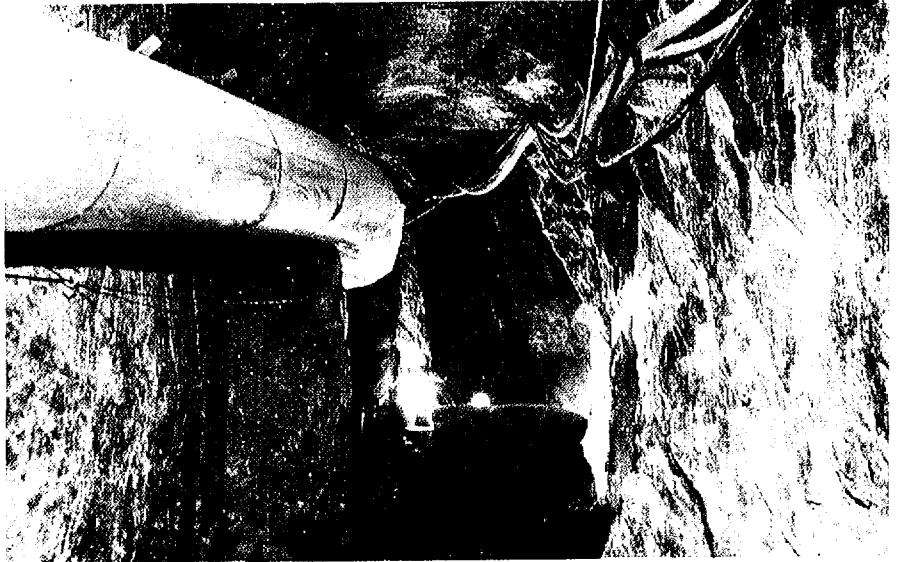


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**URANIUM PRODUCTION
SAFETY ASSESSMENT TEAM**

UPSAT

AN INTERNATIONAL PEER REVIEW SERVICE
FOR
URANIUM PRODUCTION FACILITIES

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 1996

INTRODUCTION

Facilities which beneficially produce uranium are one of the most visible segments of the nuclear fuel cycle. These facilities include mines and mills that produce only uranium, as well as facilities that produce uranium as a by-product of other commodities such as gold, vanadium, phosphate and rare earth operations. These facilities may employ a relatively large number of people and cover significant areas. Each uranium production facility may involve the movement and processing of a significant volume of material with a low content of radioactive constituents, including ore, rock waste and mill tailings. The design and operation of these facilities require safety measures common to all mining, milling and processing activities, in addition to those specific to radiation hazards. Public concern for the possible negative impacts of these facilities on the environment, their employees and the public at large necessitates a standardized approach to good operational practice. This would, to the extent practicable, minimize negative impacts and at the same time increase public acceptance.

The IAEA Uranium Production Safety Assessment Team (UPSAT) programme is designed to assist Member States to improve the safe operation of uranium production facilities. This programme facilitates the exchange of knowledge and experience between team members and industry personnel. It is intended to enhance overall safety in uranium production facilities in all countries that have this type of activity.

An UPSAT review will be conducted only at the request of the relevant Member State. The IAEA undertakes the responsibility of convening an international panel of experts and performing an independent peer review according to the terms of reference established by the requesting Member State. The mechanisms used for this purpose are: a review of source material, technical exchange with international experts and the requesting Member State or organization, and preparation of a review report with findings, conclusions and recommendations. The review can be tailored to the particular needs of a facility. A full review may cover numerous operational areas: organization; quality assurance; general safety; radiation protection; training and qualification; mine engineering; mill process; environmental impacts; waste management; security; hydrology; maintenance; monitoring system and decommissioning plans.

An UPSAT mission is an international expert review, conducted outside of any regulatory framework. The programme is implemented in the spirit of voluntary co-operation to contribute to the enhancement of operational safety and

practices where it is most effective, at the facility itself. An UPSAT review supplements other facility and regulatory efforts which may have the same objective. The benefits of an UPSAT are not limited to the subject facility. Other facilities of the same organization and of the same country, as well as the facilities which made the review team experts available, also benefit.

The term 'operational safety' as used in an UPSAT review refers to all activities under the direct responsibility and authority of the subject facility which help to ensure optimal protection of the facility personnel, the general public and the surrounding environment.

The advantage of such a peer review for the requesting Member State or organization is to obtain independent international expert opinion and advice on: (a) proposed or ongoing safety programmes and their implementation; (b) upgrading ongoing safety programmes; and (c) regulatory matters. UPSAT can contribute to improving the confidence level of safety systems planned or in operation and help to ensure that the system performs in a reliable manner. UPSAT can also assist in improving public acceptability.

It is emphasized that this review is not regulatory in nature nor an audit against a set of codes and standards. Rather, it is a review of practices consistent throughout the industry recognizing site specific needs and conditions. Good co-operation between all parties is paramount for the success of the mission.

The report of the review team presents the conclusions of the UPSAT mission, including good practices, good performances and proposals for enhanced operational safety, and improving practices that will be submitted for consideration of the requesting Member State and the management of the facility reviewed.

OBJECTIVES

An UPSAT mission is a peer review of a uranium production facility by a team of selected international experts having direct experience in the technical areas specific to that facility. Judgements of the performance are made on the basis of the collective expertise of the review team. The review is a technical exchange of experience and work practices aimed at strengthening the programmes and procedures and their implementation at the subject facility. It is not a regulatory inspection, nor an audit. The principal objective of the UPSAT programme is the identification of areas that may require improvement and the formulation of recommendations for improved practice.

The key objectives of the mission are:

- to provide the requesting Member State or organization with an objective assessment of the status of operational safety and practices at the facility in the context of generally accepted international practices;
- to provide recommendations and suggestions for improvement in areas where performance falls short of generally accepted international practice; and
- to provide key staff of the facility with an opportunity to discuss their practices with experts who have experience with other practices in the same field.

OPERATIONAL AREAS TO BE REVIEWED

The following list of topics, though not exhaustive, identifies the major areas to be considered in developing the plans for an UPSAT mission.

Organization: The organizational structure of the facility should be assessed for clearly defined functions, assigned responsibilities and authority to carry out those responsibilities. Goals and objectives for each operating unit should be examined, starting with management commitment to a safe and environmentally sound operation.

Quality Assurance Programmes: For appropriate processing aspects, including radiation protection and laboratory services, quality assurance programmes should be in place. Internal communication between departments is vital, in particular between the production, maintenance and safety departments. External relationships with regulatory agencies and the public should also be reviewed.

General Safety: The conventional safety programme in the facility, including mining, milling and processing operations, should be assessed. This will require an expert in both mine and process safety, including the safety of chemical operations. Areas to be examined must include safety philosophy, occupational health programme, day-to-day operation of the safety programme, employee participation and emergency planning, including fire fighting and spill response. The transportation of dangerous goods should be reviewed, including both chemicals brought onto the site and products being shipped to the customer.

Mine Engineering: The safety of a mining facility is very much dependent upon the mining techniques employed. Mine design, including ventilation, should be examined, considering the type of ore body, rock mechanics, mining methods, design and efficiency of the ventilation system, ore transport, equipment employed, etc. The requirements will be quite different depending upon whether the ore body is being mined by underground, open-pit or in situ leach techniques.

Extraction Process: An efficient extraction process is essential to the minimization of emissions to the environment. Hence, an examination of the extraction process, chemical usage, equipment and operation should be done. In particular, opportunities for the reduction of water consumption should be considered.

Training and Qualification: Subjects to be examined are the organization and administration of training, training facilities and materials, and training and qualification programmes. Training for both production work and safety should be examined.

Waste Management: The most significant waste from a conventional uranium mining and milling facility is usually the mill tailings. The management system for the tailings must be examined, including the transport of tailings from the mill, the design of the tailings disposal facility, the operation of the facility, and the impact of local climatic conditions on the operation. Waste rock management is also important, in particular the potential for acid generation or metal leaching from the waste rock and the means of dealing with it. Other areas to consider are the handling and disposal of items, process materials and scrap equipment contaminated with radioactive materials, and the handling of uncontaminated wastes and opportunities for waste volume reduction by recycling.

Radiation Protection: The assessment may include: organization, operational radiation protection, transport of radioactive material, waste, effluents, training, instrumentation, dose assessment, ALARA (As Low As Reasonably Achievable) programme, environmental monitoring and record keeping. Since ventilation is such a vital part of radiation protection in uranium mining, particular attention must be paid to this subject in the facility.

Monitoring Systems: Monitoring systems are required in many parts of a uranium production facility. Radiation protection requires workplace measurements and personal dosimetry with appropriate records. Environmental programmes may require monitoring of emissions to the environment and measurement of potential contaminants in air, water, soil, sediments and biota

in the environment surrounding the operation. A good monitoring programme will not only satisfy the requirements of the local competent authority, but will also look beyond the minimum requirements for potential trends which could be an indication of developing problems before they become infractions of regulations.

Environmental Impacts: Emissions from the production facility which may include the mine, mill, in situ leaching well field, tailings and other effluent management areas should be examined. Because these operations are frequently in remote locations, there is often an associated camp or town which should be included in the environmental review, with such subjects as sewage treatment being considered.

Security: The security arrangements should be examined, with consideration of both site access by unauthorized persons and the protection of raw materials, equipment and products from theft and unauthorized use.

Hydrogeology: The potential for both surface water and groundwater contamination must always be considered in examining a mining operation. Tailings disposal systems should be examined for both operating and potential long term impacts. Hydrogeology is of particular importance for in situ leach operations.

Decommissioning Plans: Many decommissioning problems can be avoided by proper planning and operating procedures. The site decommissioning plan should be examined and operational procedures should be reviewed for possible impacts on the decommissioning plan.

Maintenance: Aspects to be examined include the organization of the maintenance programme, the upkeep of both facility and mobile equipment, preventive maintenance systems, stores and spare parts management, procedures, documentation and maintenance records.

Some specific study areas may be emphasized or omitted, depending upon the specific facility to be reviewed. For example, an in situ leach facility would not require consideration of mine engineering, but would require an examination of hydrogeology. When a request for an UPSAT is received by the IAEA, the UPSAT co-ordinator will determine which areas must be addressed during the selection of the review team.

UPSAT REVIEW MECHANISM

Typical elements of an UPSAT review and its timetable are presented in Fig. 1. As reviews may differ in time and scope, sufficient flexibility must be applied to the UPSAT service in order to accommodate the actual needs of an individual request.

Transmittal of Request

The IAEA UPSAT service can only be initiated by a formal request from a Member State or an organization within the Member State. Such an organization requesting an UPSAT review should write to the Director General clearly stating the “terms of reference” of the proposed review, the time considerations involved and the person responsible for the review.

Team Composition/Selection of Experts

The UPSAT team will be recruited by the IAEA and will consist of experts from countries other than the country in which the review is being performed. The team members will be selected on the basis of their special skills. The team may consist of 4–8 individuals with expertise in the various areas of the review, including an IAEA co-ordinator. A team leader will be selected from the team members.

The team members will be experienced in the areas of facility management, including mining, processing, environment, safety and radiation protection. Depending on the type of facility under review the team may include other specialists in areas such as hydrogeology and refrigeration. The size and composition of the team will be determined by the IAEA during the evaluation of the project but will not exceed 8 members.

The IAEA co-ordinator will be responsible for the initial organization of the review and recruitment of the expert team. The team leader will be responsible for overall management of the review and preparation of the final technical report. The co-ordinator will work with the team leader to facilitate interaction with the IAEA, as well as to help maintain a consistency between UPSAT reviews. He or she will also update the review process procedures as required. All team members will be briefed and have appropriate training prior to undertaking the review; specific background information regarding the facility will be part of the briefing.

The experts will act on their own behalf and not reflect the opinion or the policy of their country or organization.

Advance Information/Source Material

To assist the UPSAT team in the familiarization with the facility and to ensure the most effective use of their time while at the facility, it is necessary for all team members to be provided with material relevant to that facility. The material should include the following information:

- general background of facility, description and size, including plans
- company philosophy
- process flow diagram, including volume, mass and concentration
- overall personnel and structure
- specific personnel and qualification of the safety and environment departments
- routine monitoring programmes and copy of report reflecting results and assessment of the monitoring programme
- results of self-audit reviews (if any) and external reviews (if available)
- operating and safety procedure documentation
- all written philosophies, e.g. engineering, safety and environmental
- any other material the facility feels will assist in the review
- summary of employee dose distribution

Source material for team members should be available a few weeks prior to the review.

Conduct of Review

After the source material has been reviewed, the UPSAT team will meet with the experts of the organization of the requesting Member State.

The UPSAT members, when they arrive at the uranium production facility, are already familiar with the main features of the facility, operating characteristics, history, regulatory aspects, procedures, organizational approach and key personnel. At the start of the review mission, which may take from one to two weeks depending on the facility and type of activities to be reviewed, members of the team will be briefed and meet the corresponding counterpart staff. The team members will follow a predetermined methodology in recording the observations and conclusions from which the mission report will be drawn. During the visit to the Member State, the team will meet regularly according to a preset timetable for general consultations and discussions.

REPORTING

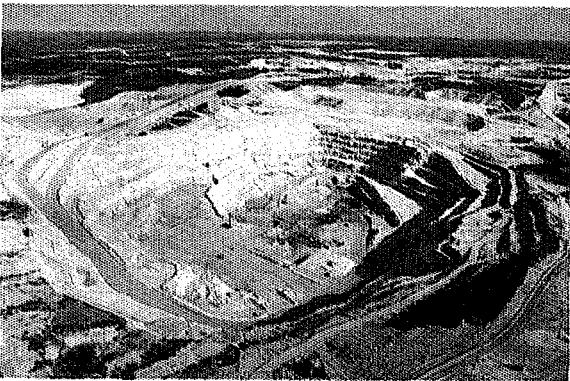
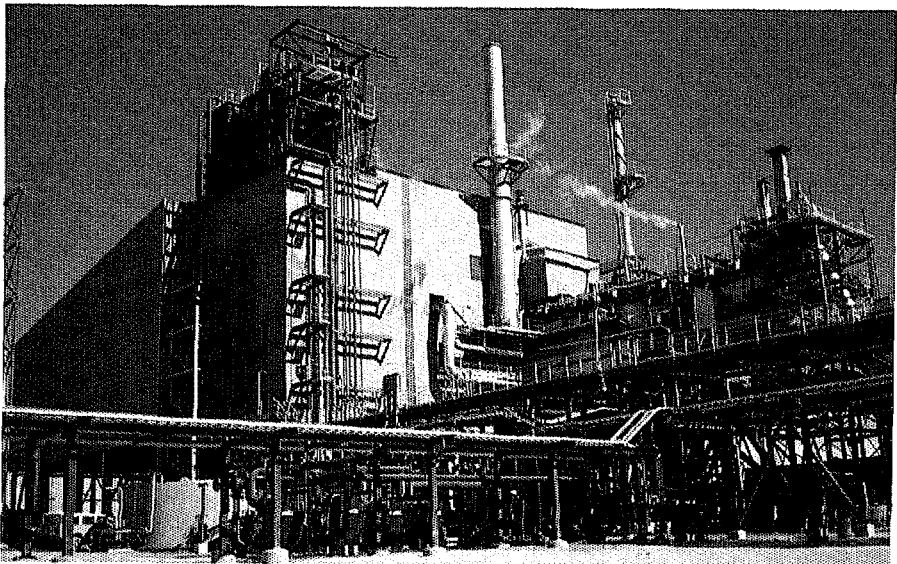
The reporting procedure is as follows. First, all experts will submit their findings to the team leader before completing their site visit. A summary of the review will be submitted to the facility management at the exit meeting. The team leader will then prepare a final draft mission report according to the prescribed schedule. This final draft will be reviewed by all members of the UPSAT team before the IAEA prepares and transmits the report to the requesting Member State. Such a report is the property of the requesting Member State and will be kept confidential by the IAEA and the UPSAT team. Publication of the report or part of the report must have the permission of the requesting Member State and organization.

FUNDING

The funding of an UPSAT mission would be based on a cost-sharing principle involving the Member States which provide experts, the Member States which request the review mission and the IAEA. The international travel cost for a review mission to industrialized Member States should be borne by the requesting countries. This cost may be financed through IAEA technical co-operation funds if the review mission is requested by a developing Member State. This, however, should be properly formalized, approved and included in the technical co-operation biennial programme. The Member State requesting an UPSAT shall bear locally incurred expenses, i.e. costs of board and lodging and incidental expenses; local transportation as necessary; clerical services; and meeting room and office space. A review mission may require a preparatory meeting. Travel and local expenses of the IAEA staff member (co-ordinator) attending this meeting shall be borne by the IAEA.

		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
1	Request from Member State	■						
2	IAEA reviews and considers the request	■						
3	Additional information needs identified and information provided by Member States		■					
4	Selection of experts		■					
5	Information sent to experts		■					
6	UPSAT					■		
7	Preparation of final report by experts					■		
8	Report processed by IAEA and sent to Member State						■	

Fig. 1. Projected schedule of UPSAT activities.



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