

Guest editorial

Treaty on Antarctic minerals and oil — what impact on science and environment?

The Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA) was adopted in 1988. Of legitimate concern to all Antarctic scientists is CRAMRA's impact on the Antarctic environment and on the conduct of research; the treaty will have a positive effect on both.

Despite publicly expressed criticism, I believe that the vulnerable Antarctic marine ecosystem will be far better protected with this treaty in force than without it. The first stage is Prospecting: essentially offshore and onshore geophysical surveys and geological mapping of exposed rock on land. Prospecting will be separated in time from later Exploration and Development. Because offshore geophysical surveys are already going on under the rubric of scientific research, the impact on the environment will be no greater (but not necessarily zero) than scientific programs, tourism-adventurism etc. (three ships have sunk in the Antarctic in the past decade).

Should targets for commercial exploration and development be found during Prospecting, CRAMRA requires a lengthy and politically difficult process to proceed to Identification of an area, selection of a Regulatory Committee and approval for Exploration. These procedures will strongly protect the environment. Earth scientists do not see a world shortage of petroleum and hard minerals in the next several decades that would provide an economic incentive for mineral development in Antarctica. Any proposal for such in the near future will probably be made for non-economic reasons. Thus the required consensus of all members of the Commission to move to the Identification stage will prove a difficult obstacle for a sponsoring country and its potential operator to overcome. Considering the recent catastrophic marine oil spills in Antarctica (*Bahia Paraiso*) and Alaska (*Exxon Valdez*) environmental consciousness is extremely high and I anticipate that a rigorous protocol on liability for petroleum and minerals related activities will be soon negotiated by consensus. There is at present no liability provision in the Antarctic Treaty covering accidents in science support or tourism.

In general, I think CRAMRA will have a positive effect on scientific research with increased funding for biological, physical oceanographic, glaciological, climatological and geological studies. Any country wishing to sponsor the development of a resource would have to demonstrate the absence of any possible natural hazards. Substantial research would be required to define the associated risks before any such activity would be permitted, and much basic science will result. Because deep drilling is essentially prohibited during Prospecting, CRAMRA provides an incentive for ever deeper research drilling in projects like the Ocean Drilling Program and for rock coring using land techniques on the ice sheet, sea ice or land. Increased research drilling was also recommended by SCAR in 1986.

Although scientific results from nearly 100 000 km of multi-channel seismic reflection profiles collected since 1976 are published, the raw data are, with one or two exceptions, not available for other scientists to use. Therefore, on the negative side will be the probably poor availability of geophysical data collected under Prospecting, although under CRAMRA these should become available within ten years. Vigilance from the scientific community is required to ensure timely release of Prospecting data, as there is a large loophole in the treaty in this respect. CRAMRA does, however, require that nations sponsoring Prospecting activities insure that data 'are *maintained* in archives' for eventual release to the scientific community, a non-trivial problem for dense digital magnetic tapes.

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