ROCKY FLATS SAFETY ADVISORY OVERVIEW GROUP

Recommendations Related to Environmental Monitoring

Prepared for the Safety Advisory Overview Group

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The environmental monitoring program for the Rocky Flats Plant was reviewed on July 11 and 12 as a part of the Safety Advisory Overview Group responsibilities. Although the time given to this review was brief, it was carried out with specific objectives in mind, and focused on several areas that are typically of concern at all Department of Energy facilities having extensive ongoing environmental monitoring programs. The objectives for the review were as follows:

1. **Staffing** - Is the staff adequate in terms of numbers, training, and delineation of responsibility?
2. **Analytical support** - Is high quality, ample analytical support available?
3. **Sample tracking** -Is there a dedicated, state-of-the-art method for tracking environmental samples from collection to results?
4. **Publication of results** - Is "in-house" desk-top publishing used to ensure high quality, timely reporting of results to the public?
5. **Rationale for environmental monitoring** - Are the types, frequencies, and analyses performed on environmental samples based on a clear rationale that fully supports the objectives of environmental monitoring. (Objectives of environmental monitoring are described in ICRP 43, see Appendix A.)

A description of the program follows along with recommendations that should be considered for making the program more defensible.

Description of the Environmental Monitoring Program

Environmental monitoring at Rocky Flats is directed by 11 technical staff members. These individuals have the responsibility for determining the types and frequencies of samples as well as the analyses that are run. Results of monitoring are also analyzed within this group and are summarized in the annual environmental monitoring report.

The monitoring program is responsible for all aspects of environmental quality, radiological and non-radiological. Approximately 50,000 samples are taken annually, some analyzed for multiple contaminants.

Environmental monitoring, within the scope of responsibility of this program, begins at the point of effluent from facilities on site. For example, source terms of radionuclides emitted from 707 building vents are monitored by the environmental monitoring program. Atmospheric monitoring within building 707 is not a responsibility of this group. The delineation of responsibility between operational health physics and environmental monitoring appears to be clear and is consistent with most health physics organizations.

Within the monitoring group, responsibilities are divided into categories by environmental media including air (effluent, ambient, and non-radiological), surface water, and soil. One staff member is responsible for dose assessment related to environmental emissions from Rocky Flats and preparing the annual report. Ground water monitoring is carried out by technical staff who are not a part of the routine environmental monitoring program. A separate group has also been formed to carry out studies pertaining to atmospheric sciences (modeling) which is also not a part of the environmental monitoring program.

Samples are collected by radiation monitors who are not part of the monitoring group and who carry out this task, to a large degree, at the discretion of their supervisors. Therefore sample collection is carried out by persons who have an entirely different chain of command from the environmental monitoring group.. For some areas, (effluent stack monitoring) there is considerable turnover of radiation monitors collecting samples.

No analytical work is carried out by the monitoring group although essentially all of the analytical laboratory work is being performed on site. Due to the load of analytical results being requested, there appears to be competition between groups needing work done which may not only be creating delays in obtaining results but may also causing some samples to be deleted that should be carried out. This observation cannot be confirmed, however, on the basis of this brief review and should not be construed as a fault in the environmental monitoring program.

Sample tracking is a critical element of any environmental monitoring program. Tracking includes the identification of sample types, frequencies, individual responsible for collection, analytical results, and data analysis. In the case of effluent stack samples, it is up to the Lab to notify the monitoring group if a required sample is not taken. Although there is considerable effort to improve the methods used for sample tracking, presently there is no consistent, well developed method for sample tracking at Rocky Flats.

The annual environmental report is published by delivering draft material to a publications department within the Plant. This process has caused delays in generating the report which according to DOE guidelines, should be available to the public May 1 each year.

Recommendations

Staffing

The environmental monitoring program is fragmented and much less effective than it should be due to the lack of a single focal point for all work related to environmental sampling.

Radiation monitors must be a part of this organization and must be under the direction of the environmental monitoring group leader. Likewise, ground water monitoring should also be a part of the environmental monitoring program to minimize a duplication of effort between the environmental monitoring group and the present ground water group.

The need to have a separate group of experts investigating the atmospheric characteristics of the Rocky Flats site is not apparent. Unfortunately time did not permit meetings with staff in the atmospheric sciences group to better understand their purpose and therefore no strong recommendation is being made at this time for integrating these persons into the environmental monitoring group.

To summarize, the environmental monitoring group should be consolidated to include all persons presently carrying out monitoring tasks. The only exception to this consolidation is the need to maintain separate analytical capabilities to enhance credibility of measurement results.

Analytical support

Although most of the analytical support is being provided by facilities and expertise within the plant, there is competition between different groups requesting services which could lead to samples not being given adequate turn around time or samples not being collected due to non-available analytical support.

On-site analytical capabilities are very cost effective provided the laboratories are professional and strongly backed by a highly visible quality assurance program. This practice should be continued at Rocky Flats.

Nevertheless, it is strongly recommended that the flexibility be maintained to contract analytical work outside when labs are overloaded or when independent verification of samples is desired.

High quality, timely analytical support, either on site or off site, must be available to the manager of the environmental monitoring program at all times.

Sample tracking

Sample tracking and feedback on samples not collected or results that are abnormal are not consistent among the monitoring group. There must be a single reference that identifies what samples are to be collected each day, who is responsible for collection, and step-by-step tracking of the sample through the analytical trail, until the final result is examined and recorded.

A comprehensive sample tracking system is currently being developed at the Savannah River Plant. Although this system may not be adaptable to Rocky Flats, it should be reviewed along with mechanisms now being employed at other DOE facilities for sample tracking.

As a minimum, a consistent, simple, manual system must be implemented until a more state-of-the-art program can be provided. (Such as the one being used for surface water sampling.)

Publication of results

The hardware and software for high quality desk top publishing is available at a very reasonable price. This equipment gives the user the capability of preparing photo-ready versions of reports that include sophisticated graphics and impressive text layout. Both the DuPont Company, contractor at Savannah River Plant, and Battelle Northwest Laboratories, contractor for the environmental monitoring program at Hanford, are now producing their own environmental reports in house. This procedure saves time and costs and gives much more flexibility for producing the annual report on schedule (by May 1 each year).

Rocky Flats should obtain the following hardware and software for producing the annual environmental report within the environmental monitoring group.

Apple® Macintosh SE™ or Mac II™

Apple® LaserWriter II™ printer

Microsoft® Word™ 3.0

Aldus® PageMaker™

Microsoft® Excel™

Apple® MacDraw™ or Aldus® Freehand™

The present staff will be able to use this equipment to produce the 1988 annual report (due May 1, 1989) if quick action is taken to acquire it. A copy of the Savannah River Plant annual environmental monitoring report is included as an example of a well written document that was published entirely within the environmental monitoring group.

Rationale for environmental monitoring

Environmental measurements must be based on a clear rationale that supports the basic objectives set out in ICRP 43 (see Appendix A). Samples should not be added to the program unless they contribute to meeting one of these objectives. Likewise, there must be a mechanism for removing samples from the environmental program as the source term changes or as long term observations indicate they are no longer needed. In summary, there should be a reason why every sample is taken and for every analysis performed on that sample.

Time did not permit a review of samples being taken at Rocky Flats. This should be completed, however, for both radiological and non-radiological samples as soon as possible by the environmental monitoring staff. This review of environmental monitoring samples should be repeated at least on an annual basis.

In considering a rationale for sampling, careful attention must be given to the results of environmental assessment models which predict the transport of materials in the environment and help to identify important pathways, contaminants, and groups of exposed persons. This information should be the fundamental basis for the design of an environmental monitoring program for Rocky Flats

Establishing steady-state background levels of contaminants is crucial to a strong environmental program. For example, upstream surface water samples should be collected routinely to establish water quality coming into the Plant.

APPENDIX A

Objectives of Environmental Monitoring as Outlined by the International Commission on Radiological Protection

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ICRP 43, "Principles of Monitoring for the Radiation Protection of the Population," Pergamon Press Oxford, 1985.

In the ICRP report on environmental monitoring, the primary objectives of an environmental monitoring program for radionuclides are specified. Although the objectives pertain to radionuclides, they could also apply to non-radioactive substances as well.

The objectives are listed below and should be considered as the basis for environmental monitoring at the Rocky Flats Plant.

1. To assess actual or potential doses to critical groups and populations from the presence of radioactive materials or radiation fields in the environment from normal operations or accidents. This may be limited to the assessment of dose equivalents to critical groups or may extend to the assessment of collective dose equivalents to populations.
2. To demonstrate compliance with authorized limits and legal requirements.
3. To check the condition of the source, the adequacy of operation of the plant or containment and the effectiveness of effluent control, to provide a warning of unusual or unforeseen conditions and, where appropriate, to trigger a special environmental monitoring program.

Once these basic objectives are met and the need for a radiological monitoring program is established, then implementation of a program should accomplish the following secondary objectives.

1. To disseminate information to the public.
2. To maintain a continuing record of the effect of the installation or practice on preexisting environmental radioactivity levels.
3. To distinguish the contribution from the operator's installation or practice from contributions from other sources.
4. To obtain data on the behavior or materials in the local environment that may be required in assessment of the consequences of accidents.
5. To identify changes in the relative importance of transfer pathways and mechanisms including the emergence of new pathways, and hence to enable the environmental monitoring program to be revised in the light of experience and in response to changing conditions.
6. To verify or refine the predictions of environmental models, in order to improve the structure of the model and to reduce uncertainties in the parameters.
7. To conduct more general, scientific studies aimed at improving knowledge of transfer of radionuclides in the environment.