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Department of Energy
Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
Route 2, Highway 94 South
St. Charles, Missouri 63303

M-K FERGUSON CO.
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WSSRAP CONTRACT 3589

November 9, 1987

Ms. Katherine Biggs
United States Environmental
Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Ms. Biggs:

INTERIM RESPONSE ACTIONS (IRA'S)

Enclosed are six (6) copies of the documentation for the construction of the Ash Pond Dike, including copies of the relevant portions of the technical specifications and drawings from the proposed bid packages.

It is our intention to have copies of these documents in place in the repositories for public inspection, and to provide public notice of their availability on November 10, 1987. This will initiate the twenty one (21) day comment period.

If you have any questions, please give me a call.

Sincerely,

R. R. Nelson

R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc: D. Bedan, MDNR (6 copies)

FILE NUMBER: 32-200-201-1.01

CONSTRUCTION OF ASH POND ISOLATION DIKE

Site Background

The Weldon Spring site is located in St. Charles County, Missouri, about 48 km (30 mi) west of St. Louis. From 1941 to 1944, the U.S. Department of the Army operated the Weldon Spring Ordnance Works at the site for production of trinitrotoluene and dinitrotoluene. In the mid 1950s, a portion of the property was transferred to the U.S. Atomic Energy Commission (AEC), a predecessor of the U.S. Department of Energy (DOE).

From 1957 to 1966, the AEC operated a uranium processing facility at the Weldon Spring site. Impure uranium ore concentrates and some scrap uranium metals were processed at the chemical plant, and thorium-containing materials were also processed on an intermittent basis. Following closure by the AEC, the Army reacquired the chemical plant in 1967 and began converting the facilities to produce herbicides. The buildings were partially decontaminated and some equipment was dismantled. In 1969, prior to becoming operational, the herbicide project was canceled. Since that time, the plant has remained essentially unused and in caretaker status. The Army returned a portion of the Ordnance Works property to the AEC in 1971 but retained control of the chemical plant buildings. In 1984, the Army repaired several of these buildings; decontaminated some of the floors, walls, and ceilings; and removed some contaminated equipment to areas outside of the buildings. In 1985, custody of the chemical plant property was transferred to DOE.

Ash Pond is located in the far northwest section of the Weldon Spring site and has the lowest surface elevation on the site (Fig. 1). Water in Ash Pond is recharged by intermittent surface runoff and overflow from the St. Charles County water tower, which is located on the Weldon Spring site (U.S. Department of the Army 1976). The watershed of Ash Pond includes the area around raffinate pits 1 and 2 as well as the western quarter (about 25 ha [62 acres]) of the chemical plant area. Discharge from Ash Pond flows northward to Lake 35, an impoundment on Schote Creek in the Busch Wildlife Area (U.S. Department of Energy 1987a). There is a hydraulic connection between the Ash Pond outflow and Burgermeister Spring, which is also located in the Busch Wildlife Area. Routine environmental monitoring of intermittent surface runoff resulting from precipitation events has identified substantial levels of uranium contamination in the runoff from Ash Pond.

Site Characterization

A preliminary radiological survey of the Weldon Spring site was performed in 1975. Analysis of water samples from Ash Pond indicated that the concentrations of radium, thorium, and uranium were less than their maximum permissible concentrations as specified in 10 CFR Part 20 (Jacobson 1976). (At the time of the survey, 10 CFR Part 20 was the appropriate regulation because control of the site was under cognizance of the U.S. Department of the Army.) Recent radiological sampling identified uranium

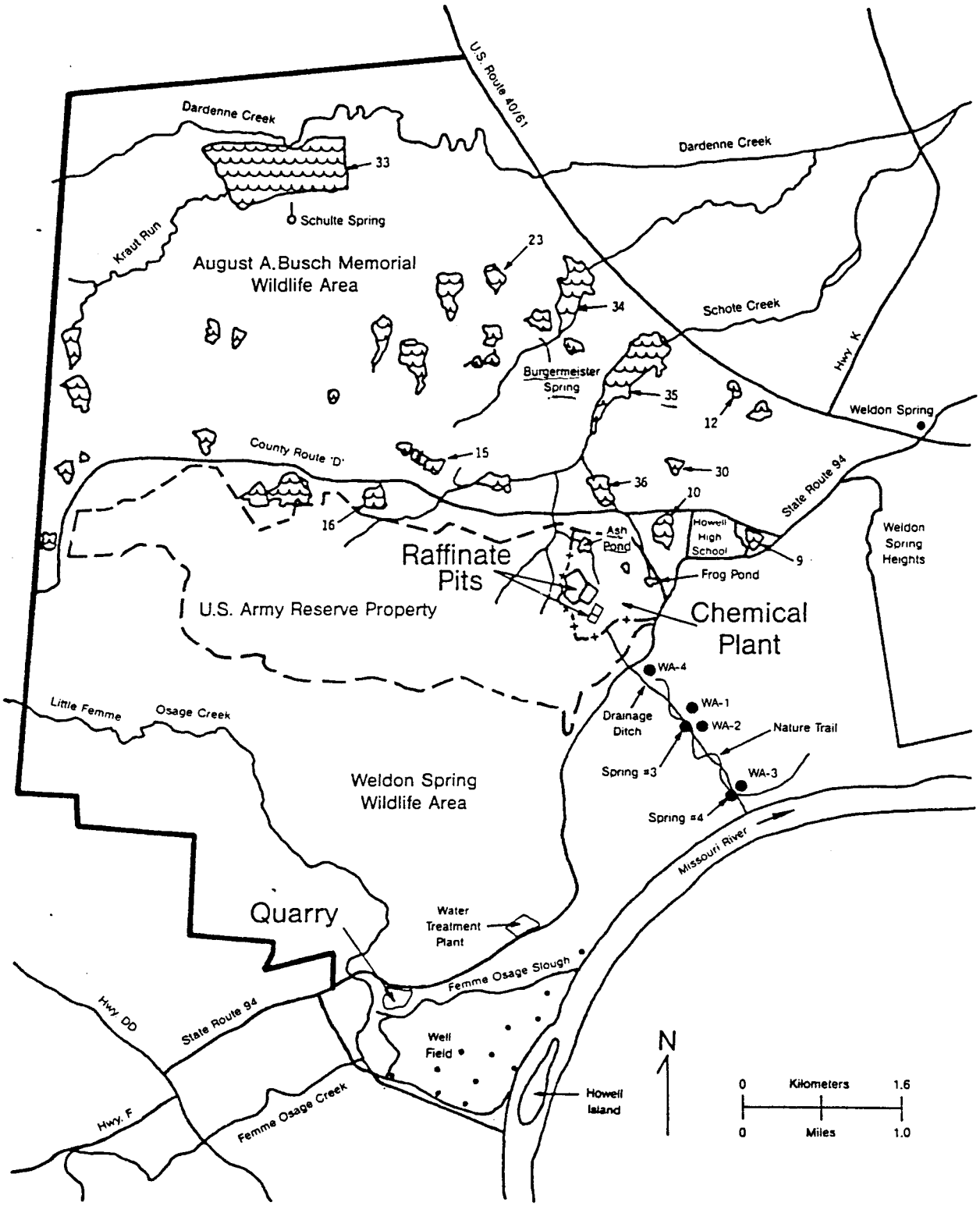

FIGURE 1 Map of the Weldon Spring Site and Vicinity (Source: Modified from U.S. Department of Energy 1987a)

concentrations as high as 4,000 pCi/L in surface runoff from Ash Pond and lower uranium levels of up to 400 pCi/L in surface waters upstream from Ash Pond (MK-Ferguson and Jacobs 1987).

A 1987 sampling of soils adjacent to Ash Pond identified the predominant radionuclides as radium and thorium. Contamination of soils in the Ash Pond area likely derives from previous processing activities at the site, radionuclide migration from a dump located adjacent to Ash Pond, and past discharges to the pond of decant liquids from the area between raffinate pits 1 and 3 (MK-Ferguson and Jacobs 1987). Background levels of radium-226, thorium-232, and uranium-238 — which were determined by sampling off-site locations — averaged 1.0, 0.8, and <1.9 (detection limit) pCi/g, respectively.

A more extensive sampling of surface and subsurface soils was performed in areas adjacent to Ash Pond that were identified as potential borrow areas for the proposed dike construction project (Fig. 2). Radionuclide concentrations in these soil samples ranged from 0.3 to 2.9 pCi/g thorium and from 0.3 to 7.2 pCi/g uranium. All thorium measurements are below applicable DOE guidelines for unrestricted release (U.S. Department of Energy 1987b), and the uranium concentrations are below preliminary values specified for release for unrestricted use. Chemical analyses of area soil samples identified background concentrations of metals and nitroaromatics and only slightly elevated nitrate and sulfate concentrations. Although no known chemical hazards currently exist in the area, additional confirmatory soil sampling is planned.

Threat to Public Health and the Environment

A health and environmental hazard exists at the site due to high levels of uranium contamination in the surface waters of Ash Pond. The contamination poses a similar hazard off-site because at least a portion of the outflow from Ash Pond, which enters the subsurface just west of the site boundary, surfaces again at Burgermeister Spring in the Busch Wildlife Area. Lake 35 in the wildlife area also receives water from Ash Pond (MK-Ferguson and Jacobs 1987). Contamination of Lake 35 and Burgermeister Spring poses a potential health hazard to area personnel, the general public, and resident wildlife.

Response Objectives

The objectives of this response action are as follows:

1. Reduction of the potential on-site health hazard due to radiation exposure associated with uranium contamination of surface water in Ash Pond;

2. Reduction of the potential off-site health hazard due to radiation exposure associated with uranium contamination of receiving waters in the Busch Wildlife Area;

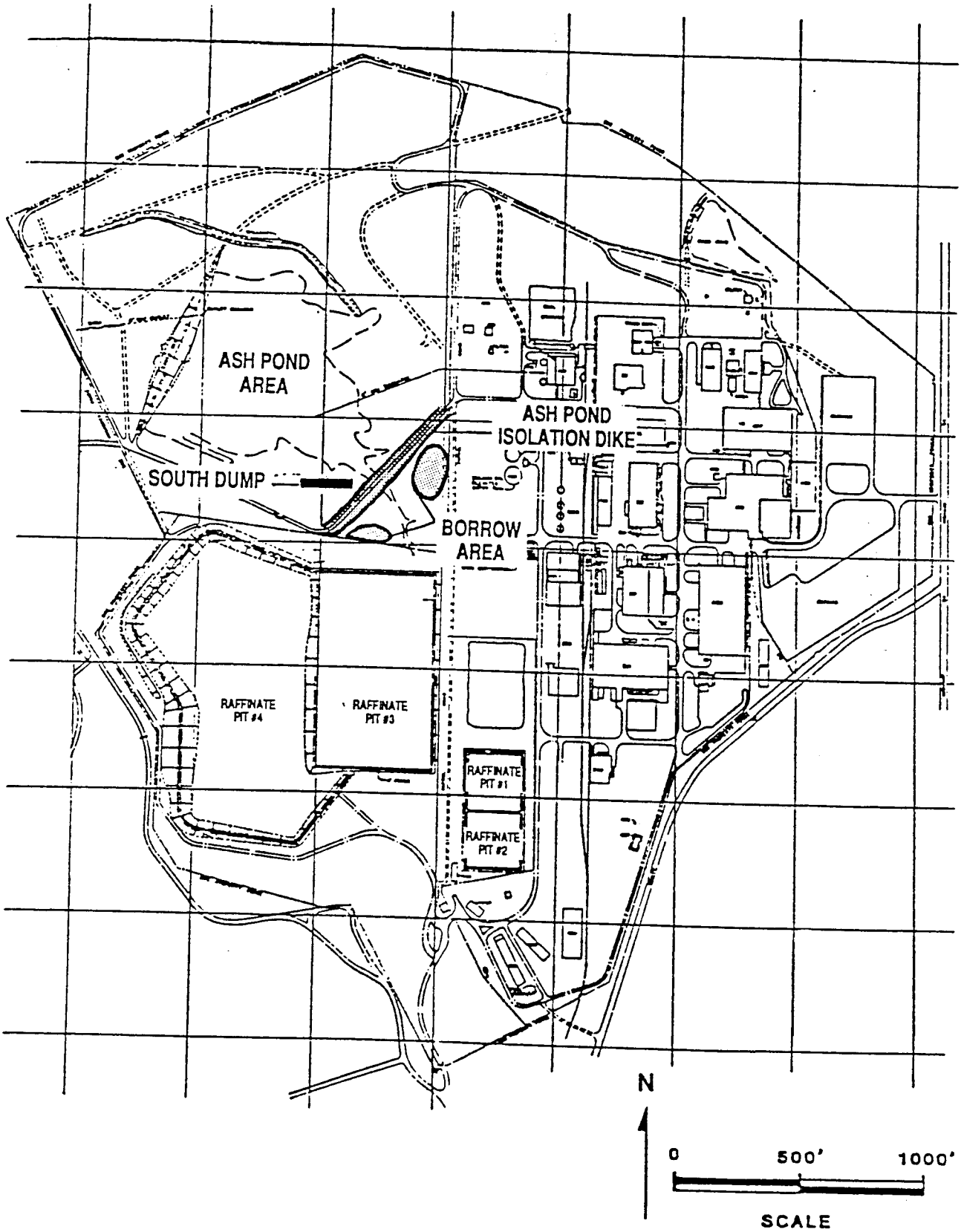

FIGURE 2 Location of Proposed Dike and Borrow Areas (Source: Modified from MK-Ferguson and Jacobs 1987)

3. Reduction of the potential for erosion and related resuspension and transport of the contaminated soils in Ash Pond;

4. Reduction of the surface water infiltration rate through contaminated soils in Ash Pond; and

5. Improvement in the quality of water being discharged from the site at Ash Pond.

Proposed Response Action Alternatives

Interim response actions are designed to ensure the health and safety of on-site personnel and to minimize or preclude off-site releases of contamination. These actions are limited to those that can be performed under the Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act and remain within the constraints of the Council on Environmental Quality's regulations for the National Environmental Policy Act (i.e., actions will be limited to those that do not have an adverse environmental impact nor limit the choice of reasonable alternatives).

Alternative response actions identified for reducing radiological contamination of surface runoff from Ash Pond are:

1. No action;

2. Excavation of contaminated soils in the Ash Pond location that are responsible for radiological contamination of surface flow through the area, with on-site storage of all material that exceeds the radiological criteria for unrestricted release (and on-site interim storage of any material that exceeds limits for chemical contamination, prior to its eventual transport off-site to a licensed treatment/disposal facility);

3. Construction of a dike at the site boundary downstream of the Ash Pond area to provide a retention basin for the contaminated water until its subsequent decontamination at an on-site water treatment plant; and

4. Construction of an isolation dike upstream of Ash Pond to prevent contact of the surface runoff with contaminated soils in the Ash Pond area, construction of diversion channels to route the water away from these contaminated locations for subsequent discharge at its current point, and concurrent or subsequent excavation of the contaminated soils with on-site storage of all material that exceeds the radiological criteria for unrestricted release (and on-site interim storage of any material that exceeds limits for chemical contamination prior to its transport off-site to a licensed treatment/disposal facility).

Analysis of Alternatives

Alternative 1 affords no reduction in the potential health threat posed by uranium contamination of surface runoff from Ash Pond. There would be no improvement in on-site or off-site environmental conditions if no action were taken. Although this alternative presents no technical barriers and costs nothing in the short term, Alternative 1 is effectively precluded by institutional factors related to the community's demand for timely response actions at the Weldon Spring site — in particular, a reduction in the release of contaminants off-site.

Alternatives 2 through 4 are technically feasible and would reduce the potential hazards associated with uranium contamination of surface runoff. Alternative 2 would be less expensive than Alternative 3 or 4 because it would not include costs associated with dike and channel construction. However, the location and extent of radiological contamination in the Ash Pond area has not yet been determined. Characterization of this area would have to be performed prior to the initiation of any excavation effort. Therefore, Alternative 2 would not satisfy institutional factors related to the community's strong desire for expedited response with regard to minimizing off-site releases of radiologically contaminated water.

Excavation of radioactive soils in the Ash Pond area following construction of the isolation dike would be less feasible for Alternative 3 than Alternative 4 because the retention pond would cover these soils, at least intermittently. Delayed decontamination of the soil (and potential resuspension and/or leaching of uranium) would prevent Alternative 3 from being fully responsive to institutional issues related to the need for timely cleanup action at the site. Costs associated with deferred excavation, and with the subsequent decontamination of stored water in a water treatment plant, would cause Alternative 3 to be more expensive than Alternative 4. In addition, factors related to the desire for minimizing the potential for off-site contaminant releases would not be completely addressed by Alternative 3. Ponding of water above areas of contaminated soil would increase the likelihood of infiltration through these areas and the resultant transport of radionuclides into the groundwater. In comparison, Alternative 4 would involve diversion of surface runoff away from contaminated areas and would effectively reduce the hydraulic head at Ash Pond, thereby reducing the potential for contaminant transport into groundwater. Finally, Alternative 3 is precluded by institutional factors related to construction of the treatment plant, i.e., approval for its construction has not yet been granted by the appropriate federal, state, or local agencies, and it could be a long time before the plant is built. In addition, because the allowable levels of radioactive and chemical contaminants in the treated water have not yet been determined, it is not possible to estimate the date by which a water treatment plant would be operational.

Therefore, following the screening and analysis process for interim response action alternatives, Alternative 4 has been identified as the preferred alternative.

Description of Proposed Action

The proposed interim response action involves restriction of flow across Ash Pond by construction of an upstream dike and diversion channels. The response action will include the following operations:

1. Completion of the radiological and chemical characterization of the isolation dike area (radiological and chemical characterization of the remainder of the site will be performed at a later date following completion of the Soils Investigation Work Plan);

2. Construction of an isolation dike upstream of Ash Pond — measuring approximately 230 m (750 ft) in length and 3 m (10 ft) at its maximum height, containing about 5,400 m^3 (7,000 yd^3) of soil material, and creating a retention pond covering approximately 2.4 ha (6 acres);

3. Construction of diversion channels totaling approximately 610 m (2,500 ft) in length and measuring about 1 m (3 ft) in depth, which would circumvent Ash Pond and connect the dike to the current point of surface water discharge; and

4. Emplacement of a discharge monitoring station for intermittent measurement of water quality and continuous measurement of the quantity of surface water discharged from the Ash Pond area.

Under the proposed action, the dike and diversion channels will be constructed in full compliance with all applicable regulations and procedures. This compliance will ensure protection of the safety and health of on-site workers as well as limit off-site releases of contaminants. The proposed action would result in a decrease in the uranium concentration in discharged water from about 4,000 pCi/L to 400 pCi/L. The DOE uranium limit for water released off-site is 600 pCi/L. Hence, this action would reduce the uranium concentration in the water to levels below those allowed by DOE regulations. (The applicable limits to be used for the water treatment plant have not yet been determined.)

The dike and channels will be constructed of soil taken from adjacent borrow areas (Fig. 2), following final verification that the soil is neither chemically nor radiologically contaminated. (Characterization efforts to date have identified negligible contamination of this soil.) If the results of the surface water monitoring indicate unacceptable levels of contamination at the point of discharge, the water could be pumped to a raffinate pit in lieu of being released off-site.

This interim response action is being taken to reduce the concentration of uranium in water leaving the site. The contaminated areas responsible for this contamination will be remediated in the future. All material that exceeds the radiological criteria for unrestricted use will be transported to a dry, concrete-floored building currently located at the Weldon Spring site or to an on-site material staging area

that may be constructed in the future. Material that exceeds the appropriate chemical contamination limits (to be developed), but is not radiologically contaminated, will be consolidated at an interim staging area on-site prior to its eventual transport off-site to a licensed treatment/disposal facility.

Implementation of the proposed response action at this time will minimize the potential adverse impacts on health and the environment resulting from continued runoff of highly contaminated surface water from the Ash Pond area.

References

Jacobson, J.R., 1976, *Preliminary Radiological Survey of the Weldon Spring Chemical Plant*, Memorandum Report No. 2610, prepared for the U.S.A. Ballistic Research Laboratories, Aberdeen Proving Ground, Md. (April).

MK-Ferguson Company and Jacobs Engineering Group, Inc., 1987, *Characterization Report for the Ash Pond Isolation Dike Interim Response Action*, prepared for U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tenn. (Sept.).

U.S. Department of the Army, 1976, *Assessment of Weldon Spring Chemical Plant in St. Charles County, Missouri*, Office of the Department of the Army Project Manager for Chemical Demilitarization and Installation Restoration, Aberdeen Proving Ground, Md. (March).

U.S. Department of Energy, 1987a, *Draft Environmental Impact Statement, Remedial Action at the Weldon Spring Site*, Office of Remedial Action and Waste Technology, Washington, D.C. (Feb.).

U.S. Department of Energy, 1987b, *U.S. Department of Energy Guidelines for Residual Radioactive Material at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites* (Revision 2, March).