSIR, universities, the Atomic Energy Corporation of SA Ltd, Department of Environment Affairs (SA Research Institute for Forestry), Department of Water Affairs (Hydrological Research Institute), Department of National Health and Population Development (National Centre for Occupational Health), National Parks Board, industries (ESCOM, SASOL) as well as air pollution consultants. It was quite evident from the

ensuing discussions reported on in detail previously^{2,3} that a wealth of climatological and air pollution related data had already been gathered and that a need existed for the integration and careful interpretation of this data in order to allow a realistic appraisal of the air pollution situation and its implications in the ETH and neighbouring regions. This led to a recommendation by the National Committee for Weather, Climate and Atmosphere Research that a workshop be convened by FRD during 1987 to address this need.

STRATEGY FOR THE EASTERN TRANSVAAL HIGHVELD WORKSHOP

As a result of the developments sketched above, the FRD formulated a strategy for a workshop on the air pollution situation in the ETH and neighbouring regions. Earlier this year this strategy was accepted at a meeting of the main users as well as the organizations participating in the co-operative research programme in the ETH. The essence of this strategy is outlined below:

Date and venue

The ETH workshop will be held during 27–29 October 1987 at the Espada Ranch which is situated near the CSIR.

Objectives

The objectives of the ETH workshop will be

- synthesis and evaluation of existing knowledge;
- appraisal of the air pollution situation and its impacts on the environment;
- matching of existing knowledge with user needs; and
- identification of gaps and prioritization of research needs.

A state-of-knowledge report addressing these aspects will be prepared subsequently to the workshop and made available to policymakers, control authorities, industries, researchers as well as other interested organizations and persons.

Study area

Initially the study area was confined to the closer neighbourhood of the power stations in the ETH. This has gradually expanded as the research programme progressed and now includes the forestry plantations along the escarpment, the Kruger National Park as well as the northern parts of the Orange Free State and Natal. (See Figure 1). This is the area that will be considered at the ETH workshop.

Framework

In order to guide the discussions at the ETH workshop a framework was adopted as is depicted in Figure 2. The

three topics of focus will be the pollution budget, dispersion and plume climatology and impacts on the environment. The aim will be to arrive at present and future air pollution related scenarios for the ETH.

Procedure

Only invited persons will participate in the ETH workshop. They will be selected on the basis of their expertise and/or their active involvement in the current research effort in the ETH. In order to promote efficient communication an editors' panel, a discussion panel and three working groups will be set up. Their main functions and interactions are schematically outlined in Figure 3.

Prior to the workshop the participants will be expected to study background information consisting of up-to-date reports prepared by the various participating organizations on their own research work being carried out in the ETH, key review papers as well as other relevant information which will be collated and distributed to them by FRD.

At the workshop 'position' papers will be presented on the three topics of focus by leaders of relevant working groups (see Figures 2 and 3). Each of these papers will be a synthesis of the above mentioned existing information and will serve as a basis for arriving at present and future air pollution related scenarios for the ETH and the making of appropriate recommendations to the relevant authorities.

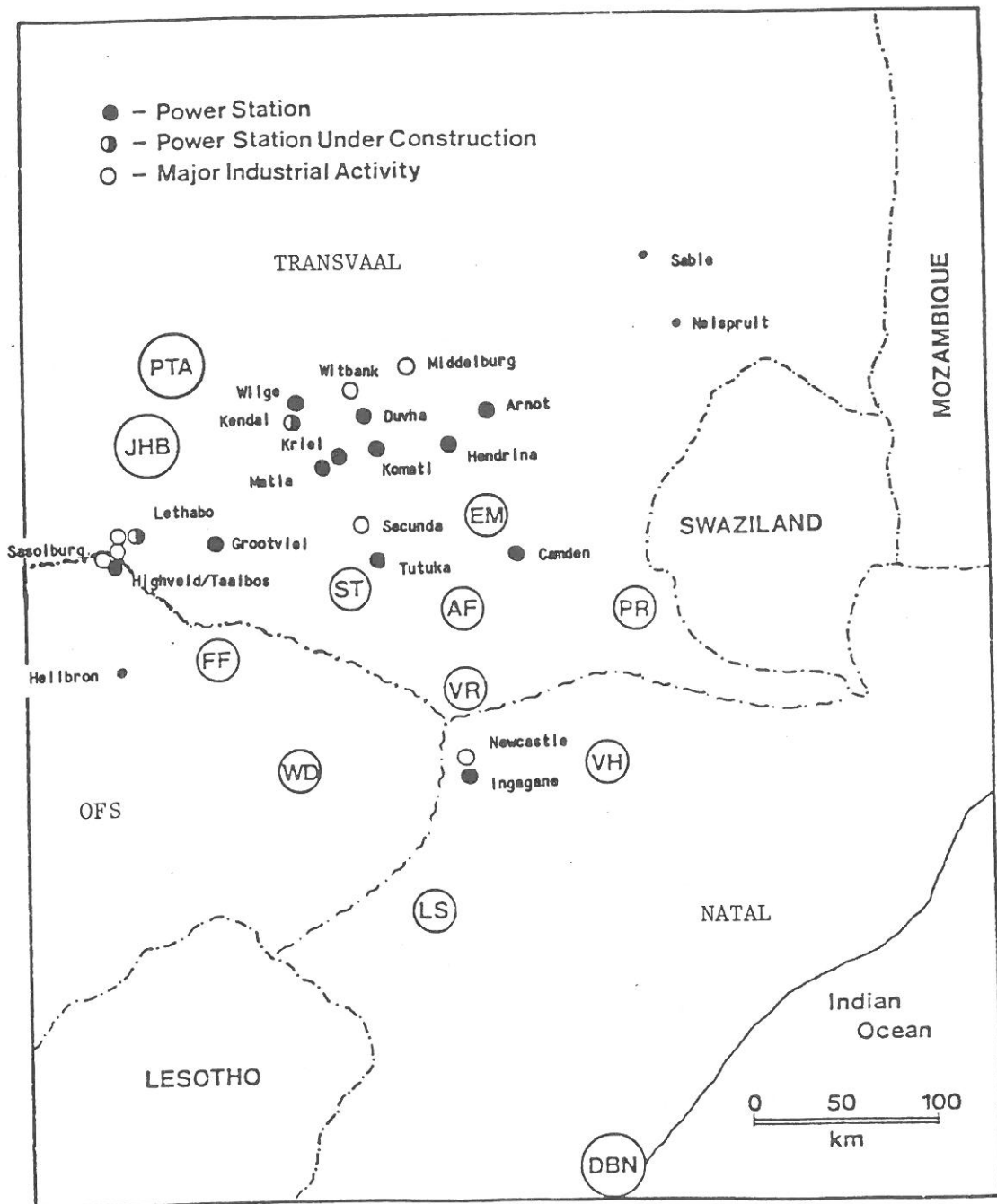
CONCLUSION

The workshop which is scheduled for 27–29 October 1987 will be a milestone in the co-operative research programme that is being carried out in the ETH. It is envisaged that the resulting state-of-knowledge report will aid the relevant authorities in taking decisions regarding control and conservation measures, further developments and research that should be undertaken.

REFERENCES

1. ELS, C J. Identification of sources and emission inventory. Paper presented at Seminar on mesoclimate air pollution related research in the Eastern Transvaal Highveld, UNISA, Pretoria, 3 September 1985.
2. LOUW, C W. Report: Seminar on mesoclimate air pollution related research in the Eastern Transvaal Highveld. *The Clean Air Journal*, 6, 4 (1985).
3. LOUW, C W. Report: Workshop on atmospheric deposition. *Ibid*, 7, 26 (1986).

FIGURE 1
PRESENT STUDY AREA*



- i) ESCOM stations where wet deposition is sampled are:
 EM = Ermelo; ST = Standerton; AF = Amersfoort; PR = Piet Retief; FF = Frankfort; VR = Volksrust; WD = Warden; VH = Vryheid; LS = Ladysmith.
- ii) Not shown but also to be included in the study area are Wolmaranstad, Kroonstad, Viljoenskroon, Orkney and Louis Trichardt.

FIGURE 2

FRAMEWORK FOR WORKSHOP ON THE AIR POLLUTION SITUATION IN THE EASTERN TRANSVAAL HIGHVELD

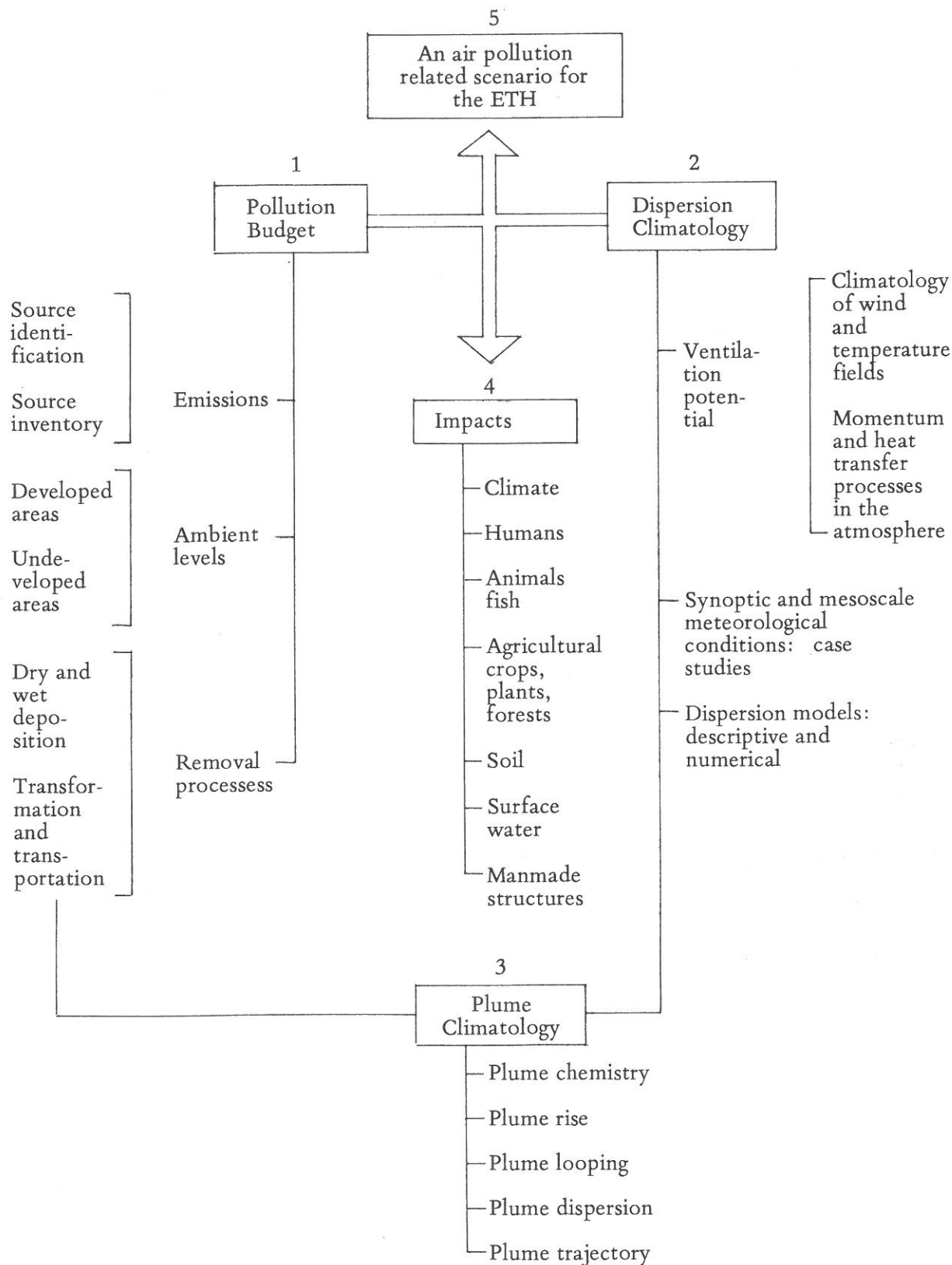
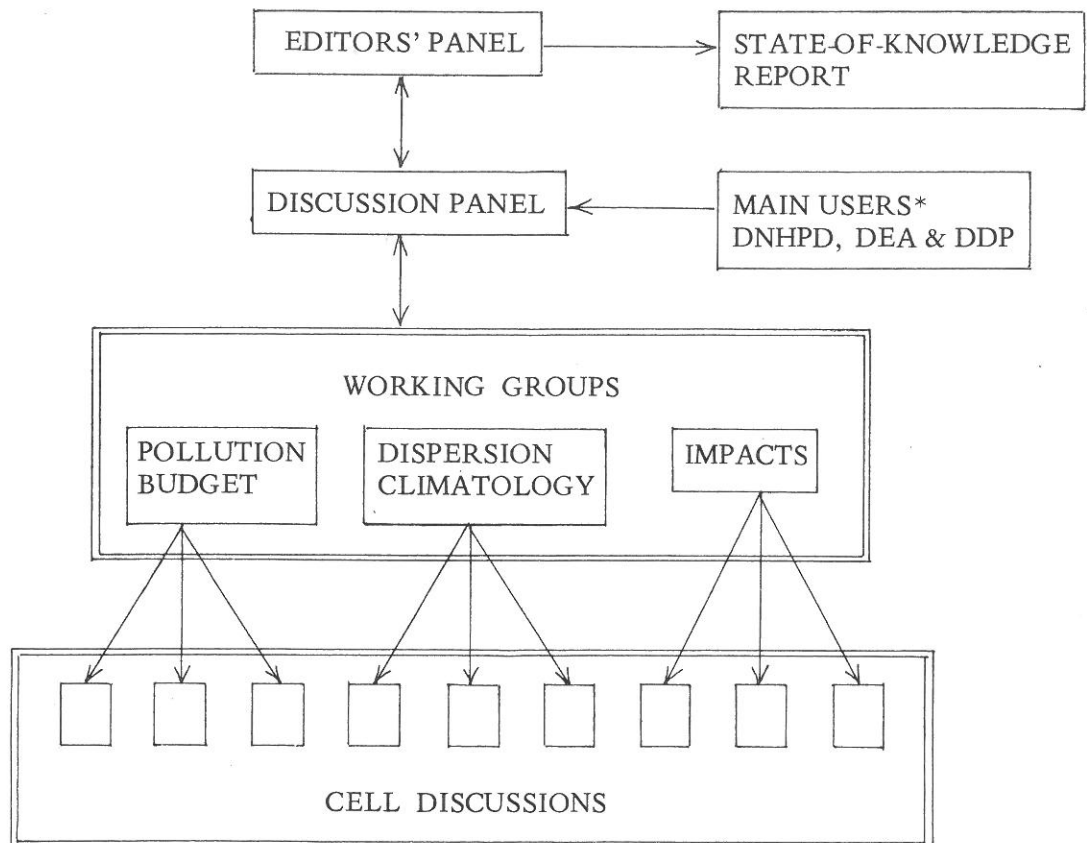


FIGURE 3
INTERACTION AND FUNCTIONS OF PANELS AND WORKING GROUPS

3.1 Interaction



- * DNHPD: Department of National Health and Population Development
 DEA: Department of Environment Affairs
 DDP: Department of Development Planning.

3.2 Functions of panels and working groups

Editor's panel: Does final preparation of state-of-knowledge report.

Discussion panel: Leads the plenary sessions to promote effective interaction between working groups and to ensure that the basic requirements of the main users are addressed.

Working groups: Use the position papers and background information as a basis to integrate and interpret available data, synthesize the knowledge, put forward hypotheses and formulate relevant recommendations regarding further research.

Cell discussions: Discuss specific aspects as and when required.