

EGG-M--90030

REGULATORY CONTROLS ON THE HYDROGEOLOGICAL
CHARACTERIZATION OF A MIXED WASTE DISPOSAL SITE,
RADIOACTIVE WASTE MANAGEMENT COMPLEX
IDAHO NATIONAL ENGINEERING LABORATORY

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ABSTRACT

Following the detection of chlorinated volatile organic compounds in the groundwater beneath the SDA in the summer of 1987, hydrogeological characterization of the Radioactive Waste Management Complex (RWMC), Idaho National Engineering Laboratory (INEL) was required by the Resource Conservation and Recovery Act (RCRA). The waste site, the Subsurface Disposal Area (SDA), is the subject of a RCRA Corrective Action Program aimed at evaluating the nature and extent of the volatile organic release; describing the site hydrogeological characteristics; and identifying, developing, and implementing appropriate corrective measures.

Regulatory requirements for the Corrective Action Program dictate a phased approach to evaluation of the SDA. In the first phase of the program, the SDA is the subject of a RCRA Facility Investigation (RFI), which will obtain information to fully characterize the physical properties of the site, determine the nature and extent of contamination, and identify pathways for migration of contaminants.

If the need for corrective measures is identified during the RFI, a Corrective Measures Study (CMS) will be performed as a second phase. Information generated during the RFI will be used to aid in the selection and implementation of appropriate corrective measures to correct the release. Following the CMS, the final phase is the implementation of the selected corrective measures.

INTRODUCTION

The Idaho National Engineering Laboratory (INEL) occupies approximately 890 mi² of the northwestern portion of the eastern Snake River Plain in southeast Idaho (Figure 1). The INEL is a government-owned nuclear reactor test site managed by the U. S. Department of Energy (DOE). It was established in 1949 as the National Reactor Testing Station, by the U.S. Atomic Energy Commission, as a site for building, testing, and operating various nuclear reactors, fuel processing plants, and support facilities with maximum safety and isolation. In 1974, the National Reactor Testing Station was redesignated as the INEL to reflect the broad scope of engineering activities conducted at the Site.

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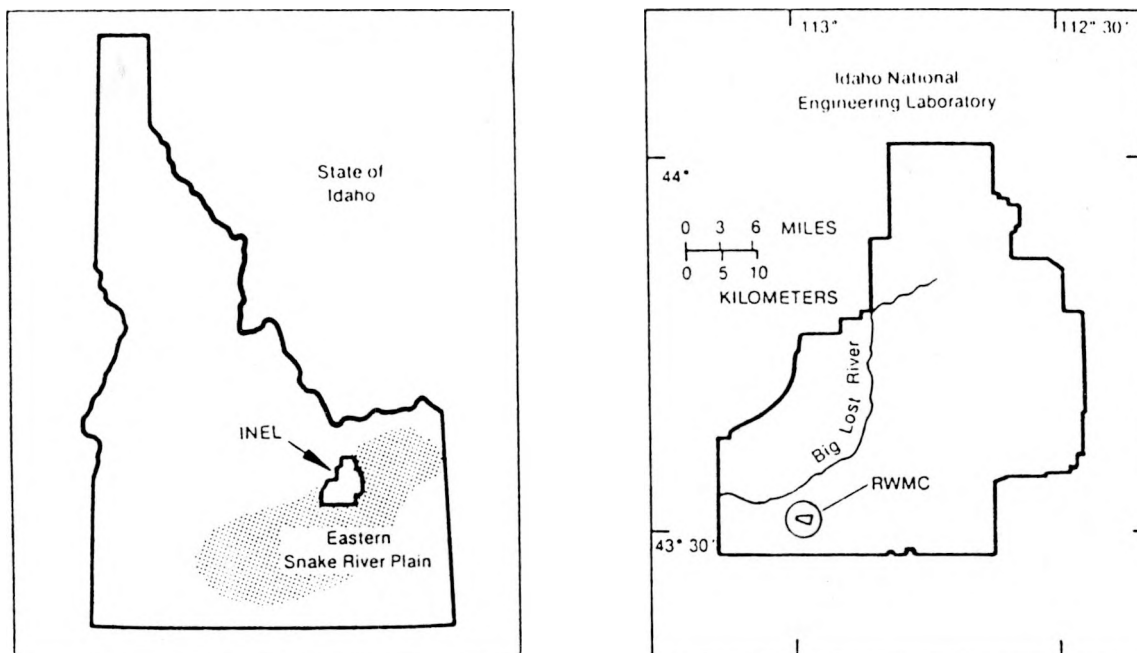


Figure 1. Location of the Idaho National Engineering Laboratory and the Radioactive Waste Management Complex (modified from Pittman, 1989).

The Radioactive Waste Management Complex (RWMC) is located in the southwest section of the INEL (Figure 1). It was established in 1952 as a disposal site for solid low-level waste (LLW) generated by INEL operations. The RWMC encompasses 144 acres and consists of two main disposal and storage areas: the Transuranic Storage Area (TSA) and the Subsurface Disposal Area (SDA). Beginning in 1954, transuranic (TRU) solid waste generated by nuclear weapons production activities at the DOE's Rocky Flats Colorado Plant was disposed of at the RWMC. From 1954 through 1970, this waste was placed in shallow-land pits and trenches and was often intermixed with LLW generated from INEL operations. The current mission of the RWMC is to (a) provide waste management for the present and future needs of the INEL and designated DOE offsite generators of LLW and TRU waste and (b) retrieve, examine, and certify stored TRU waste for ultimate shipment to the DOE Waste Isolation Pilot Plant in Carlsbad, New Mexico.

Following the detection of chlorinated volatile organic compounds in the ground water beneath the SDA in the summer of 1987, hydrogeological characterization of the RWMC was required by the Resource Conservation and

Recovery Act (RCRA). The SDA is the subject of a RCRA Corrective Action Program aimed at evaluating the nature and extent of the volatile organic release; describing the site hydrogeologic characteristics; and identifying, developing, and implementing appropriate corrective measures.

COCA AGREEMENT

On July 28, 1986, the U. S. Department of Energy, Idaho Operations Office (DOE-ID) entered into a Consent Order and Compliance Agreement (COCA) with the U. S. Environmental Protection Agency (EPA), Region X. The COCA establishes the compliance schedule for addressing hazardous waste land disposal units, solid waste management units, and release sites at the INEL. In addition, the agreement includes provisions for notifying EPA Region X of the release of hazardous constituents from a COCA site not previously established as having a release. The authority for the COCA agreement is vested in the Administrator of the EPA under Section 3008(h) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C., Section 6928(h). This authority was delegated to the Regional Administrator, EPA Region X.

RCRA CORRECTIVE ACTION PROGRAM

The objective of the RCRA Corrective Action Program at the SDA is to evaluate the nature and extent of the volatile organic release; evaluate the site characteristics; and identify, develop, and implement appropriate corrective measures.

Solid radioactive waste generated in national defense and research programs is stored or buried at the RWMC. Before mid-1987, environmental sampling and analysis at the RWMC was performed only for radionuclides. A broad-based monitoring program was instituted in the summer of 1987, and four chlorinated volatile organic compounds were detected in samples from the Snake River Plain Aquifer beneath the Subsurface Disposal Area (SDA). During this monitoring one compound was detected above relevant drinking water standards [Maximum Contaminant Levels (MCLs)] and then in only one sampling episode. In accordance with provisions in the COCA, DOE-ID notified EPA Region X of a release of hazardous constituents to the groundwater from the SDA in January 1988.

Subsequently, the INEL submitted a RCRA Corrective Action Plan to EPA Region X in March 1988. On June 1, 1988, sections of a revised Corrective Action Plan were submitted. The RCRA Facility Investigation (RFI) Work Plan for the RWMC was prepared in response to comments from EPA Region X and the State of Idaho on the previous documentation submitted. The RFI Work Plan was approved by EPA on April 5, 1989.

The RCRA Corrective Action Plan guidance (EPA, 1988) provides a framework for the development of a site-specific schedule of compliance and establishes the scopes of work for the three essential phases of a complete corrective action program. These phases are; Phase I - RCRA Facility Investigation; Phase II, Corrective Measures Study; and Phase III - Corrective Measures Implementation. Each phase of the corrective action program consists of several tasks. The following discussion presents the objectives and descriptions of the three phases.

PHASE I - RCRA FACILITY INVESTIGATION

The objective of the RCRA Facility Investigation (RFI), is to evaluate the nature and extent of the release of hazardous waste and hazardous constituents and gather the necessary data to support the Corrective Measures Study (CMS)(EPA, 1987). The RWMC RFI consists of 7 tasks. The RFI Task 1 Report (description of current conditions) and the RFI Task 2 Report (pre-investigation of corrective measures technologies) are included in the RWMC RFI Work Plan, Task 3.

Task 4 of the RFI is the Facility Investigation, currently ongoing at the RWMC. Investigations are being conducted to characterize the facility, define the source, define the degree and extent of contamination, and identify actual or potential receptors.

Data on hazardous constituents migrating from the SDA is limited. Information currently available comes from grab air sample measurements, soil gas studies, shallow and deep drilling sediment samples, perched water samples, and groundwater monitoring.

To date, volatile organic chemicals (carbon tetrachloride, trichloroethylene, 1,1,1-trichloroethane, chloroform, and tetrachloroethylene) have been detected in the groundwater, soil, and boreholes (subsurface gas) at the SDA. The source of these chemicals is the organic waste buried with LLW and mixed TRU waste in the SDA, primarily from 1966 to 1969 (RWMC RCRA Facility Investigation Work Plan, 1988).

The volatile organic chemicals detected in the groundwater are in the very low ppb range and, to date, no gross contamination has been detected in the groundwater. All concentrations of volatile organic chemicals in RWMC drinking water have been detected below relevant drinking water standards (MCLs), as verified by samples taken at the RWMC production well. High concentrations of volatile organic chemicals have been detected only in a perched water zone (RWMC RCRA Facility Investigation Work Plan, 1988). Volatile organic chemicals have not been detected in regionally downgradient wells within the INEL boundary.

Task 5 of the RFI, Investigation Analysis, will begin when the Facility Investigation is complete and will consist of an analysis and summary of all facility investigations and their results. The objective of this task is to ensure that the investigation data are sufficient in quality and quantity to describe the nature and extent of contamination, potential threat to human health and/or the environment, and to support the Corrective Measures Study.

Task 6, Laboratory and Bench-Scale Studies, are conducted to determine the applicability of a corrective measure technology or technologies to conditions at the site under investigation. Upon completion of the testing, the testing results shall be evaluated to assess the technology or technologies with respect to the site-specific questions.

Task 7 of the RFI requires submittal of progress reports to EPA; these progress reports are currently being made on a monthly basis. Reports on Task 1 and 2 were submitted with the RFI Work Plan and, upon EPA approval, a final report presenting Tasks 4 and 5 shall be prepared.

PHASE II - CORRECTIVE MEASURES STUDY

The objective of the CMS is to develop and evaluate corrective measure alternatives and to recommend the final corrective measure or measures. As part of Phase I, Task 2 of the RFI, a pre-investigation evaluation of corrective measure technologies has begun for the RWMC.

Preliminary risk assessments based on site characterization information, contaminant transport conceptual site models and available monitoring data identified the Snake River Plain aquifer as the primary resource affected and RWMC operational personnel as the initial human health risk receptor (RWMC RCRA Facility Investigation Work Plan, 1988). If, during the conduct of the RFI other data on contaminants, pathways, or receptors are identified, the data will be considered in evaluating other potential receptors, and the need for a CMS. If the preliminary risk assessment is verified by the RFI and a need to perform a CMS is determined to be necessary, the studies will focus on volatile organic contaminants and the protection of the Snake River Plain aquifer and RWMC personnel.

Because the buried waste contains a mixture of radiologic and hazardous waste contaminants, EG&G Idaho, Inc. is currently conducting a comprehensive investigation and evaluation study for recommending a comprehensive action for all potential contaminants present in the buried LLW and mixed TRU waste (organic, inorganic, and radionuclide) at the SDA (RWMC RCRA Facility Investigation Work Plan, 1988). Volatile organics, as well as other contaminants of concern that remain in the mixed waste, will be addressed in the overall alternative evaluations.

PHASE III - CORRECTIVE MEASURES IMPLEMENTATION

If a CMS is completed, and using technical, human health, and environmental criteria, a corrective measure(s) is selected, Phase III of the Corrective Action Program will be implemented. The objective of Corrective Measures Implementation is to design, construct, operate, maintain, and monitor the performance of the corrective measure or measures selected to protect human health and the environment.

NATIONAL PRIORITIES LISTING OF THE INEL

On July 19, 1989, a proposal was made to place the INEL on the National Priorities List (NPL). Following the 60 day period of review and public comment, the INEL was placed on the NPL November 15, 1989 and became subject to the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended.

Section 120 of the CERCLA law requires federal agencies to enter into interagency agreements with EPA to clean up their sites. The general approach taken by EPA for federal facilities has been a three-party agreement which includes the relevant state. This agreement is legally binding and enforceable in federal district court by states and citizens. Preparation of an interagency agreement between the DOE, EPA and the State of Idaho was initiated when the INEL was named to the NPL. One of the subjects of negotiation will be the designation of the regulatory lead for the clean-up studies at the SDA. It is anticipated that the CERCLA-regulated process will be chosen for remediation of the SDA, regardless of regulatory lead, because the CERCLA process addresses both hazardous and radioactive waste remediation.

The RCRA corrective action and the CERCLA cleanup programs are similar in form and content to the studies and investigations that must be performed. In practice, the CERCLA process involves a greater community relations element and a more extensive and more formal evaluation of environmental/public health risks/benefits than the RCRA corrective action process.

SUMMARY

The RCRA Facility Investigation is currently ongoing at the RWMC as scientists work to characterize the site, define the source of contamination, determine the nature and extent of contamination, and identify actual or potential receptors.

If the need for a Corrective Measures Study is identified during the course of the Facility Investigation, it will focus on protection of the Snake River Plain aquifer and RWMC personnel.

The negotiation of an interagency agreement, resulting from the National Priorities Listing of the INEL, will result in designation of the regulatory lead for the SDA (EPA or the State of Idaho). It is anticipated both hazardous and radioactive wastes will be addressed in further facility investigations.

ACKNOWLEDGMENTS

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