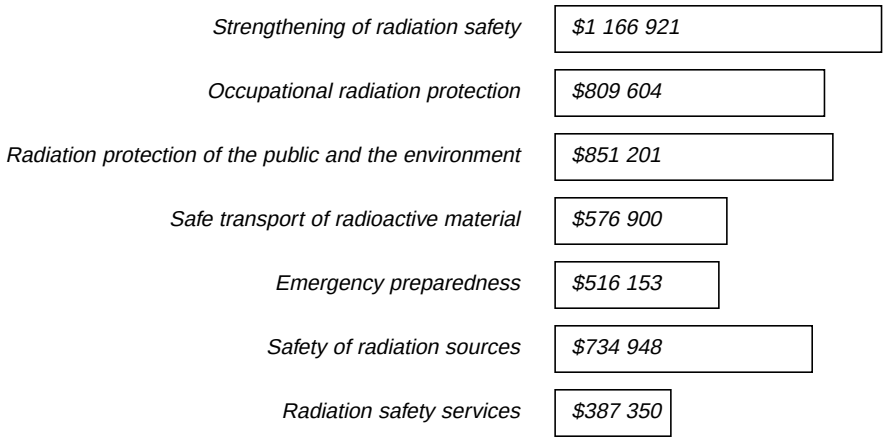
RADIATION SAFETY

Regular Budget expenditure: $5 043 077

Expenditure by subprogramme



Extrabudgetary programme resources utilized (not included in chart): $233 077

The Agency's radiation safety programme encompasses research co-ordination, development and harmonization of safety standards, regulations concerning the safe transport of radioactive material, emergency preparedness procedures, practical assistance services, training and information exchange. Together, these activities provide a comprehensive and co-ordinated framework for promoting good radiation protection practices in Member States. The 1995 work programme focused on three activities. The first was a systematic document revision and elaboration process to help users fulfill the requirements stipulated by the new *International Basic Safety Standards for Protection Against Ionizing Radiation and for the Safety of Radiation Sources* (BSS) (jointly sponsored by the FAO, IAEA, ILO, OECD/NEA, PAHO and WHO). The second effort covered services and assistance to Member States in carrying out radiological assessments. The third area was the support of technical co-operation activities.

Strengthening of Radiation Safety

In the early 1990s, the Agency began preparation of a set of internationally agreed publications known as 'Safety Fundamentals', which form the top level of the Agency's Safety Series documents and cover three topical areas: the safety of nuclear installations, radioactive waste management and radiation protection. The Fundamentals relating to the safety of nuclear installations were issued in 1993. In 1995, work was completed on Fundamentals documents relating to radioactive waste management, and to radiation protection and the safety of radiation sources (the latter co-sponsored by FAO, ILO, OECD/NEA, PAHO and WHO — an important step forward towards global harmonization in radiation protection).

Radiation protection embodies a set of protection and safety objectives with corresponding principles for achieving safety. The principles elaborated in the Fundamentals publication include: justification of a practice; dose limitation and optimization of protection; measures to be taken to enhance operational safety; the rationale for intervention; and design and construction that ensure that a source is suited for reliable, stable and easily manageable operation. Further principles require governments to establish a legal framework for the regulation of practices and interventions, with a clear

allocation of responsibilities, including those of a regulatory authority.

During 1995, considerable effort was devoted to ensuring that appropriate guidance is available for three important areas of application of the BSS in routine operation, namely the protection of workers, members of the public and patients undergoing medical diagnosis or radiotherapy.

Extensive guidance on the protection of patients had not been issued previously by the Agency. With the increased emphasis given to this subject in the BSS, and the introduction of new concepts such as guidance levels for use in diagnostic radiology, preparation of general guidance on the interpretation of the BSS in this important area was initiated and is proceeding in collaboration with WHO and the international medical community.

To assist in the practical application of the new BSS, the Agency convened in November 1995 a seminar on advances in their implementation and experience in applying the 1990 recommendations of the ICRP. The technical sessions addressed such issues as: the protection of workers, patients and the public; potential exposure situations; emergency and chronic exposure situations; administrative requirements; exemptions; interventions; and national radiation protection infrastructures.

Occupational Radiation Protection

Protection of workers is a major issue in every country that uses radiation for medical and industrial applications. Preliminary efforts were made in 1995 to prepare guidance material on how to meet the requirements stipulated by the BSS so that all aspects of occupational exposure are covered, and on aspects specific to the assessment of internal and external exposures. In the development of this guidance material, attention is being paid to the recommendations of the ICRP and the ICRU.

Radiation Protection of the Public and the Environment

Agency guidance material on the protection of the public by limiting radioactive discharges to the environment was revised and brought into line with the BSS. The new document provides an explanation on how to develop, through a regulatory system, authorized discharge limits for various practices.

A conference, organized jointly with the EC and WHO, was held in April 1996 to coincide with the tenth anniversary of the Chernobyl accident. Preparatory work carried out in 1995 included an Agency sponsored project to assist scientists in Belarus, the Russian Federation and Ukraine to collect and analyse a wealth of scientific data not previously available to the international community. The results of this analysis will be presented at the conference.

The Agency undertook a review in 1995 of 19 000 km^2 of land in Kazakhstan where nuclear weapons were tested over a period of forty years. This region, known as Semipalatinsk, includes the town of Kurchatov and a number of other inhabited villages and farms. At the request of the Government of Kazakhstan, two Agency expert teams visited the site in 1993 and 1994 to determine the current hazards from living in the area.

Of particular concern were the atmospheric and surface tests carried out before 1962, five of which were unsuccessful and resulted in the dispersion of plutonium rather than a nuclear explosion. The major sites selected for field work by the teams were the settlements around the polygon of Dolon, Sharzhal and Kainar, with the settlement of Akzhar near Kurchatov as a reference site. Inside the polygon efforts concentrated on the so-called 'Atomic Lake Balapan', including the state farm in the vicinity of the lake, Ground Zero, and other sites of atmospheric and above ground explosions. Data collection activities included gamma dose rate measurements, in situ gamma spectrometry, and the gathering of soil, grass and milk samples, and biological indicators such as animal bones, mushrooms and moss.

The dose assessment included consideration of all relevant pathways, most importantly external gamma exposure from material on or in the ground, inhalation of material resuspended from the ground and consumption of contaminated food. The preliminary conclusions were that doses to local populations in the settlements are very low but that restriction of access to land with high dose rates, namely the Atomic Lake and Ground Zero, would be useful to prevent re-occupation. Further systematic studies are needed on plutonium levels in the soil and on the levels of radionuclides in drinking water sources. Overall, the results and dose assessments confirm that there is no need for concern among those living in the settlements around this test site.

Safe Transport of Radioactive Material

The Standing Advisory Group for the Safe Transport of Radioactive Material (SAGSTRAM) continued to advise

on the comprehensive revision of the Agency's regulations on this subject. The incorporation of a system of radiological protection that is consistent with the BSS was endorsed, including the establishment of exemption values. Six specialist meetings considered such areas as the requirements applicable to the packaging of uranium hexafluoride, criticality safety and alternative packaging for low level radioactive material. Specific provisions will require the use of highly accident resistant packaging when large quantities of radioactive material are transported by air.

Emergency Preparedness

Work began on updating the Agency's emergency preparedness guidance material in order to reflect recent experience, and to provide a harmonized set of emergency preparedness documents and opportunities for training. This is being accomplished by revising Agency guidance on the technical and programmatic elements of emergency response, developing practices that can be used to apply the procedures immediately, conducting training workshops on the practices, and using the updated material as a basis for technical co-operation efforts to enhance the emergency response capability of certain Member States.

Safety of Radiation Sources

The Agency's international inventory of major radiation sources, mainly industrial irradiators and radiotherapy sources, was further expanded to about 1000 records. Information on 55 accidents known to have occurred in radiotherapy centres and 9 accidents at industrial irradiation facilities has been analysed and will be published as guidance material to help prevent future occurrences. All of these accidents involved human factors, equipment failure and human–machine interface problems, consisting of the misinterpretation of conflicting signals and maintenance errors. In the radiotherapy cases, human factors problems dominated. Maintenance problems and deactivation of interlocks also played significant roles. The systematic incorporation of in-depth safety principles and feedback into training courses are measures that could be adopted to reduce the likelihood of such accidents.

Radiation Safety Services

A review of the Emergency Response Unit (ERU) began in 1995 with the aim of improving the Agency's ability to fulfill its obligations under the Conventions on Early Notification of a Nuclear Accident and on Assistance in the Case of a Nuclear Accident or Radiological Emergency. Operating procedures were critically analysed and steps were taken to modernize the communication system. Training was intensified on ERU stand-by and activation mode procedures.

Monthly internal exercises were carried out on quickly assembling a team to respond to the initial notification of a nuclear accident or radiological emergency. External exercises involving Parties to both Conventions, Member States and other international organizations were held. These included participation in exercises with Lithuania, Romania and the Russian Federation, routine external communication exercises and an exercise to test the capability of WMO to rapidly provide the Agency with atmospheric transport predictions. An off-site emergency exercise in Guangdong Province, China, was reviewed. Co-ordination continued with other United Nations organizations that would have a role to play in responding to a nuclear accident or radiological emergency.

Personnel monitoring and other services, including in-house training, continued to be provided to Agency staff involved in safeguards activities and to other personnel. Such services were also extended to field experts classified as workers occupationally exposed to ionizing radiation. Equipment for the monitoring of external and internal radiation exposure, comprising thermoluminescence dosimeters and a whole body counter, was significantly upgraded to meet the Agency's internal needs. The Agency now has available a dosimetry laboratory which is equipped with state of the art technology. In addition, the Agency's radiation protection rules and regulations were revised in the light of the revision of the BSS.