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Louis County Council
Pothman-Serot
an, Third District

October 29, 1991

Mr. Stephen McCracken
Project Manager
Weldon Springs Site Remedial Action Project
United States Department of Energy
7295 Highway 94 South
St. Charles, Missouri 63304

Re: Contaminated Water Treatment

Dear Mr. McCracken,

We were very disappointed that our tour of the Weldon Springs Quarry site had to be cancelled due to the severe storm last Wednesday. Because we feel that the treatment and disposal of contaminated water is a critical issue and because we are aware that the proposed treatment plan is to be put into effect in the very near future, we have decided that we must express our concerns to you in writing.

We want to commend you for your efforts to find a solution to the problem of contaminated water at the quarry. We know that your desire is to protect the drinking water of all residents. However, after reading the Department of Energy's five-year plan for Environmental Restoration and Waste Management, published in June 1990, we believe that the Department of Energy's own misgivings about the efficiency and safety of current treatment technologies echo our concerns and those of many citizens of this area.

The following are a few of the questions which we would ask you to address (quoted material and references to the DOE are from the above-referenced report, which we enclose):

1) DO YOU KNOW WHICH CONTAMINANTS ARE IN THE WATER?

Are you aware that the DOE considers traditional methods of characterization of groundwater to be "highly subjective and at times uncertain"? Do you have any evidence of the precision of your testing methods and instruments?

2) CURRENT GROUNDWATER TREATMENT -- IS IT EFFECTIVE?

The DOE considers many of the standard techniques for treating the contaminated groundwater (such as pumping) to be "burdened by uncertainties as to their overall effectiveness"? Have you verified the effectivness of your treatment for the contaminated groundwater surrounding the quarry?

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unty Government Center • 41 South Central Avenue • Clayton, Missouri 63105 • 889-2438; FAX 889-2890

3) CONTAMINATION CAUSED BY BACKWASH

Are you aware that the standard practice of starting and stopping the treatment process can result in contaminated water backwashing into previously uncontaminated areas? Have you analyzed the volume and flow rate of the groundwater to determine the likelihood that this will occur?

4) IS THE WELDON SPRINGS QUARRY A GUINEA PIG?

The DOE has proposed the use of "test beds" for new and untried technologies. Is your site such a test bed? If so, what guarantees do you have of the effectiveness and safety of your technologies?

5) ARE YOU REALLY READY FOR FULL-SCALE IMPLEMENTATION?

The DOE has stated that "future development phases include pilot-scale demonstrations at contaminated sites to illustrate the need to thoroughly evaluate the proposed technology before full-scale implementation". Did you have a pilot-scale demonstration? If so, what were the results?

6) ARE YOU SURE THAT THE WATER RELEASED INTO THE RIVER WILL BE FREE OF CONTAMINANTS?

The DOE has asserted that insufficient emphasis has been placed on monitoring techniques, quality assurance and long-term effectiveness standards? What evidence do you have of the accuracy of the equipment which you plan to use to monitor the level of contamination in the water BEFORE you release it into the Missouri River? Which contaminants will you test for? What about the contaminants for which you have no testing capabilities?

7) IS THERE A PLANT FACILITY BEING BUILT?

Do you plan to build a structure to house and protect your treatment and monitoring equipment? If not, will this result in equipment that can be vandalized and not appropriately monitored?

We would appreciate answers to these questions at your earliest convenience.

Thank you for your attention to this important matter.

Sincerely,

Geri Rothman-Serot
Councilman, 3rd District

Geri

James E. O'Mara
Councilman, 4th District

James E O'Mara

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DOE/S-0078P

# Environmental Restoration and Waste Management

*Five-Year Plan*
*Fiscal Years 1992 - 1996*

June 1990

United States Department of Energy

Washington, DC 20585

## 5.3.3 TECHNOLOGY NEEDS FOR WASTE STORAGE AND DISPOSAL

**Waste storage and disposal need to be carried out using technologies that avoid the requirement for future environmental restoration programs.**

Waste storage and disposal require advanced technologies to ensure continued compliance with evolving DOE Orders and Environmental Protection Agency (EPA) regulations and to ensure protection of the public and the environment without requiring massive environmental restoration.

Storage and disposal technologies fall into three principal areas: (1) improved waste disposal systems, (2) data and tools to predict performance of waste disposal units, and (3) systems for monitoring and conducting surveillance of wastes that are in storage or that have been disposed of.

Improved Waste Disposal Systems: It is recognized that, at many of the DOE disposal sites, geological, hydrological, and ecological conditions do not provide adequate isolation and prevention of radionuclide/chemical migration. The use of engineered structures that consist of natural and man-made barriers has been an area of extensive research and development. The applicability of these barriers, singly or in multiples, must be demonstrated, tested, and evaluated for implementation at specific sites. Long-term performance of barrier materials, especially synthetic materials, is a major uncertainty, and the means for accelerated testing are necessary to enable the durability to be shown with sufficient confidence to obtain regulatory and public approval.

Data and Tools to Predict Performance of Disposal Units: Sufficient experimental data to validate performance assessment models (for accurately predicting the transport of radionuclides from disposal facilities) are not available. Source term data, physical and chemical behaviors of chemical species in soil, effects of engineered barriers, far-field transport of radionuclides, and other pertinent parameters are required for the validation of performance assessments.

Monitoring and Surveillance: Remote monitoring and inspection capabilities for storage and disposal areas are needed. Monitoring technologies need to (1) be less expensive, (2) be less invasive, (3) provide ample evidence that containment of hazardous materials has not been compromised, and (4) indicate problems at a sufficiently early stage so that corrective actions can be relatively easily implemented. Innovative techniques are required for in situ monitoring of low concentrations of radionuclides at new or currently used burial sites, particularly for alpha- and low-energy beta-emitting radionuclides.

Identified storage needs include:

- minimum requirements for the design and operation of low-level waste and transuranic waste storage facilities;
- remote monitoring and inspection capabilities for storage areas to meet

storage requirements (i.e., Resource Conservation and Recovery Act); and
- evaluations to ensure that the integrity of waste containers is compatible with the contained waste for the storage time period.

Identified disposal needs include:
- disposal concepts/technologies for waste requiring long-term isolation;
- improved performance assessment processes and techniques;
- design, development, and demonstration of a mixed-waste disposal facility;
- demonstration of closure of a waste disposal unit (e.g., low-level waste burial ground);
- alternative technology for transuranic waste that is not certifiable for the Waste Isolation Pilot Plant;
- improved monitoring and surveillance of active and inactive waste disposal sites;
- improved stabilization for active and inactive sites; and
- improved waste emplacement technologies.

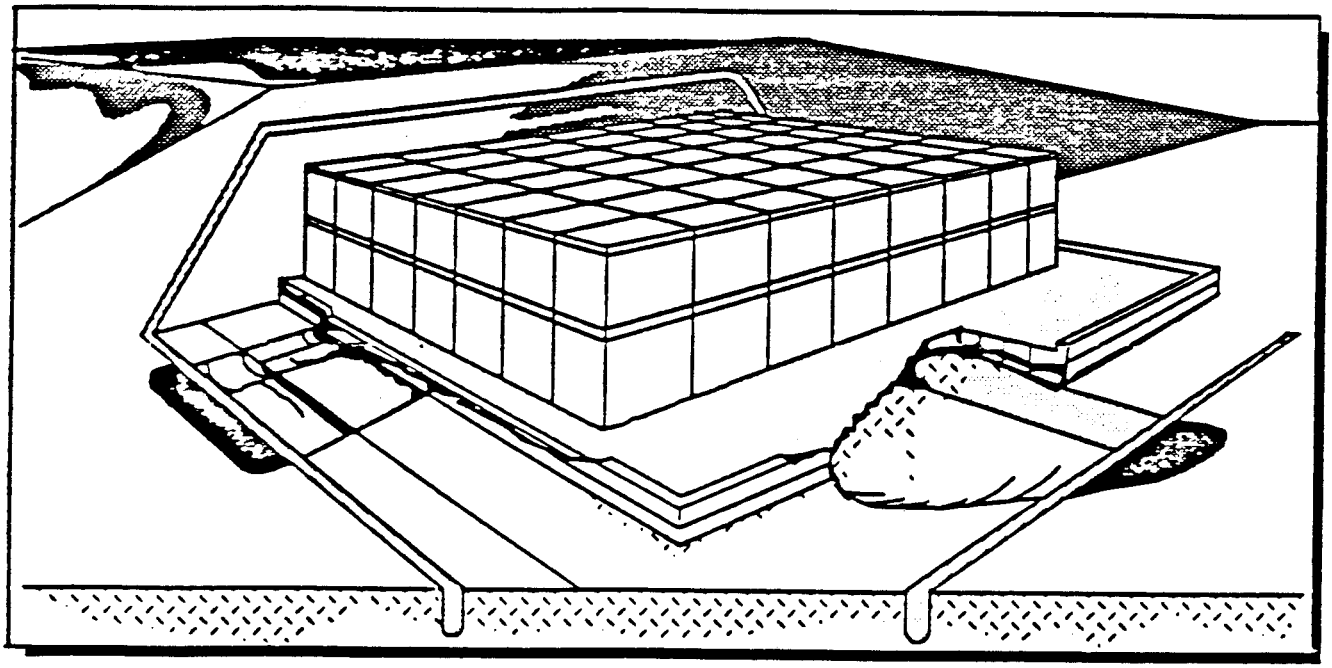

Figure 5.3.3. Tumulus disposal provides for improved long-term isolation and fixation of wastes.

## 5.3.4 TECHNOLOGY NEEDS FOR ENVIRONMENTAL RESTORATION

**If DOE is to meet its 30-year cleanup goal in a cost-effective manner, safer and more efficient technologies for site characterization, soil/groundwater remediation, and facility decontamination and decommissioning (D&D) need to be developed.**

Technologies need to be developed that will (1) constitute a permanent restoration solution, (2) minimize wastes as well as health and safety risks during restoration, and (3) prepare restored sites for subsequent use and development.

Present environmental restoration technologies are inadequate and involve high costs because of (1) the inability to accurately assess or characterize the site health/environmental status and cleanup requirements; (2) the absence of safe, efficient, and cost-effective remediating technologies for the diverse assortment of contaminated sites (soils, underground storage tanks, waste lagoons, equipment, and buildings containing a wide variety and levels of contaminants); and (3) the lack of quantitative cleanup goals for remedial action efforts.

New, quicker, and more effective methods for identifying and characterizing the extent of groundwater and soil contamination are needed. Also needed are faster, less expensive, and less intrusive methods for characterizing subsurface geohydrologic features. Present methods rely almost entirely on coring technologies and the drilling and nonautomated surveillance of coreholes and monitoring wells, which are expensive, labor-intensive, and time-consuming, and which are likely to result in conduits for the migration of contaminants to uncontaminated subsurface regions. Strategies for soil and groundwater sampling should conform to prevailing State and Federal regulations as well as rely upon geostatistical design techniques that take into account the existing knowledge of the site. Practical subsurface environment transport models need to be developed and tested to improve field-scale predictive capabilities. Remote and real-time characterization technologies need to be developed for accurately sampling and evaluating the quantities and types of contaminants (radionuclides, heavy metals, and toxic organic compounds) contained in underground storage tanks and waste lagoons. The combination of improved sensors and robotic capabilities can provide a significantly enhanced and powerful tool. Similar technologies are necessary for determining the types and quantities of waste generated in the D&D of inactive facilities.

Upon implementation, these methods will provide data that need to be managed in a timely and effective manner. Management of the data can be accomplished through a standardized DOE data base management system dedicated to site characterization, remediation efficacy, and D&D and specifically tailored to programmatic needs.

Conventional remediation technologies are often ineffective and involve high costs. For example, excavation, treatment, and redisposal is the most common process for remediating contaminated soils and waste treatment sludges and sediments contained

in underground storage tanks and unlined waste lagoons. Soils needing remediation frequently contain unacceptable levels of radionuclides, heavy metals, and a variety of hazardous organic compounds as well as buried wastes from waste treatment/disposal operations. Robots offer a safe and potentially cheap means of performing hazardous excavation of contaminated material as well as in situ treatment/stabilization.

It is imperative that DOE develop safe, reliable, and cost-effective in situ technologies for remediating contaminated soils and water. Potential in situ technologies include vitrification, bioremediation, and grouting. For contaminated groundwater, when interdiction of the contaminant source is not practical, remediation is generally accomplished by pumping and treatment technologies that are time-consuming, expensive, and burdened with uncertainties as to their overall effectiveness.

A detailed, accurate monitoring program is necessary for thoroughly evaluating the effectiveness of any environmental restoration activity. Monitoring should demonstrate whether site restoration has been successful. The monitoring design should also provide sufficient warning if the restoration activity was not successful, so that adequate time would be available for implementing a corrective action to avoid possible adverse health, safety, and environmental consequences.

The DOE sites themselves are important resources for technology development and may be used as "test beds" for the demonstration and evaluation of new methods.

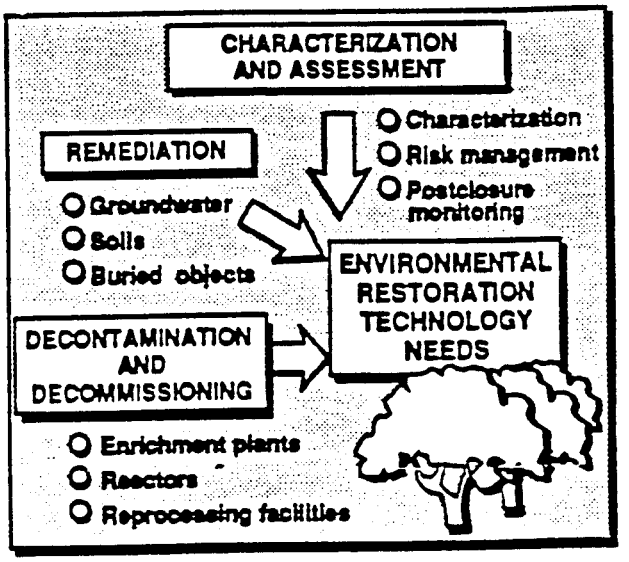


Figure 5.3.4. The needs for environmental restoration technology fall into three categories: (1) characterization and assessment, (2) remediation, and (3) decontamination and decommissioning.

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**Department of Energy**
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
7295 Highway 94 South
St. Charles, Missouri 63304

November 18, 1991

The Honorable Geri Rothman-Serot
The Honorable James E. O'Mara
St. Louis County Council
41 South Central Avenue
Clayton, MO 63105

Dear Council Members:

QUARRY WATER TREATMENT PLANT

Reference: Letter from Geri Rothman-Serot/James E. O'Mara to Stephen McCracken, dated October 29, 1991, subject: Contaminated Water Treatment

We too, regret that your tour of the Weldon Spring Site Remedial Action Project was canceled due to inclement weather. Hopefully, we will be able to reschedule the tour at a later date. We agree with your comment that the treatment and disposal of contaminated water is a critical issue. We have studied this problem extensively and are confident that we can reliably treat and test the quarry water before it is released. Hopefully, our answers to the questions raised in your joint letter of October 29, 1991, will add to your understanding of the water treatment program that will begin soon at the quarry.

1. <u>Do you know which contaminants are in the water?</u>

Your question refers to statements by the DOE in our June 1990 Five-Year Plan regarding the difficulty of characterizing and treating groundwater. Even though the Quarry Water Treatment Plant will, due to inflow, treat a certain amount of groundwater, the purpose of the plant is to dewater the quarry. The quarry water is surface water which has been sampled extensively. Proven methods have been used to reliably and accurately test the water to determine what contaminants are present and at what concentrations.

The water has been tested for the Environmental Protection Agency's (EPA) Hazardous Substance List, nitroaromatic compounds, radionuclides and other potential contaminants. We feel the characterization of the quarry pond water is complete.

The water quality data, which was used to design the quarry water treatment plant, has been verified and validated. As a result of these processes, the accuracy and precision of the data are known.

2. Current groundwater treatment - is it effective?

The contaminants present in groundwater adjacent to the quarry originated from the bulk wastes and are the same as those present in the surface water. After initial quarry pond de-watering, groundwater is expected to flow into the quarry at approximately five gallons per minute. The treatment plant is designed to effectively treat this in-flowing water. The effectiveness of the treatment plant on the quarry pond water has been verified by performance bench-scale testing using actual quarry pond water. Again, the purpose of this plant is not to achieve final treatment of groundwater. This is an issue that will be addressed following removal of wastes from the quarry.

3. Contamination caused by backwash

We are familiar with problems caused by starting and stopping water treatment processes when remediating groundwater. An example of where this can occur includes certain situations where injection and pumping wells are being used to remediate groundwater contamination. However, this is not the situation at quarry because pumping will occur directly from the quarry pond (the source of contamination). The quarry pond will be maintained below its natural level; therefore, when the plant is operating groundwater will flow towards the pond rather than into uncontaminated areas. If treatment operations are interrupted for an extended period, conditions would return to those that existed prior to pond dewatering. We cannot foresee a worse condition than currently exists.

For conservatism, however we will increase the monitoring frequency for groundwater near the quarry to detect changes in contaminant distributions and/or concentrations.

4. Is the Weldon Spring Quarry a guinea pig?

Not at all. The water treatment plant is a process that has been proven effective in many situations as well as in bench tests using quarry water. Furthermore, as part of the design for the water treatment plant for the chemical plant site, quarry pond water was again successfully bench-scale treated by a different contractor using the same processes that the quarry water treatment plant will employ.

In any case, we will hold the treated water in lined ponds until we are certain it meets the requirements of our National Pollutant Discharge Elimination System (NPDES) permit. (Reference #6 below for related information).

5. Are you ready for full-scale implementation?

Thorough bench-scale tests were conducted to confirm process capabilities and to develop process parameters. The process equipment being utilized in the quarry water treatment plant has been used extensively around the world for many years and the design parameters have been well documented. Therefore, it was concluded that the benefits to be derived from pilot-scale testing would be minimal. Often times pilot scale testing is used to optimize the design in order to minimize equipment cost. In our case, however, it was decided to design the equipment to handle "worst case" conditions. All of these considerations have allowed us to proceed with design and construction of full-scale equipment with a very high level of confidence. Further, given the batch discharge aspect of the design, if, in the unlikely event that the system did not work either initially or due to equipment failure, improperly treated water will not be discharged to the river.

6. Are you sure that the water released into the river will be free of contaminants?

We are confident that the water released into the river will comply with the effluent limitations in the NPDES permit set by the State. Standard and accepted analytical methods exist to detect the contaminants present in the quarry water. These standard methods produce results of documentable precision and accuracy. We will sample and analyze the treated water to satisfy the requirements of the effluent limits and informational monitoring as specified by the NPDES permit. The quarry pond water has been analyzed for the EPA's Hazardous Substance List, nitroaromatic and inorganic compounds, and radionuclides. This list of parameters includes the compounds known, suspected, or potentially present in the quarry, as well as compounds considered by the EPA to be a known or potential threats to human health or the environment. All tests were performed using standard analytical methods.

7. Is there a plant facility being built?

A full, heated and lighted building enclosure is being built to house the system. This will include a segregated

maintenance and laboratory area for the operators who will be present at all times during system operation.

The building enclosure, as well as the equalization basin and effluent ponds, are located in a lighted and fenced area that is patrolled by a guard around the clock.

We appreciate your interest in what we are doing at the Weldon Spring site and repeat our hope that both of you will be able to schedule a "rain check" visit soon.

Sincerely,

Stephen H. McCracken
Project Manager
Weldon Spring Site
Remedial Action Project