ANTARCTIC TREATY
XIXth CONSULTATIVE MEETING

TRAITÉ SUR L'ANTARCTIQUE
XIXème RÉUNION CONSULTATIVE

TRATADO ANTARTICO
XIX REUNION CONSULTIVA

ДОГОВОР ОБ АНТАРКТИКЕ
XIX КОНСУЛЬТАТИВНОЕ СОВЕЩАНИЕ

SEOUL
May 8-19, 1995

XIX ATCM/INF 53
May 9, 1995
Original: English

ENVIRONMENTAL MONITORING OF THE IMPACTS OF HUMAN ACTIVITIES NEAR KING SEJONG STATION PRELIMINARY DATA GATHERING AND BASELINE SURVEY

Agenda *Item 10 a*

(Submitted by the Republic of Korea)

Environmental Monitoring of the Impacts of Human Activities near King Sejong Station: Preliminary data gathering and baseline survey

AN ATCM WORKING PAPER
prepared by Korea

ATCM XIX - Agenda Item 10 a

The Antarctic region would appear to be a region of the world which is sufficiently remote not to be harmed by pollution. However, in one survey of the impacts of human activities in the Antarctic, a wide range of potential impacts on the atmospheric, terrestrial, and marine environment were identified. As potential impacts on the Antarctic environment, pollutants from the operational activities of Antarctic research and exploration have been considered as a major factor on the environmental impacts (Table 1).

Table 1. Pollutants from the human activities in the Antarctic

- Potential impacts on the terrestrial (including inland waters) environment
  Pollution by:
  - heavy metals (e.g.. cadmium, lead, zinc, copper)
  - long-lived organic toxins (e.g.. PCB, DDE, Lindane, Chlordane)
  - short-lived combustion products (polycyclic aromatics)
  - nutrients (eutrophication)
  - biocides and noxious substances
  - radionuclides
  - electromagnetic radiation
  - noise

- Potential impacts on the marine environment
  Pollution by:
  - heavy metals (e.g.. cadmium, lead, zinc, copper)
  - nutrients
  - biocides and noxious substrates
  - radionuclides
  - inert material (dumping)
  - noise and heat

- Potential impacts on the atmospheric environment
  Pollution by:
  - sulphur oxides
  - nitrogen oxides
  - carbon monoxide
  - carbon dioxide
  - hydrocarbons (chlorinated hydrocarbons, HCB)
  - radionuclides
  - dusts
  - electromagnetic radiation

Preliminary data gathering and baseline survey near King Sejong Station

Planning environmental monitoring of the impacts of human activities near King Sejong Station can not take place without biological and chemical information and therefore data need to be assembled from preliminary field surveys. In order to gather preliminary information, we selected 25 monitoring sites and collected lichen samples near each station to analyze chemical contents and biological assemblages of lichens (Fig. 1).

Lichens are long-lived organisms. They are so resistant to the harsh natural forces of the Antarctic and easily destroyed by trampling, particularly when they are dry and brittle. Their sensitivity to air-borne pollutants is well known. Although there may be confounding factors such as microclimate, droughts, and the buffering effects caused by the substrata, lichens have been used successfully to monitor air pollution. The use of lichens as bioindicators has been well documented in monitoring air pollution in the United Kingdom (see James 1982, Lichens and Air pollution).

The isolated region of Antarctica seems to be widely unaffected by air pollution, but deposition of chlorinated hydrocarbons by human activities near Antarctic research stations was recently recorded on the Antarctic Peninsula and around Japanese Showa Station. Pollutants such as sulphur dioxide affect the algae component of the lichen and thus the symbiotic relationship between algae and fungus breaks down. There are many studies which describe changes in lichen ecology as a result of increasing acidity of the substratum and conversely an increase in abundance of lichens with decreasing pollutants.

To be able to quantify changes of lichen population and their chemical contents, it is necessary to have a basis of comparison. Good baseline data are an important prerequisite for successful monitoring. Our baseline survey would help in an assessment of which parameters will be most useful in the monitoring exercise. Our monitoring program will be limited to a very small number of compounds which are known to have deleterious biological effects on lichens. Possible parameters here would be heavy metals (e.g.. cadmium, lead, zinc, and copper), long-lived organic toxins (e.g.. PCB, DDE, Lindane, and Chlordane), and chlorinated hydrocarbons (HCB). We also plan to measure atmospheric pollutants such as sulphur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, and hydrocarbons which may affect on lichen assemblages.

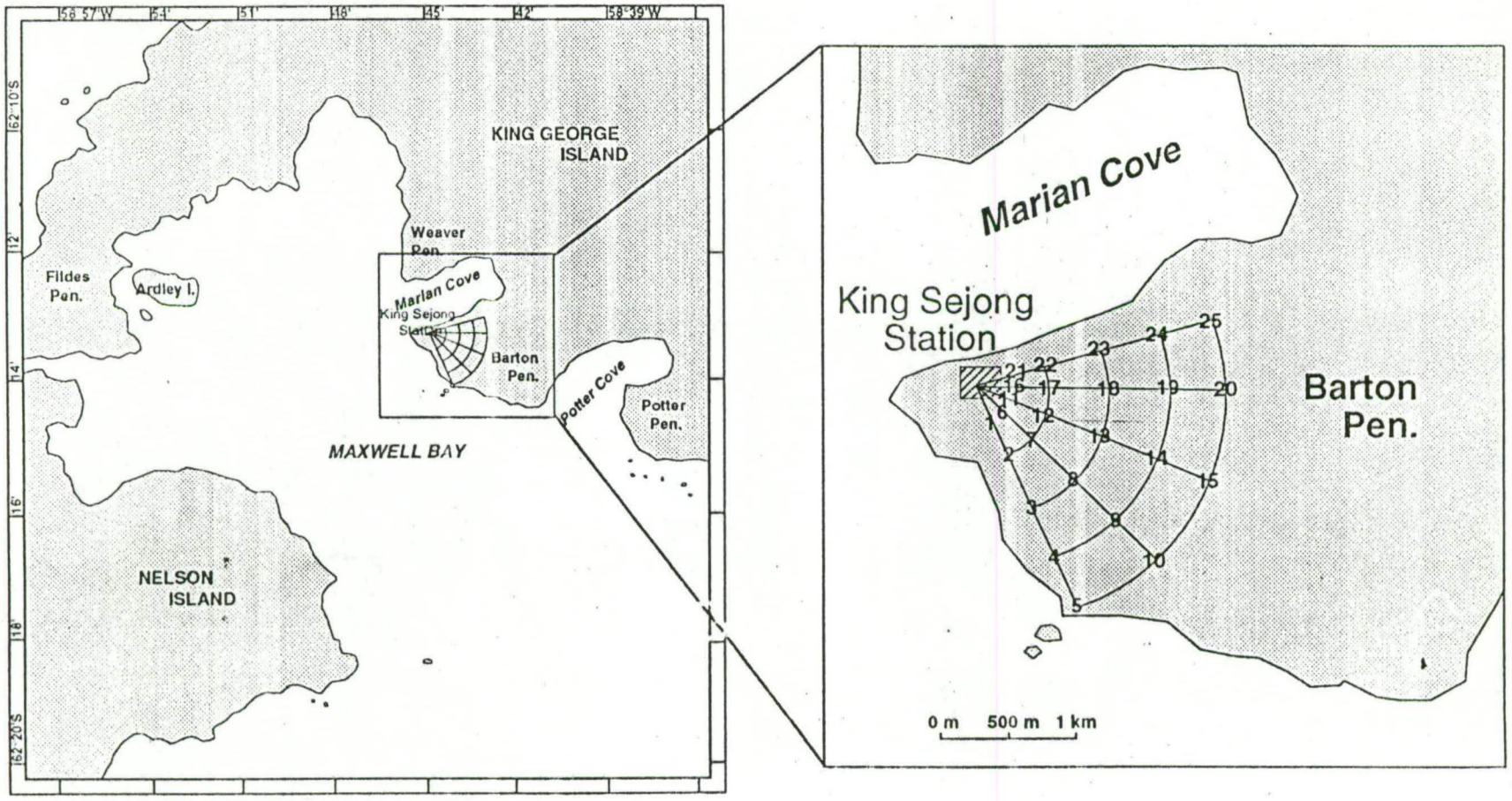

Figure 1. Long-term monitoring sites near King Sejong Station