

SELECTED ISSUES ON RECENT U. S. DOE ENVIRONMENTAL ACTIVITIES

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ABSTRACT

Many U.S. Department of Energy (DOE) nuclear production and research facilities are located in the State of New Mexico. In this paper, selected environmental problems associated with the production, disposal and storage of radioactive and hazardous wastes are examined within the context of problem identifiability and the resulting risks to environment and public health. Conflicting issues arising from overlapping regulations and their ad hoc implementation are discussed in regard to the recently DOE proposed Five-Year Plan process. Recommendations are proposed to optimize the environmental compliance and restoration solution under legal, fiscal and time constraints. Requirements of direct regulatory enforcement and continued independent oversight of DOE cleanup/waste management activities by the state are needed to ensure that DOE commitments to acceptable environmental practices are maintained.

INTRODUCTION

On April 14, 1989, Governors of the states of Colorado, Idaho, Kentucky, Ohio, Oregon, Nevada, South Carolina, Tennessee, Washington and New Mexico wrote to the U.S. Department of Energy Secretary to express their concern on the management, cleanup and permanent disposal of radioactive and hazardous chemical wastes at DOE defense and research facilities. The letter was accompanied by a nine-point policy statement to be included in any credible DOE cleanup program such as the currently proposed Five-Year Plan. Among these points are a detailed schedule and national priority system, sufficient long-term and stable funding to ensure cleanup and disposal of existing and future wastes, an effective regulatory structure, including both state and independent oversight and enforcement capabilities, a long-term waste disposal program, and increased attention to health impact monitoring and analyses. In response to the Governors' request, DOE has created an independent oversight process for the formulation of the Five-Year Plan which incorporates input by the states, tribes and other affected parties. As members of these independent oversight groups, this paper is written to discuss selected issues related to the complicated technical question on how to optimize the environmental solution. This optimized environmental solution must address the stated points of concern of the affected states as well as all other related scientific, political, and public perception issues.

One may note that a common denominator of the above concerns involves the information or data base needed to properly identify the existing environmental problems and the understanding of health and environment risks required for the logical prioritization of cleanup activities. Obviously, other considerations such as available technologies, adequate funding and qualified work force are also needed to meet the desired cleanup goal within thirty years for all sites. However, unless the problems at these sites and their related risks to the public are fully known, the complete and permanent solution to the waste management problem may never be achieved.

REGULATORY COMPLIANCE AND SITE CHARACTERIZATION ISSUES

DOE has recognized the need for a priority system as recommended by the states to guide departmental activities and to support its budget requests. Such a system, which must be acceptable by interested parties and its results equitable and defensible, is presently under development. In the mean time, a four-tiered priority system is used for the three categories of activities: corrective activities (CA), environmental restoration (ER), and waste management operations (WM). This simple system has also been used to incorporate applied research and development (RD) activities into the overall Five-Year Plan DOE budget allocation process. CA, defined as activities needed to bring active and standby facilities into compliance with applicable local, state, and federal/DOE internal requirements, is classified as priority 1 for immediate and timely action.

CONFLICTING LAWS AND REGULATIONS

For a specific facility currently out of compliance, the overlapping of applicable laws such as National Environmental Policy Act (NEPA) and the Resource Conservation and Recovery Act (RCRA) may result in disagreement on the minimum scope of work required to gather adequate data for the determination of adverse human health and environment risks and for the determination of violations of past practice to warrant corrective action. Specific laws, such as RCRA, waive sovereign immunity, allowing state or local statutes to be applied to federal facilities. Therefore, the state has the responsibility to resolve the differences in the interpretation of overlapping regulations from the enforcement point of view. This implies the state must be directly involved in the review and modification of DOE CA and ER workplans formulated for a specific site to meet the state and the local requirements. For the completeness of the state enforcement role, full access to federal records of environmental review is essential in order to avoid inadequacy or duplication of CA and ER tasks initiated by DOE site management. Because the CA and ER activities at a site are sometimes governed by either consent decree order or interagency agreement, and such documents may contain

detailed schedules of task performance, the involvement of the state in the evaluation of timeline compliance should become part of the enforcement activities. While courts recognize an exemption for environmental agencies from complying with NEPA when the agency's environmental and health procedures are "functionally equivalent" to an environmental impact statement (EIS), no such exemption applies to DOE as the owner and operator of several facilities. The state believes that U.S. EPA does not have the authority to relieve another federal agency, i.e., DOE, of its legal obligation to perform an EIS, when appropriate, or to otherwise comply with NEPA. For example, DOE recently published notice of "Compliance with NEPA; Amendments to Guidelines" which proposes additional categorical exclusions from DOE's need to perform an EIS in certain situations. Thus, apparently DOE makes the initial determination as to whether and when it must comply with all or part of NEPA.

The above note brings the state to the position that the necessity of an EIS must be based on the complete information on the scope of waste generation of the operation of a facility. The risk that an operation may cause to the environment is essentially dependent also on the pathway from the source to the environment. In this sense, site characterization activities may become part of the overall impact assessment planning. The understanding of the characteristics of a site may also be used in the valuation of emergency and contingency plans as they relate to the health and environmental impact mitigation and control. The risk management aspects of the operation planning of a facility under the present knowledge of the waste problem would become a part of any comprehensive compliance process.

Site Characterization Issues

The ability of DOE to meet certain deadlines contained in any action plans or any other enforceable agreements rests with the full understanding of the nature of the environmental problem as well as the availability of cleanup technology employed to correct the problem or restore the site within the proposed timeline. Institutional barriers to full discovery or disclosure of the environmental problem exist in DOE facilities today. These barriers range from a lack of basic information and data from early days at DOE facilities to a lack of concern by scientists on the need to dispose of wastes that result from the applied research activities at these sites. Regardless of their origin, these barriers have the effect of making solutions to environmental problems less than optimal. Since compliance schedules and cleanup timelines are often set forth prior to the site characterization activities, the implementation of the environmental obligations by DOE may be restricted by unreasonable goals and milestones. Furthermore, the scientific characterization of the nature and extent of all hazardous substance releases and associated impacts also depends on

both the quality of the collected physical data and the level of uncertainty inherent in the data acquisition and assessment process. Consequently, the information gathering and evaluation for the site characterization works must be given highest priority. In this sense, research activities which provide and demonstrate techniques for the establishment of the widest range of options for source identification, risk assessment and remediation in the most cost effective manner must also be given highest priority.

Because most of the information concerning the operation of nuclear production, defense and weapon research facilities is classified, another difficulty of credible CA and ER activities lies in the ability to obtain sufficient information for the solution to the contaminant source identification problem and to provide independent monitoring systems to indirectly verify the original information. The balance between the DOE ability and commitment to fully identify and solve environmental problems and the state responsibility to monitor and enforce the laws will dictate the outcome of the CA and ER activities. In this respect, close consultation with the state and consistency in the level of interaction supported by the CA and ER workplans are essential to the achievement of environmental goals.

Another issue related to the need for a full site characterization plan is the time necessary to establish the baseline condition for the understanding of the physical transport process of the chemicals from the sources to the accessible human environment. The extent of the contamination problem on-site and off-site may require extensive spatial and temporal information on the movement of involved chemicals, and the data measured over time would provide a more accurate picture of long-term evolution of the problem with respect to adverse environmental and health risks. The potential impact caused by hazardous chemicals can manifest itself in different media which require comprehensive and interactive monitoring network to detect the possible trends of significant deterioration of environmental quality. The public health risks to be evaluated would cover the multitude of environmental transport pathways which lead to human exposure. This particular issue will require careful analysis as the need to show the public progress towards site characterization or environmental restoration must be carefully balanced with the need to be sufficiently deliberate with regard to rigorous scientific exploration of the particular health or environmental concern.

The site characterization issues involving the permanent disposal of radioactive wastes in geologic medium are complex and may not be resolved without considerable advancement in the current state of geological and engineering sciences. On-site monitored retrievable storage of nuclear wastes subsequently becomes a relevant issue in which the question of health risk to the public in the predictable future must also be addressed by the presently

collected data base. Careful analysis of the data base in order to increase the precision of the health risk assessment should become a high DOE priority.

HEALTH RISK AND PRIORITIZATION OF ENVIRONMENTAL ACTIVITIES

Health Risk Assessment Issues

As previously stated in the Governors' statement, increased attention to health impact monitoring and analyses must be an important element of the DOE Five-Year Plan. Efforts to investigate the health and safety problems which the DOE operation of its facilities may pose to the workers as well as to study the potential impacts on public health caused by radioactive/hazardous chemical releases from these facilities constitute a major part of the commitment made by the Department. Among the information and analyses needed for the meaningful assessment of the environment and health risk issues are the cause/effect relationship, especially in regard to effects of long-term low dose radiation exposure and ingestion of hazardous chemicals at trace levels.

It is only recently understood that exposures to low-levels of ionizing radiation in the working or living environment may cause cancer mortality and genetic diseases. These low levels may be well within the past acceptable standards recommended by the National Academy of Sciences Committee on the Biological Effects of Ionizing Radiations (BEIR Committee) and the International Commission on Radiological Protection (ICRP). An example is the Garner report on worker health effects at Sellafield, United Kingdom.

In this respect, the DOE recent announcement on the immediate public release of information and data collected from the workers in regard to the level of radiation exposure at the nuclear production facilities will be beneficial and helpful to the risk assessment effort. Dose reconstruction projects must be considered for unmonitored populations living and working at or near these facilities. The conduction of the dose reconstruction projects should be overseen by independent scientists and carried out by non-DOE contractors. In parallel with such activities, increased and required monitoring efforts should be made in commensurate with the current understanding of long-term health impacts caused by exposure to low-levels of ionizing radiation in the work place.

Finally, the risk assessment instrument is a dynamic accumulation of increasing data elements and information. The system must, therefore, have the capability to accepting and using this information in calculating and becoming more precise in the estimation of risk to humans and the environment.

Prioritization System

The prioritization system must take into account all risk reduction attributes involved in the overall utility cost in a computationally effective manner. These risk reduction attributes, discussed and proposed by the affected parties in the Five-Year Plan process, are measured using information which often is plagued by uncertainty and estimation errors. The ER cost estimates which enter the cleanup budget allocation prioritization process are based on the level of detail of the workplan proposed for site characterization and cleanup activities. Because such a workplan can change as more information is acquired from the various phases of the ER works, this cost estimation iterating process can provide the prioritization methodology with input data of inconsistent and non-uniform standards. Another problem of the risk-based prioritization process is the comparison and competition of two distinct types of site cleanup specific budget: the high cost estimate with high uncertainty; and the low cost estimate with higher uncertainty. In other words, the confidence level of the cost estimates must enter the ranking process by means of probabilistic analysis in the multiattribute utility framework to assure unbiasedness. Therefore, a carefully designed and implemented quality assurance and control program for the ER cost estimates as site specific data is necessary for any success of the prioritized budget results. The currently proposed Activity Data Sheets (ADS) are certainly not adequate in and of themselves for cost quality assurance purposes in regard to the prioritization system under development. Cost audit of proposed workplans and critical path analysis of the associated cleanup scheduling problem of phased ER activities should be the integral elements for any equitable and effective prioritization system.

CONCLUSIONS

The above discussion and recommendations have covered a small set of selected issues of interest to one affected state. In the context of current development of a new environmental compliance and restoration program by the U.S. DOE to deal with its waste generation and management problems, these issues cannot be fully addressed and resolved between federal agencies in the absence of full state participation. The enforcement of state and local regulations requires an active role for the state at the earliest phase of the solution formulation. This means the state must be allowed to set up and operate adequate monitoring programs which would provide needed information for the determination of public health risks. In addition to the monitoring information, the data base pertinent to the site contamination problems must be established and/or enhanced by means of well planned and executed site characterization activities. As recommended in the preceding discussion, the long-term commitment of DOE to bring its

operation into compliance and to restore the contaminated sites to their unrestricted future usage must be made with well defined objectives in recognition of state's authority and responsibility to protect the public health. Steps to be taken by DOE require not only the adoption of a new

culture, but also the initiation of inspiring and innovative working partnerships with the state to realize the common environmental goals.