EDUCATION, SCIENCE AND TRAINING

SENATE LEGISLATION COMMITTEE - QUESTIONS ON NOTICE 2004-2005 SUPPLEMENTARY ESTIMATES HEARING

Outcome:3Output Group:3.1 Research Infrastructure

DEST Question No. E361_05

Senator Stott Despoja provided in writing.

Question:

Can the Government provide details of research undertaken by the Commonwealth that involved use or generation of nuclear materials during 2004?

Answer:

Nuclear matters

The following response, covering the three research agencies within the Education Science and Training Portfolio, has been prepared on the basis of the interpretation of "nuclear materials" as described in the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) *Glossary of Terms Used for Regulatory Assessment 2001*.

AIMS has provided the following response

During 2004 AIMS research has used nuclear materials to:

- calibrate for natural radioisotope determination of sedimentation rates in estuarine and marine sediments;
- measure density variations in corals to provide proxy climate records using a gamma densitometer;
- measure processes such as rates of phytoplankton and bacterial production and carbon consumption. Small (micromolar) quantities of weak beta emitters (14C, 3H, 35S) are used in ecological studies in waters and sediments along the tropical Australian coastline; and
- investigate activity and function of invertebrate proteins with radiolabelled ligands.

ANSTO has provided the following response

ANSTO's activities in 2003-4 were grouped in more than 100 projects, most of which involve the use of nuclear material. For example, over the past year, ANSTO research has used or generated radioactive materials to:

- examine how mud is dispersed in Homebush Bay in Sydney, using tracers that are activated (that is, made radioactive) in the research reactor;
- support the commercilisation of ANSTO's innovative ceramic forms, which enable safe disposal of radioactive waste;
- investigate the structure of polymer molecules, the molecular structure of composite materials and the porosity of oil-bearing rocks, which uses neutron beams that are produced by irradiating nuclear materials in the reactor;
- study large molecules of biological origin using neutron beams, with potential application in biomedical prostheses, drug-delivery systems, environmentally-friendly biodegradable polymers and communication infrastructure;

- develop porous inorganic sorbents for decontaminating waste streams, including radioactive waste streams;
- develop safe treatment of radioactive waste from ANSTO's own site and long-term immobilisation of waste arising in production of molybdenum-99 (which is used in radiopharmaceutical production) using leach-resistant waste forms;
- research the development of new radiopharmaceuticals for the diagnosis and treatment of such diseases as Alzheimer's Disease; and
- improve technologies for radiation detection, environmental monitoring for nuclear safeguards and forensic research, for application in counter-terrorism contexts.

More details of research undertaken by ANSTO last financial year are provided in the ANSTO Annual Report for 2003-04, Report of Operations, pp 23-52.

CSIRO has provided the following response

CSIRO did not undertake research in 2004 that involved the generation of nuclear materials.

During 2004, CSIRO conducted more than 4,000 research projects within its 21 research divisions and units. CSIRO uses radiation sources, including radioisotopes, as standard research tools in the laboratory and the field. For example CSIRO uses radioactive materials:

- as tracers in plants and animals to study metabolic function such as the uptake of carbon in livestock (e.g. CSIRO Livestock Industries, CSIRO Plant Industries);
- as heavy metal labels for electron microscopy and crystallography (e.g. CSIRO Atmospheric Research, CSIRO Health Sciences and Nutrition, CSIRO Livestock Industries, CSIRO Molecular Science);
- in neutron soil moisture probes for soil moisture studies (e.g. CSIRO Forestry and Forest Products, CSIRO Land and Water);
- in measurement gauges, probes (e.g. CSIRO Minerals), and analytical instruments such as gas chromatographs (e.g. CSIRO Atmospheric Research, CSIRO Energy Technology, CSIRO Forestry and Forest Products, CSIRO Sustainable Ecosystems, CSIRO Textile and Fibre Technology), gas analysers (CSIRO Energy Technology) and CT scanners for scanning mineralogical samples (e.g. Petroleum Resources); and
- for calibration purposes such as the calibration of gamma ray detectors to determine the levels of activity for naturally occurring radionuclides in soils and sediments (e.g. CSIRO Land and Water), and the conversion of water to hydrogen gas for mass spectrometry (e.g. CSIRO Land and Water).

All but three research divisions (The Australian Telescope National Facility, CSIRO Mathematical and Information Services and the CSIRO ICT Centre) store and use radiation sources and apparatus for a broad range of research purposes. All radiation sources and apparatus held by CSIRO are licensed through the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and include sealed sources for calibration purposes, unsealed sources, X-ray equipment and optical sources.