US Army Corps of Engineers®

FUSRAP

Preliminary Assessment

SHALLOW LAND DISPOSAL AREA, PARKS TOWNSHIP, ARMSTRONG COUNTY, PENNSYLVANIA

Prepared by:

U.S. Army Corps of Engineers
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Abbreviations, Acronyms, and Symbols

AEC	Atomic Energy Commission
Am	Americium
ARCO	Atlantic Richfield Company
BWXT	BWX Technologies
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	Environmental Protection Agency
FUSRAP	Formerly Utilized Sites Remedial Action Program
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NRC	Nuclear Regulatory Commission
NUMEC	Nuclear Materials and Equipment Corporation
ORAU	Oak Ridge Associated Universities
pCi/g	Picocuries per gram
pCi/L	Picocuries per liter
Pu	Plutonium
RESRAD	Argonne National Laboratory's residual radioactivity computer code
SLDA	Shallow Land Disposal Area
U	Uranium
USACE	United States Army Corps of Engineers
µR/h	microRoentgen per hour

1.0 INTRODUCTION

A Preliminary Assessment was performed, by the United States Army Corps of Engineers (USACE), of the Parks Township Shallow Land Disposal Area (SLDA) following the process outlined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Contingency Plan (NCP). The purpose of this assessment was to review information to determine the need for further action by USACE, under the Formerly Utilized Sites Remedial Action Program (FUSRAP), to ensure the protection of human health and the environment. The scope of the assessment included a review of existing information about the site and a site visit on 5 April 2001.

Uranium contaminated wastes were disposed at the SLDA by the Nuclear Materials and Equipment Company (NUMEC), between 1961 and 1970. The Disposal of that waste was done in accordance with the U.S. Atomic Energy Commission (AEC) regulation in effect at the time, 10 CFR 20.304. Contaminated waste originated from the nearby Apollo nuclear fuel fabrication facility, which began operations under NUMEC in the late 1950's and converted enriched uranium to naval reactor fuel. In 1967, the Atlantic Richfield Company (ARCO) bought the stock of NUMEC. In 1970, NUMEC discontinued use of the SLDA for radioactive waste disposal. In 1971, ARCO transferred ownership of the site to Babcock & Wilcox, which later changed its name to BWX Technologies (BWXT). BWXT is the current licensee for the site and is responsible for compliance with the terms and conditions of the Nuclear Regulatory Commission (NRC) License SNM-2001 (Attachment A).

In 1974, FUSRAP was created by the Department of Energy (DOE) to address sites used during the early atomic energy program that had residual contamination exceeding current regulatory limits. In the Energy and Water Development Appropriations Act, 1998, (Title I, Public Law 105-62, 111 Stat. 1320, 1326) Congress transferred the responsibility for the administration and execution of cleanup at eligible FUSRAP sites to USACE. In the Energy and Water Development Appropriations Act, 2000 (Title VI, Public Law 106-60, 113 Stat. 483, 502), Congress indicated that any response action taken under the FUSRAP program by the Secretary of the Army, Acting through the Chief of Engineers, shall be subject to CERCLA and the NCP.

In March of 1999, USACE and DOE signed a Memorandum of Understanding (MOU) between the agencies for the purpose of delineating the administration and execution of responsibilities of each party for the FUSRAP. Pursuant to that MOU, when a new site is considered for inclusion in the FUSRAP, DOE is responsible for performing historical research to determine if the site was used for activities which supported the Nation's early atomic energy program. If DOE concludes that the site was used for that purpose, the agency will provide USACE with that determination. USACE is then responsible for preparing a Preliminary Assessment (PA) in accordance with CERCLA and the NCP to determine if a response action is appropriate.

The purpose of a PA at FUSRAP sites and potential FUSRAP sites is to determine if there is an unpermitted release or threat of release, as those terms are defined in Section 101(22) of CERCLA, of an AEC-related hazardous substance at the site that may present an imminent and substantial danger to the public health or the environment. If a PA determines that there is a release or there is a threat of release, other than one that is federally permitted or addressed by a legally enforceable license, permit, regulation or order issued pursuant to the Atomic Energy Act of 1954 or other Federal statute, and it may present an imminent and substantial danger to the public health or the environment, CERCLA authorizes a response action. If such circumstances are found, the PA will recommend appropriate action to address the release or threat of release. If no such release or threat of release is found, the PA will recommend no further action.

On May 25, 2000, after performing historical research regarding the SLDA, the DOE provided USACE with a determination that the site contains wastes resulting from activities which supported the Nation's early atomic energy program (Attachment B). Subsequent to that determination, the Senate Committee on Appropriations recommended in S.R. 106-395, which accompanied P.L. 105-62, The Energy and Water Development Appropriations Act, 2001, that up to $5,000,000 of money appropriated for FUSRAP in 2001 be used to determine the appropriate response action under CERCLA to address FUSRAP related contamination at SLDA and to initiate remedial actions as appropriate. In H.R. 106-988, the House of Representatives Committee of Conference concurred with the language in S.R. 106-395.

In November 2000, as a result of DOE's determination and Congress' direction, USACE included the SLDA in the FUSRAP and referred the site to the Great Lakes and Ohio Rivers Division for action. This PA is being is performed in response to that direction.

In July of 2001, the USACE and the NRC signed a Memorandum of Understanding (MOU) between the agencies to minimize dual regulation and duplication of regulatory requirements at FUSRAP sites with NRC-licensed facilities, such as the SLDA. The MOU applies to USACE response actions which meet the decommissioning requirements of 10 C.F.R. Section 20.1402, "Radiological Criteria for Unrestricted Use." Any future USA CE activities at the SLDA will be consistent with the MOU.

2.0 SITE DESCRIPTION, OPERATIONAL HISTORY AND WASTE CHARACTERISTICS

2.1 Location

The SLDA is a 40-acre site in Armstrong County, Pennsylvania, about 23 miles east-northeast of Pittsburgh, Pennsylvania (Figure C-1). The site includes ten trenches containing an estimated 23,500 cubic yards of potentially contaminated waste and soil (Figure C-2).

The site area has a humid, continental-type climate, with average temperatures ranging from 23 °F to 84 °F. Average annual precipitation is 36 inches, about one-fourth of which occurs as snow. The highest recorded wind at the site is 50 mph. In the past 60 years, four droughts have occurred in the area following subnormal precipitation over a period of several years. Prevailing winds in the area are from the west-southwest and average from about 7 miles per hour in August to 11 miles per hour in March (NRC, 1997).

The topography of the area is characterized by rounded hills and steep-sided valleys drained by meandering rivers. Surface-water drainage from the site consists of two intermittent streams that flow into the Kiskiminetas River. The Kiskiminetas River bounds the northwest edge of the SLDA and flows into the Allegheny River about eight miles fromthe site (Figure C-3).

2.2 Site Description

The SLDA consists of ten trenches spread over an approximately 40-acre area (Figure C-2). The total trench surface-area is approximately 1.2 acres. The area is mowed three times per year and can be described as a grass-covered field. The site is fenced and posted. The trenches are separated into two general areas; one area containing trenches 1 through 9 and a second area containing trench 10. The land slopes downward from the southeast (trenches 1 through 9) toward the northwest (trench 10), describing a change in elevation of approximately 115 feet over a distance of approximately 1000 feet.

Land use surrounding the SLDA site is mixed, consisting of medium-sized residential communities and individual rural residences, small farms with croplands and pastures, idle farmland, forest lands, and light industrial areas. The closest community is Kiskimere, which is adjacent to and to the south of the SLDA. Some residences within this community are located within several hundred feet of the

SLDA. These residences are upwind and not directly downgradient of the site with respect to groundwater and surface water flow. A restaurant and a small industrial complex are located north and within a mile of the site (Figure C-3). Three natural gas pipelines traverse the area; two are owned by Apollo Natural Gas Company and one is owned by People's Natural Gas Company. Recreational resources in Armstrong County, especially for aquatic recreation, are extensive and well used by both visitors and residents (NRC, 1997). Boating on the Allegheny River is supported by several launch sites and marinas. The Kiskiminetas River downstream of the SLDA is canoeable throughout the Summer and Fall and the Roaring Run Watershed, a wildlife preserve south of the SLDA, is used for hiking, wildlife viewing, and picnicking (NRC, 1997).

The former Parks Fuel Fabrication Facility, also owned by BWXT, joins the SLDA property to the north (Figure C-3). This facility and the SLDA were included under the same NRC license until 1995, when the license was divided and each area became licensed individually and separately. The Parks Facility consisted of three buildings, A, B, and C, all of which have been dismantled. An overview of each building's function is provided below (personal communication with Rich Bartosik, Site Licensing Manager).

Building A: Plutonium Fuel Production and Research; Plutonium Scrap Recovery; Alpha, Beta, Neutron Source Manufacturing; Hot Cell Gamma Source Manufacturing; Nuclear Component Repair and Refurbishment
Building B: Hafnium and Zirconium Crystal Bar Manufacturing; Depleted Uranium Processing; Plutonium-238 Source Manufacturing; Machine Shop; Laboratory
Building C: High Enriched Uranium manufacturing for US Navy (Type II).

Decommissioning of the Parks Facility is ongoing under NRC oversight and expected to be completed in 2001.

2.3 Operational History and Waste Characteristics

Uranium- and thorium-contaminated wastes consisting of process wastes, equipment, scrap, and trash from the nearby Apollo nuclear fuel fabrication facility were disposed of in the SLDA between 1961 and 1970. The uranium in the trenches is present at various levels of enrichment, from depleted to highly enriched. Activity percentages indicate levels of enrichment from less than 0.2% U-235 to greater than 45% U-235, by weight. Americium (Am-241) and plutonium (Pu-239/240/242), whose presence is attributed to the storage of equipment used in Parks Facility, have been detected in soils in the trench 10 area. The disposals were conducted according to U. S. Atomic Energy Commission (AEC) regulations, 10 CFR 20.304, by the Nuclear Materials and Equipment Company (NUMEC) which began fabricating nuclear fuel at the Apollo facility in 1957. The Apollo Facility processed uranium and, to a lesser extent, thorium. Processing operations included the conversion of uranium hexafluoride (UF_6) to uranium dioxide (UO_2) by the ammonium diuranate process and subsequent metallurgical and ceramic processes to produce uranium products and fuel components. Typical products included uranium (U) metal, UO_2, UC, UC_2, ThO_2, ThO_2-UO_2, and UC-ThC produced as sintered pellets, powder, and other particulate forms. Process wastes, including off-specification products and incinerated HEPA filters and rags, were recycled in a nitric acid solvent extraction scrap recovery process to recover usable uranium. The Apollo plant processed uranium at a capacity of 350 to 450 metric tons per year (ARCO, 1995).

The waste types consisted of process wastes (slag, crucibles, spent solvent, unrecoverable sludges, organic liquids, debris, etc.), laboratory wastes (sample vials, reagent vials, etc.), old or broken equipment, building materials, protective clothing, general maintenance materials (paint, oil, pipe, used lubricants, solvents (trichloroethene, methylene chloride), etc.), and trash (shipping containers, paper, wipes, etc.). Some of the wastes were in cardboard and metal drums, some were bagged, and some, particularly pieces

of equipment and building materials, were placed in trenches with no special packaging or containers. The estimated waste volume in the trenches is 23,500 cubic yards (ARCO, 1995).

Trenches were dug in order of their numbering between 1961 and 1970 and reportedly capped with four feet of soil upon completion of use (ARCO, 1995). Approximate dimensions of each trench are shown in Figure C-2. Estimated average waste thickness' in trenches 1 – 9 range from 8.5 feet to 15.8 feet. The estimated thickness of the waste in trench 10 is 18.1 feet. In 1967, the Atlantic Richfield Company (ARCO) bought the stock of NUMEC. In 1970, NUMEC discontinued use of the SLDA for radioactive waste disposal. In 1971, ARCO transferred ownership of the site to BWX Technologies, the current owner of the Apollo Facility and the SLDA. A draft environmental impact statement for the decommissioning of the SLDA has been prepared by the Nuclear Regulatory Commission (NRC), the agency under which the site is currently licensed. The draft environmental impact statement was withdrawn by the NRC in 1997 due to procedural problems (personal communication with Rich Bartosik, Site Licensing Manager). The NRC license was originally issued to Babcock & Wilcox (currently BWXT) for the Parks Operating Facility, which included the SLDA and the Parks Fuel Fabrication Facility. BWXT was issued a separate NRC license for the SLDA site in 1995 (current License Number SNM-2001, Docket number 070-3085) (Attachment A).

The NRC license requires BWXT to properly maintain the site in order to insure the protection of workers and members of the public while the site is under an active license. In addition, BWXT is required to decommission the site in compliance with the AEA and NRC regulations as part of its license termination activities and is fully capable of complying with those requirements.

3.0 SOIL EXPOSURE AND AIR PATHWAYS

3.1 Physical Conditions

The SLDA trench area is mowed three times per year by BWXT and can be described as an open, grass-covered field. However, the overall SLDA site presents some variety in vegetation and wildlife habitat. The site is fenced and posted. Surface soils in the upper trench area within the SLDA belong to the Rainsboro silt-loam series which is classified as deep and moderately well drained silt loams with moderately low permeability. The infiltration rate in the upper trench area is 3.8×10^{-7} cm/s. Once these soils are disturbed, they have a moderate erosion hazard. Rainsboro soils range in slope from less than 3 to 8 percent. The northwest area was strip-mined and back-filled with mine spoil, which has a high erosion hazard. Hydraulic conductivity values in the unconsolidated mine spoils range from 9.5×10^{-2} cm/s to 2.0×10^{-3} cm/s. Trench 10 was excavated in this mine spoil and is presently covered with vegetation.

3.2 Soil and Air Pathways and Gamma Radiation

Potential air pathway receptors for releases from the SLDA include residents of a trailer park approximately one half mile northeast of the site, employees at the small industrial complex and recreational users of the Kiskiminetas river. Potential soil pathway receptors are minimal and include employees who mow the site three times per year.

During the period May 1981 to March 1982, a survey of the SLDA site was conducted by the Radiological Assessment Team of Oak Ridge Associated Universities. Soil, water, and vegetation samples were analyzed for U-235, U-238, Th-232, Ra-226, Cs-137, and Co-60 by gamma spectroscopy. An extensive, four-phase investigation was also performed between 1989 and 1993 in support of a Site Characterization Report (ARCO, 1995). There is also regular groundwater and air monitoring for gross alpha and gross beta levels at the site.

Average direct gamma radiation levels in the upper and lower trenches at the surface and 3 feet above the surface were 11 µR/h, within the range of natural background radioactivity for the region. However, isolated areas of higher surface contact radiation levels were found. In the upper trench area, values ranged up to 1,300 µR/h, while in the lower trench area, exposure levels were up to 670 µR/h (ARCO, 1995).

The background level calculated by ARCO for total uranium was 8.98 pCi/g. This concentration was based on the mean value of 16 samples (12 off-site and 4 on-site). Total uranium background concentrations from these samples ranged from 1.6 pCi/g to 11.7 pCi/g. Concentrations of total uranium in eleven surface soil samples from the upper trenches area (trenches 1 – 9) were above the background level and ranged from 14.3pCi/g to 53.2 pCi/g. Surface soil samples were composited over a 2-foot split-spoon sample interval. Recent walkover surveys, conducted as part of an NRC confirmatory surveys (September, 2000) revealed the presence of radiological contamination immediately outside the southern boundary of the site (personal communication with Rich Bartosik, Site Licensing Manager). Results from this confirmatory survey will be published in the NRC Region 1 Inspection Report. As part of a materials accountability search in 1965, trenches 2, 4, and 5 were exhumed and their contents were placed on the ground surface in this area. This recently discovered contamination might have been a result of this waste placement. Some of the exhumed wastes were subsequently reburied on site and some were taken off-site for disposal at a licensed radioactive waste disposal facility (ARCO, 1995). The NRC is currently considering a BWXT license modification proposal to include this area within the SLDA.

Total thorium was detected in four samples taken near trenches 5 and 6. The highest concentration of total thorium (32,800 pCi/g) was found within what is considered the Trench 5 boundaries. The next highest value was 22.6 pCi/g and the remaining two values were less than 6 pCi/g (ARCO, 1995). The background concentration calculated for thorium was 2.9 pCi/g.

Am-241 was detected in surface soil samples taken along the northern, eastern, and western edges of trench 10. Am-241 concentrations ranged from approximately 0.1 to 62 pCi/g. Five soil samples with the highest Am-241 concentrations were analyzed for plutonium. Plutonium was found in these samples at concentrations ranging from approximately 8.5 to 88 pCi/g. The results from downhole gamma logging in boreholes in trench 10 indicate that the concentration of Am-241 in trench solids is less than 1 pCi/g. These samples indicate that Am and Pu concentrations in the area were likely caused by surface soil contamination and not waste buried in trench 10.

Air monitoring data provided by BWXT show average gross alpha and beta activity levels, in the air pathway, on and around the SLDA as being less than 10% of regulatory limits (10 CFR Part 20).

3.3 Soil Exposure, Air Pathway, and Gamma Radiation Conclusions

Data indicate that elevated concentrations of uranium, thorium, americium and plutonium and isolated areas of elevated gamma radiation are present in the soils on the SLDA site. Also, a walkover survey in September 2000 revealed the presence of radiological contamination immediately outside the boundary of the site. The current NRC license for the SLDA requires the licensee, BWXT, to address and control all of the releases or threatened releases of those hazardous substances. BWXT is addressing them with institutional controls (fencing and vegetation) which prevent ingestion of the soil and dermal contact with the soil, as well as release to the air in the form of airborne particulates. In the absence of these institutional controls, migration of these contaminants may occur through the completion of the soil and air exposure pathways.

Based on the above data, there is no evidence of a release or threat of release into the soil or air of radioactive materials related to the Nation's early atomic energy program that is not a federally permitted release in compliance with a legally enforceable license, permit, regulation, or order issued pursuant to the Atomic Energy Act of 1954.

4.0 GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

At the request of the NRC, a four-phase site characterization was performed by Earth Sciences Consultants, Inc., between 1989 and 1993, to delineate trench boundaries and describe subsurface characteristics (ARCO, 1995). Near-surface geological units are Pennsylvanian in age and consist of sequences of sandstone, siltstone, claystone, shale, and coal. Several coal seams underlie the site, the uppermost of which, known as the Upper Freeport Coal, has been strip-mined and deep-mined within the boundaries of the SLDA. The hydrogeologic systems in the upper and lower trench areas are fundamentally different. The upper trenches (trenches 1 – 9) are excavated into approximately 11 to 16 feet of Pleistocene terrace deposits that overlie 54 to 80 feet of shale and sandstone, which in turn overlie the Upper Freeport Coal seam (Figure D-1). The bases of trenches 1 – 9 rest on the weathered shale bedrock. The mine workings that underlie the upper trench area (approximately 80 feet below ground surface) consist of a combination of room-and-pillar construction and open mine haulage-ways. Room and pillar construction allows approximately one-third of the coal to remain in place to provide support pillars. Under this type of construction, the open mined areas are approximately 3 feet thick. The open haulage ways are about 30 feet wide and up to six feet tall and supported by timbers (Figure C-4). Collapse of mine structures predominately overlain by shale, leading to surface subsidence, has been documented and site conditions here may lead to the eventual development of trough type subsidence(Figure C-4a). But, neither the time of occurrence nor the location of a subsidence trough can be forecasted (ARCO, 1995).

Trench 10, in the lower trench area, is excavated into coal mine spoils, where the Upper Freeport Coal seam was once strip-mined. The base of trench 10 rests on a clay and shale layer that lies beneath the Upper Freeport Coal seam.

4.2 Groundwater Pathway

In the upper trench area (trenches 1 – 9), the distribution of hydraulic head is strongly influenced by the open-channel flow that occurs in the abandoned mine workings within the Freeport Coal Seam. This influence creates a dominant vertical gradient in the surficial deposits. Further, the fracture trace analysis presented in the Site Characterization Report (ARCO, 1995) reveals several on-site lineaments passing beneath the upper trench area that typically represent zones of near vertical fractures. These fracture traces correlated well with topography, structural features, and piezometric head distributions in the unconsolidated overburden and the upper or first shallow bedrock zone. The hydraulic gradient in the shallow bedrock is in the direction of Dry Run, adjacent to and to the north-northeast of the SLDA, and away from Kiskimere, the nearest community (Figure C-6). There are groundwater seeps along Dry Run where groundwater from the upper trench area drains. Groundwater flow and storage in the shallow bedrock layer is primarily in secondary features such as fractures, joints, and dissolution cavities. Retardation of uranium is high in the soils of the SLDA and carbonaceous shales, found below trenches 1 – 9 and containing up to 3 percent organic matter, were found to adsorb uranium. However, vertical flow through this fractured bedrock system must be considered because of the strong vertical gradient and the fact that the upper trenches rest on or near the upper bedrock layer. Although municipal water supply is available in the nearby community of Kiskimere, records indicate that there are five residential wells there (ARCO, 1995). These residential wells are believed to be screened in the Glenshaw Formation, above the Freeport Coal Seam and their status is unknown (personal communication with Rich Bartosik, Site Licensing Manager). These wells are upgradient of the SLDA with respect to groundwater flow in the shallow bedrock zones (Figure C-6). An inventory of wells within approximately 1.2 miles of the SLDA show groundwater for domestic use to be obtained also from wells screened below the Upper Freeport coal seam (ARCO, 1995). Because of the hydraulic properties of the mined coal seam, contaminants from the trenches would not be likely to migrate below the coal mine aquifer (NRC, 1997).

Trench 10 rests on a clay and shale layer beneath the Freeport Coal Seam and does not overlie the shallow bedrock layer. The hydraulic conductivity of the unconsolidated mine spoils is relatively high but, based on groundwater elevation contours measured near trench 10, there is a groundwater mound in the vicinity of trench 10. Other than during storm periods, water from Dry Run disappears into the mine fill area (NRC, 1997). It is possible that most of the water that enters Dry Run, through groundwater seeps from the upper trench area, flows into the mine fill, downward into the coal mine, and then southward into Carnahan Run (NRC, 1997).

Gross alpha and/or gross beta levels, which were elevated above screening levels, have been observed in at least one quarterly sample in seven monitoring wells and four piezometers in the upper trench area. Screening levels were calculated based on the mean of all samples below the Environmental Protection Agency's Maximum Contaminant Level (EPA MCL) for gross alpha (15pCi/L) and the compliance analysis threshold for gross beta (50 pCi/L) [40 CFR 141.26(b)(1)(i)]. The gross alpha and gross beta screening levels were 7 pCi/L and 21 pCi/L respectively. Four piezometers, PZ-1, PZ-2, PZ-6, and PZ-9 had gross alpha levels exceeding 15 pCi/L in second quarter of 1991 (NRC, 1997). Subsequent quarterly readings showed lower gross alpha readings. Samples taken during the third quarter of 1991 showed gross alpha levels below 6 pCi/L in PZ-1 and below 1 pCi/L in PZ-9. Third quarter results for PZ-2 gave a gross alpha level of 15 pCi/L, but samples from subsequent samples showed levels below 2 pCi/L. PZ-6 levels were 37.2 pCi/L, 7.6 pCi/L, and 23.3 pCi/L in samples from the second, third and fourth quarters of 1991 respectively. Isotopic composition was not specified in gross alpha measurements and uranium concentrations were not subtracted from the reported levels. Gross alpha concentrations dropped to less than 1 pCi/L after 1991. Samples from these piezometers were taken from the surficial soil zone in the upper trench area. Locations of piezometers and monitoring wells are shown in Figure C-5.

Monitoring well sample analysis data showed elevated (> 15pCi/L) gross alpha levels in samples from one well screened in the first shallow bedrock zone, approximately 19 feet from trench 4 (MW-27), and two wells screened in the Upper Freeport Coal Seam (MW-03 and MW-20). Mean gross alpha levels for MW-03 and MW-27 were 42 pCi/L and 31 pCi/L respectively. The mean gross alpha level in MW-20 was 8.5 pCi/L, but a result from one sample in 1997 showed 17pCi/L. It is uncertain whether elevated readings in samples taken from the Freeport Coal Seam were due to trench leachate or mine drainage. However, gross alpha levels from these samples were consistent with mine drainage gross alpha activity (Ogden, 1996). Samples from MW-45, screened in the second shallow bedrock aquifer near trench 9, showed a mean gross beta level of 145 pCi/L. The mean gross beta level from MW-30, screened in the Upper Freeport Mine Horizon, was reported as 53 pCi/L.

Based on findings presented in the Site Characterization Report (ARCO, 1995), it is uncertain whether future mine subsidence would create preferential pathways for the migration of trench solid wastes. But such subsidence may create new vertical fracture zones and widen existing vertical fracture zones to allow a direct and uninhibited hydraulic pathway from the base of the trenches to the open channel flow system within the mine. The mine workings are approximately three feet thick, with some haulage ways that may be up to six feet thick. The bedrock structure underneath the upper trench area, and overlying the mine workings, ranges in thickness from 50 feet to 80 feet and consists of approximately 50 to 60 percent soft rock (shale, claystone, siltstone) and 40 to 50 percent sandstone (ARCO, 1995). Upward progression of mine roof caving would likely be arrested by the sandstone layers in the bedrock and progress to heights no greater than three to five times the thickness of the mined coal seam (ARCO, 1995). This would make the formation of sinkholes at the surface improbable (Figure C-4a).

While mine subsidence leading to sinkhole formation has been documented in overburden consisting predominantly of shale, the sandstone layers beneath the SLDA add strength to the rock strata and would inhibit the formation of sinkhole-type surface subsidence. Any surface subsidence that would occur would more likely be in the form of a broad, shallow trough, formed by the slow downward movement of the mine roof over time. Downward movement of the mine roof may be caused by the supporting coal pillars sinking into the underclay on which they rest, though there is evidence that localized cracking at the level of the mine roof has occurred. The three montoring well borings (MW-16, MW-17,

MW-18), placed to closely bound the upper trench area and advanced to intersect the mine, revealed a fracture zone that extends from 10 to 27 feet above the elevation of the mine roof. Two of these borings (MW-17 and MW-18) lost drilling fluid a few feet above the mine while advancing the hole. During the first attempt at sampling well MW-18 the bailer became lodged in the well and could not be retrieved. This was an indication of settlement of the rock above the mine void following placement of the screen. The presences of the fracture zone above the void indicates that some subsidence of the mine roof has occurred.

Results from sixteen borings taken from mine workings during the site characterization indicate that an estimated 35% of the coal still remains, providing support pillars to the mine roof. This amount of remaining coal is consistent with the mining practices at the time when the mine was active.

Coal mine fires start from man-made fires at surface outcrops and spread through mine openings (NRC, 1997). Such outcrops exist in the area of the SLDA. The primary potential impact of a mine fire at the SLDA would be mine collapse due to consumption of the coal pillars and support timbers by fire (NRC, 1997). Mine collapse would lead to surface subsidence.

It is possible that mine subsidence and subsequent shallow trough formation at the surface could lead to the creation of preferential pathways for the migration of trench wastes into the open mine and Carnahan run.

4.3 Groundwater Pathway Conclusions

Sampling results indicate that gross alpha and gross beta levels, in concentrations greater than screening level concentrations, have been measured in the shallow water-bearing unit. Wells in the community of Kiskimere that rely on this bedrock unit are not downgradient of the SLDA. Contaminants in this water-bearing unit would be unlikely to reach wells screened below the Upper Freeport coal seam due to the hydraulic properties of the mined coal seam. Because of the inability to determine isotopic composition from gross alpha concentrations and the small number of samples containing elevated concentrations, current data present no evidence of a release of AEC-related contaminants that poses an imminent and substantial danger to human health or the environment.

Although mine collapse can occur at anytime and becomes more likely as time goes by, the bedrock structure of the overburden in the upper-trench area would inhibit the formation of sinkholes. However, the possibility does exist that a release of AEC-related hazardous substance, through the completion of the goundwater pathway, could occur in the future due to mine subsidence that may present an imminent and substantial danger to human health and the environment. The current NRC license for the SLDA requires the licensee, BWXT, to address all releases or threats of release of an AEC- related hazardous substance that may result from such circumstances.

Based on the above data, there is no evidence of a release or threat of release into the groundwater of radioactive materials related to the Nation's early atomic energy program that is not a federally permitted release in compliance with a legally enforceable license, permit, regulation, or order issued pursuant to the Atomic Energy Act of 1954.

5.0 SURFACE WATER PATHWAY

5.1 Hydrologic Setting

The topography of the area is described by rounded hills and steep-sided valleys drained by meandering rivers. Local drainages are shown in Figure C-3. The Kiskiminetas River flows in a northerly

direction, about 0.25 mile west of the SLDA, at a mean annual rate of 3100 ft^3/sec, and enters the Allegheny River eight miles northwest of the site. Several local and intermittent tributaries enter the Kiskiminetas River from the east. These include Dry Run, which bounds the SLDA on the northeast side and flows to the Kiskiminetas River during periods of heavy precipitation, and Carnahan Run, which flows within 0.5 mile of the southeast side of the site. Three short, unnamed streams flow into the Kiskiminetas River between Dry Run and Carnahan Run. Lee Lake, a recreational site on Carnahan Run, is about 0.5 mile south and slightly to the east of the site. Surface runoff from the upper trench area, as well as shallow groundwater, enters Dry Run, while drainage from mine workings flows into Carnahan Run.

5.2 Surface Water Pathways

There is a water treatment plant on the Kiskiminetas River, about 200 feet upstream of the mouth of Carnahan Run. A water treatment plant is located on the floodplain of the Allegheny River at Freeport, about 8 miles downstream of the SLDA. Recreational boating and hiking in and around the Allegheny and Kiskiminetas Rivers is common, providing receptors for any contaminants in the surface-water pathway.

Total uranium concentrations from sediment sampling stations downgradient of the trench areas, taken quarterly from Dry Run between 1992 and 2000, were elevated with respect to concentrations found at the upgradient sampling station. Average total uranium concentrations in samples taken from seven downgradient sampling stations ranged from 10.3 pCi/g to 21.5 pCi/g. The average total uranium concentration at the upgradient sampling station was 4.13 pCi/g. Gross alpha and beta levels in surface water samples were also measured quarterly at the same sampling stations between 1995 and 2000. At downgradient stations, average gross alpha levels ranged from 4.0 pCi/L to 11.7 pCi/L and average gross beta levels fell between 2.9 pCi/L and 16.2 pCi/L. Average gross alpha and beta levels measured at the upgradient station were 3.7 pCi/L and 11.1 pCi/L respectively.

Results from one surface water sample taken from Carnahan Run, downstream of the coal mine spring, show an elevated gross alpha concentration (19 pCi/L). It is uncertain, however, whether this is due to natural uranium from mine drainage or enriched uranium from the trenches (NRC, 1997). However, data cited in Ogden, 1996 show gross alpha activity values for old mine drainage, and surface water downstream of mine drainage, ranging up to 143 pCi/L and 119 pCi/L, respectively. Mine drainage is also indicated by the iron-stained surfaces and the acidic quality of the water of Carnahan Run.

5.3 Surface Water Pathway Conclusion

No evidence of a release of hazardous substances, due to AEC-related, radiological constituents, to the surface-water pathway has been found. Elevated gross alpha activity in Carnahan Run is consistent with gross alpha activities found in surface water downstream of mine drainage. Sediment and surface-water samples analyzed for gross alpha activity and uranium were taken from Dry Run, within the federally permitted area. Gross alpha levels in water discharging from the permitted area are below NRC criteria [10CFR20 Appendix B, Table 20]. In the absence of current institutional controls, migration of contaminants in Dry Run may occur through the completion of the surface-water pathway. However, there is no evidence to indicate there is a threat of release of an AEC-related hazardous substance into the surface water that the current licensee, BWTX, would not be compelled to address pursuant to the active NRC license for the SLDA.

Based on the above data, there is no evidence of a release or threat of release into the surface water of radioactive materials related to the Nation's early atomic energy program that is not a federally permitted release in compliance with a legally enforceable license, permit, regulation, or order issued pursuant to the Atomic Energy Act of 1954.

6.0 COMBINED PATHWAY CONCLUSION

A radiological dose assessment was performed to support the Site Characterization Report (ARCO, 1995). This assessment used the Argonne National Laboratory's RESRAD computer code to calculate radiation doses associated with exposure to contaminant concentrations present in media on the site. Ten different transport/receptor scenarios were chosen based on potential future uses of the site. Total radiation doses calculated from these scenarios ranged from 0.0018 millirem/year to 470 millirem/year.

Of the ten scenarios modeled, six resulted in radiation dose estimates that were greater than the NRC decommissioning criteria for unrestricted use of 25 millirem/year (10 CFR 20, Subpart E, Radiological Criteria for License Termination). Four of these six scenarios included the instability and erosion of the soil covering the trench waste. The remaining two scenarios assumed a stable soil cover and the domestic use of groundwater from wells screened in the shallow and deep bedrock aquifers. These scenarios present conservative dose estimates with respect to current site conditions, as the presence of institutional controls currently prevent the instability of trench covers and consumption of groundwater from wells on the site.

Estimated doses from the four scenarios that did not exceed the NRC criteria ranged from 0.0018 millirem/year to 1.4 millirem/year. Three of these four scenarios modeled assumed the use of local surface waters; the domestic use of waters from Carnahan Run and the Kiskiminetas River and watering stock from Dry Run. The domestic use of water from Dry Run was not considered because it is an intermittent stream. The fourth scenario included resident farming on the site.

The conservative nature of these results indicates that there is no substantial radiological exposure threat to human health.

7.0 SUMMARY AND CONCLUSIONS

The United States Army Corps of Engineers has reviewed existing, available data on the SLDA site. Based on that review, there is no evidence of a release or threat of release of radioactive materials related to the Nation's early atomic energy program that is not a federally permitted release in compliance with a legally enforceable license, permit, regulation, or order issued pursuant to the Atomic Energy Act of 1954. The possibility exists that migration of AEC-related contaminants could occur in the future. This possible future migration may occur due to mine subsidence or the completion of surface-water, groundwater, soil, or air exposure pathways, and may present a substantial danger to human health and the environment in the future. However, exposure pathways are subject to institutional controls present at the site and the current NRC license for the SLDA requires the licensee, BWXT, to address all releases, or threats of release, of an AEC- related hazardous substance that may result from such circumstances.

Therefore, in accordance with CERCLA since there is no unpermitted release or threat of an unpermitted release, no response action is appropriate and it is recommended that no further investigation of the SLDA site be undertaken within the FUSRAP program. Pursuant to the MOU between the USACE and NRC, this PA shall be provided to the NRC for their consideration.

8.0 LEGISLATION

Section 8143, Department of Defense Appropriations Act, 2002, P.L. 107-117 directs the Secretary of the Army, acting through the Chief of Engineers, to clean up radioactive waste at the SLDA site, consistent with the memorandum of understanding between the United States Nuclear Regulatory Commission and the United States Army Corps of Engineers for coordination on cleanup and decommissioning of the FUSRAP Sites with NRC-Licensed Facilities, dated July 5, 2001, and in accordance with Section 611 of P. L. 106-60. It also directs the Secretary of the Army to seek to recover response costs from the appropriate responsible parties in accordance with the CERCLA of 1980. The legislation also states that the Secretary of the Army and the Corps of Engineers shall not, by virtue of this cleanup, become liable for the actions or omissions of the past, current, or future licensees, owners, or operators of the Shallow land Disposal Area. Direction given in the legislation supersedes the recommendation in Section 7.0. Therefore, in accordance with directions provided by the USACE Headquarters and the Great Lakes and Ohio River Division (Attachment G), the project will proceed to carry out the Act language in accordance with CERCLA and FUSRAP requirements.

ATTACHMENT A
NRC LICENSE

MATERIALS LICENSE

Amendment No. 3

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. BWX Technologies, Inc. B&W Services 2. R.D. #1, Box 355 Vandergrift, Pennsylvania 15690	3. License Number SNM-2001 4. Expiration Date October 31, 2005 5. Docket or Reference No. 070-3085

6. Byproduct, Source, and/or Special Nuclear Material	7. Chemical and/or Physical Form	8. Maximum Amount that Licensee May Possess at Any One Time Under This License
A. Uranium and Thorium in any enrichment or as source material	A. Any chemical or physical form	A. Any quantity only as residual contamination and waste at the Shallow Land Disposal Area
B. All Isotopes 1 to 103	B. Any chemical or physical form	B. Any quantity only as residual contamination that currently exists at the Shallow Land Disposal Area

CONDITIONS

9. Authorized Places of Use:

The Shallow Land Disposal Area (SLDA) located in Armstrong County, Pennsylvania off Pennsylvania State Route 66 approximately three miles southeast of Leechburg, Pennsylvania. The site is on a hillside adjacent to B&W's Parks Township Facility (SNM-414) and the Kiskiminetas River as shown in Attachments 2 and 3.

10. Authorized Use:

For use in possession, storage, monitoring, and characterization, at the SLDA, in accordance with statements, representations and conditions contained in licensee's application, dated August 8, 1995, except as modified by the condition of this license.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number: SNM-2001
Docket or Reference Number: 070-3085
Amendment No. 3

11. The licensee shall plan all work activities to keep radiation doses to workers as low as is reasonably achievable (ALARA) sufficient to meet the intent of 10 CFR 20.1101(b) through the use of administrative procedures or engineering controls to limit exposure and effluents during handling of contaminated materials.

12. The release of equipment or packages from the controlled areas for unrestricted use shall be in accordance with the criteria in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Materials" dated April 1993.

13. The licensee shall institute criticality safety controls over materials removed from the waste trenches to restrict the quantity of plutonium and uranium-235 to a safe quantity in any area. A safe quantity is defined as 350 grams U-235, 200 grams plutonium, or any combination of uranium-235 and plutonium in accordance with the equation $\frac{\text{gms U-235}}{350} + \frac{\text{gms Pu}}{200}$ is equal to or less than 1.

14. Schedule for Decommissioning Site:

    A. The licensee shall submit a Site Decommissioning Plan by June 4, 2001.

    B. The licensee shall submit a Decommissioning Funding Plan (DFP) in accordance with 10 CFR 70.25(e), including an appropriate financial instrument in accordance with 70.25(f) and covering the estimated costs of decommissioning at the time the SDP is submitted.

15. A. The licensee shall provide a Letter of Credit (LOC) in favor of the NRC by a qualified bank (LOC Bank) in the amount of ten million dollars ($10,000,000) within 10 days from the issuance of this license.

    B. The licensee shall maintain an appropriate financial assurance instrument for decommissioning. This instrument shall be updated in accordance with Condition 14B and maintained thereafter to cover the anticipated remaining cost of decommissioning until completion of decommissioning and termination of this license.

16. Licensee's point of contact and Regulatory Compliance Manager is Mr. Richard M. Bartosik,

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date: December 14, 2000

By: Larry W. Camper

Larry W. Camper, Chief
Decommissioning Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

ATTACHMENT B
DOE LETTER 25 MAY 2000

Department of Energy

Washington, DC 20585

MAY 25 2000

Major General Hans A. Van Winkle
Director of Civil Works
U.S. Army Corps of Engineers
Department of the Army
Washington, D.C. 20314-1000

Dear General Van Winkle:

This letter is a follow-up to a phone conversation between the Department of Energy (DOE) and the Army Corps of Engineers staff concerning Congressional interest in the inclusion of the Shallow Land Disposal Area (SLDA) in Parks Township, Pennsylvania (near Apollo, Pennsylvania) in the Formerly Utilized Sites Remedial Action Program (FUSRAP). The site is currently owned by BWX Technologies, Inc. (BWXT).

The radioactively-contaminated SLDA received wastes from another BWXT-owned facility in Apollo, Pennsylvania, which conducted nuclear activities, including fabrication of nuclear fuel and nuclear research for the Atomic Energy Commission (AEC) as part of the Nation's early atomic energy program.

The contaminants of concern from AEC activities include uranium in varying enrichments and other hazardous substances. In addition, there is evidence of slight plutonium and americium contamination resulting from storage of equipment used in another BWXT facility adjacent to the SLDA in Parks Township, which was also utilized for AEC nuclear fuel and nuclear research activities. The SLDA may contain wastes resulting from commercial activities at the Apollo facility, which are unrelated to any AEC work.

Section III.D.1. of the Memorandum of Understanding (MOU) between DOE and the Army Corps of Engineers regarding the program administration and execution of the FUSRAP provides that DOE:

a. Shall perform historical research and provide a FUSRAP eligibility determination, with historical references, as to whether a site was used for activities which supported the Nation's early atomic energy program;

b. Shall provide the Army Corps of Engineers with the determination, a description of the type of processes involved in the historical activities at the site, the geographic boundaries of those activities (as reflected by documentation available to DOE), and the potential radioactive and/or chemical contaminants at the site; and

c. Shall maintain records of determination of eligibility and other files, documents and records associated with the site.

In accordance with the MOU, DOE has performed historical research regarding the SLDA, and has concluded that this site contains wastes resulting from activities which supported the Nation's early atomic energy program. Historical information is being prepared by my staff for transmittal to your staff.

Accordingly, we would not object to the SLDA being included in the FUSRAP if the Army Corps of Engineers determines, under Section III.D.2 of the MOU, that response action under the Comprehensive Environmental Response, Compensation, and Liability Act is required to address FUSRAP-related contamination at the site.

If you need any further information, please call me at (202-586-6351).

Sincerely,

James J. Fiore
Deputy Assistant Secretary
for Site Closure

cc: Stephen Lerner, CI-30
David Berick, CI-30

ATTACHMENT C
SITE MAPS

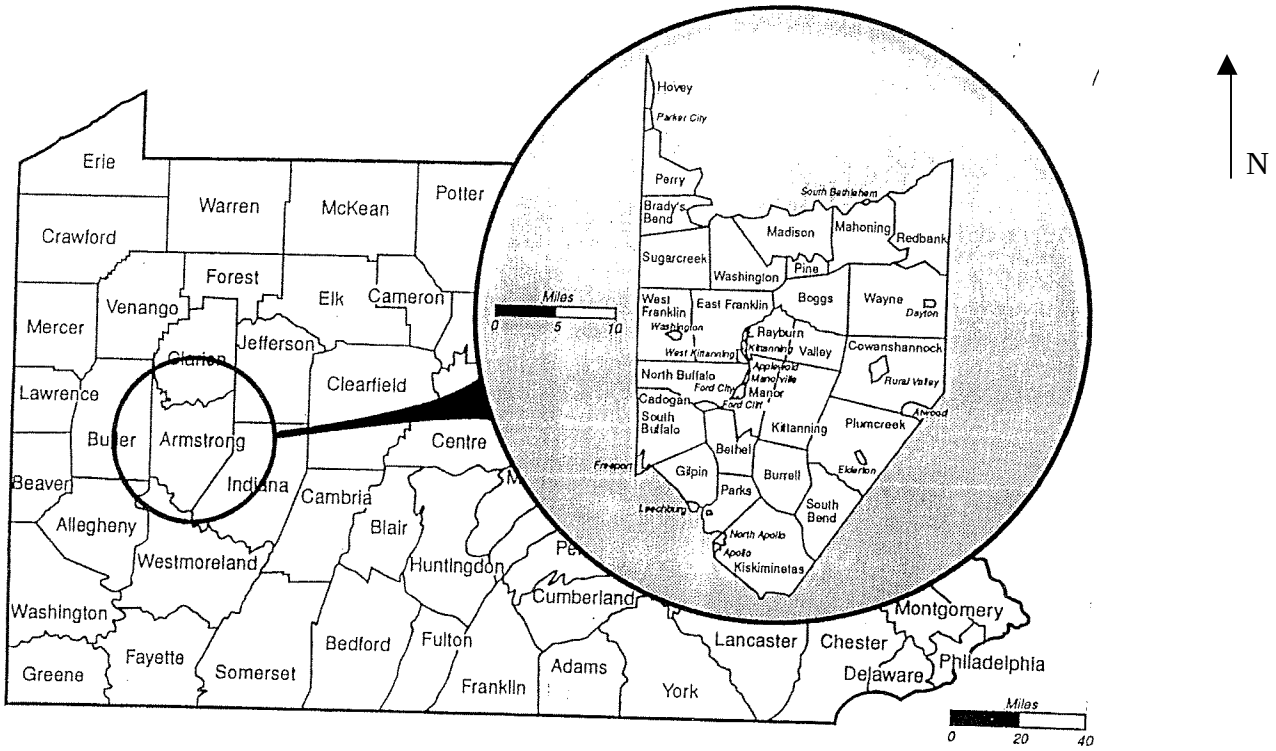

Figure C-1 Location of Armstrong County in western Pennsylvania (from NRC, 1997)

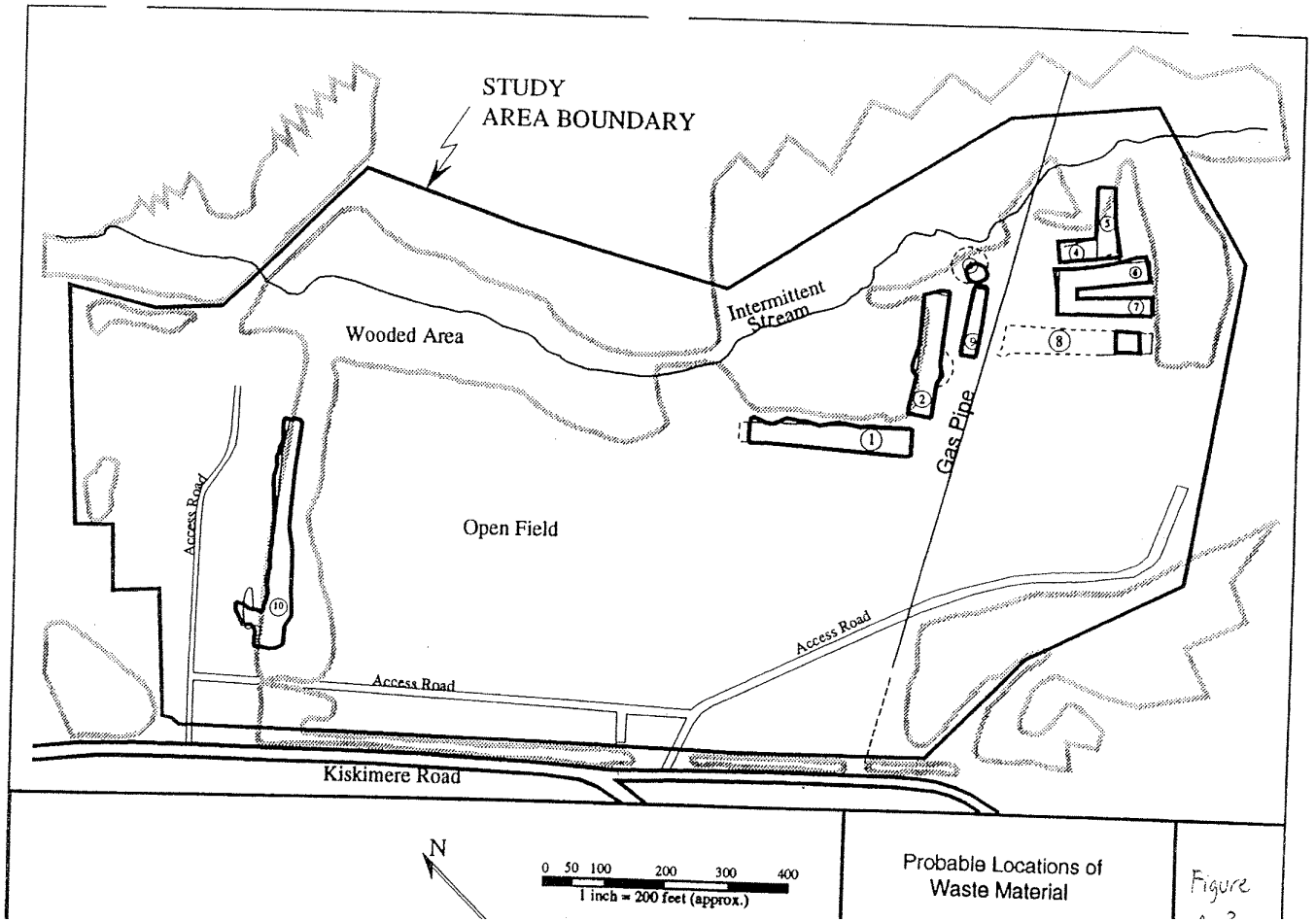

Figure C-2 Probable locations of waste material (from ARCO, 1995)
("*Intermittent Stream*" is Dry Run)

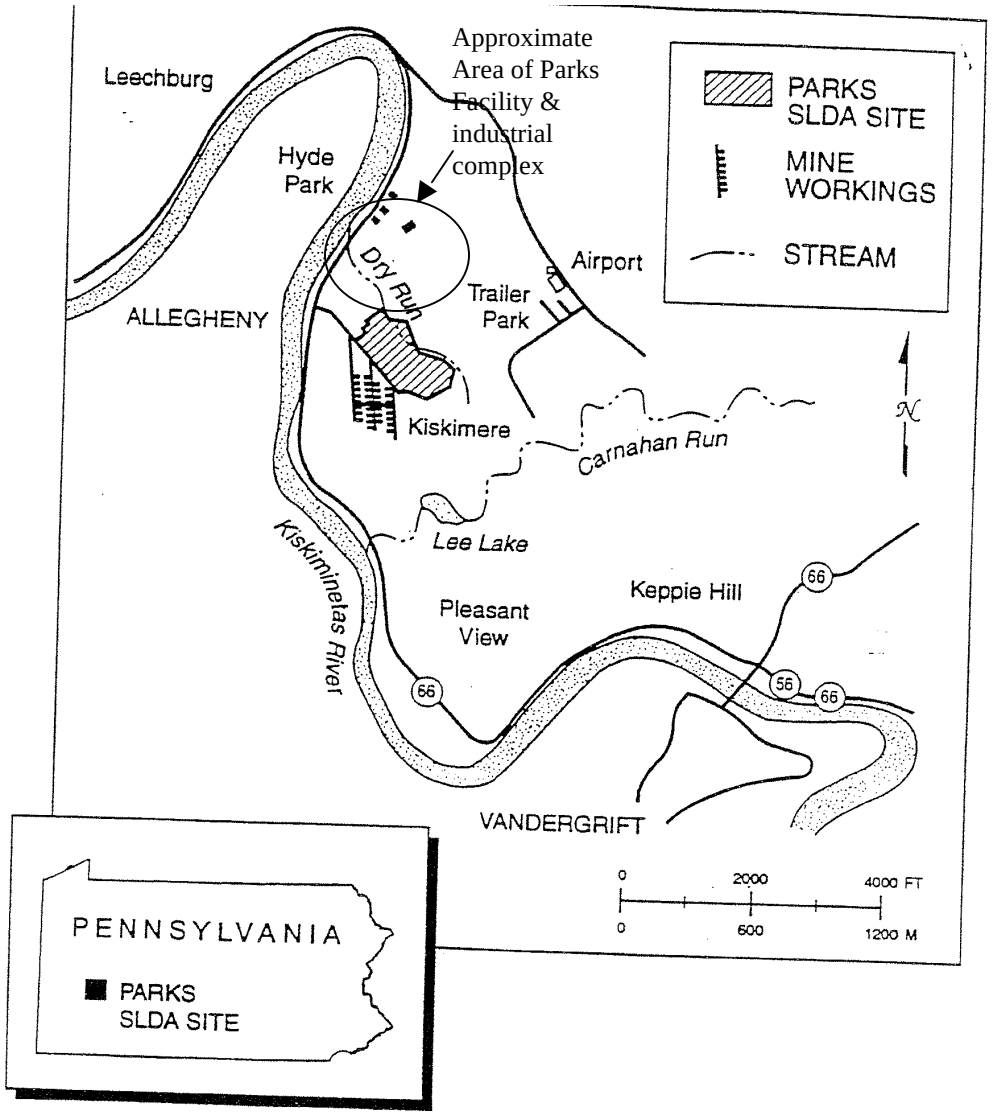

Figure C-3 Shallow Land Disposal Area site location map (from NRC, 1997)

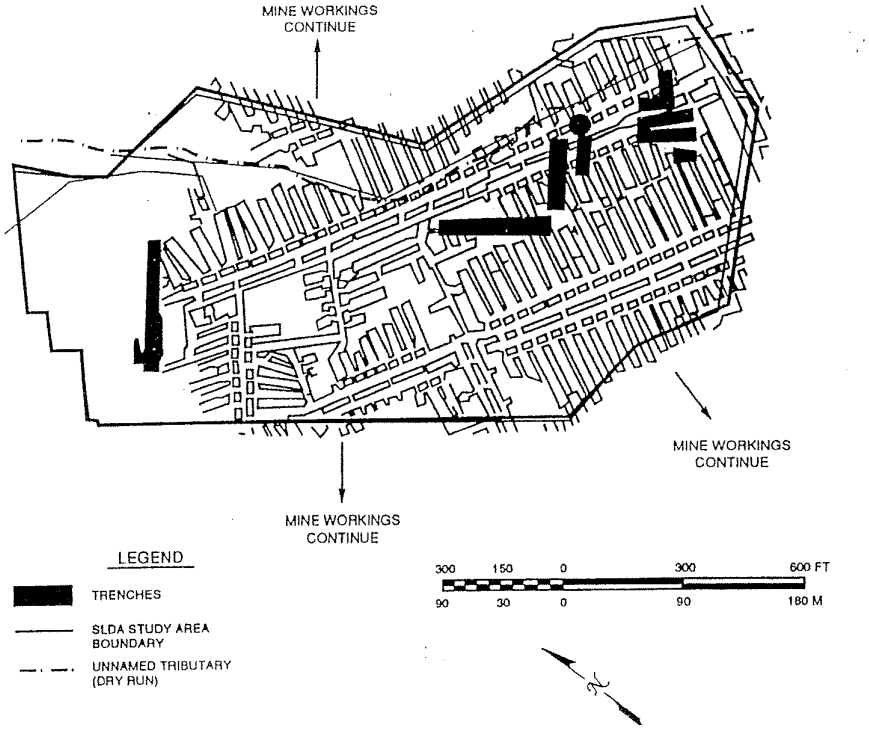

Figure C-4 Waste disposal trenches and mine layout (from NRC, 1997)

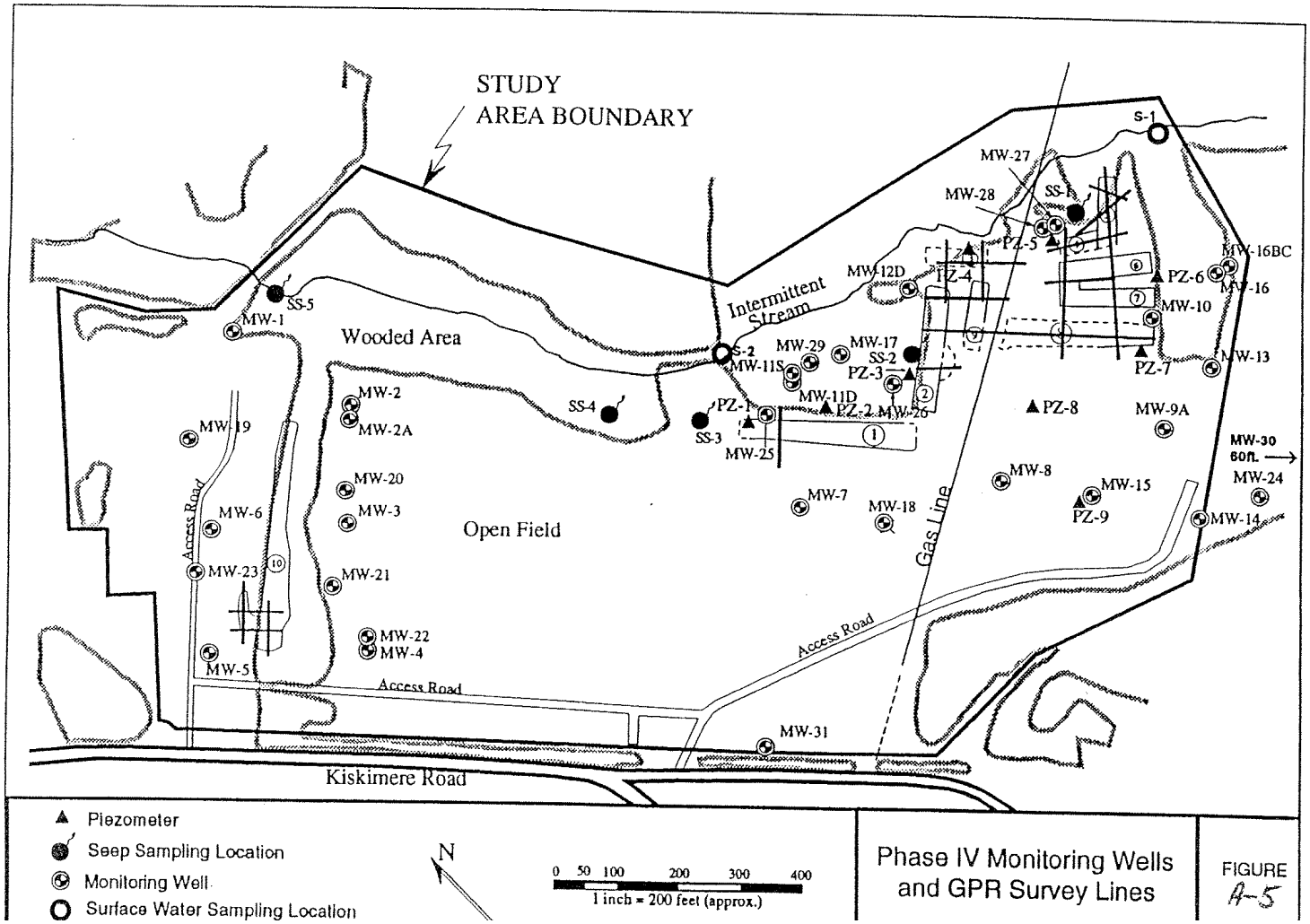

Figure C-5 Monitoring well and sampling point locations (from ARCO, 1995) ("*Intermittent Stream*" is Dry Run)

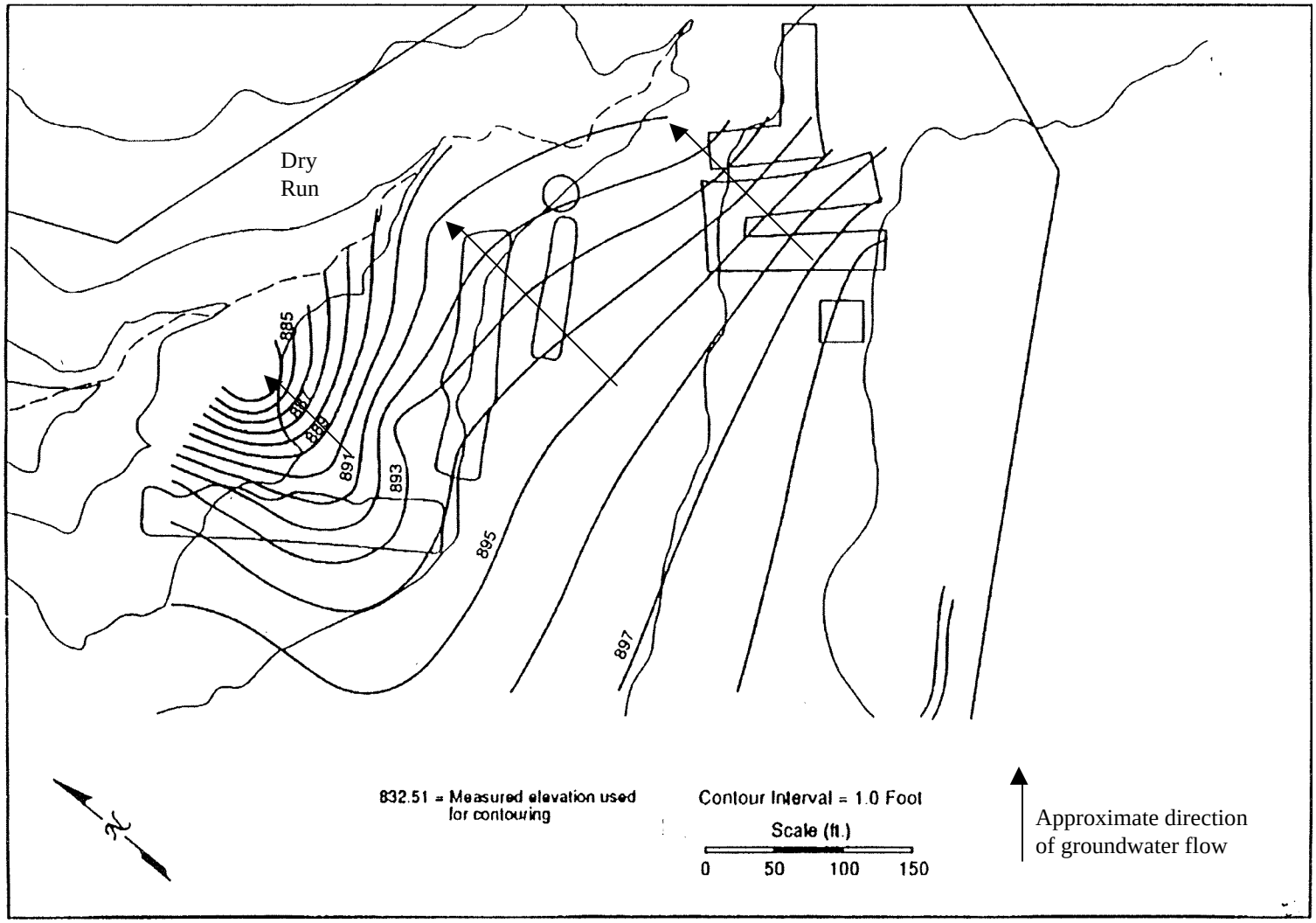

Figure C-6 Groundwater elevation in the first shallow bedrock aquifer, January 1996 (from NRC, 1997)

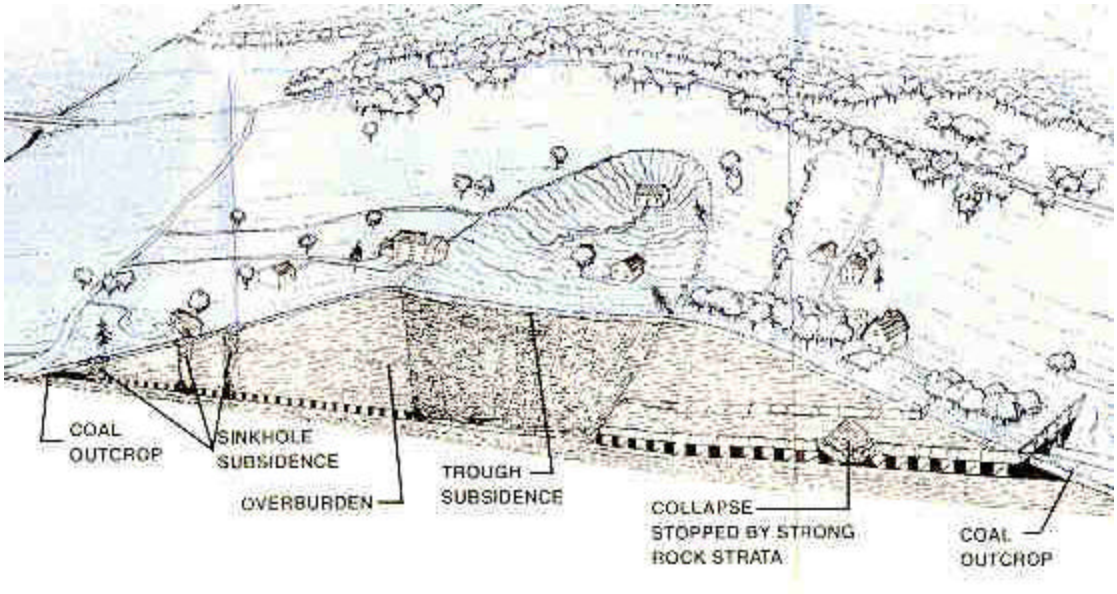

Figure C-4A (From PADEP, 1999)

ATTACHMENT D
STRATIGRAPHIC COLUMN

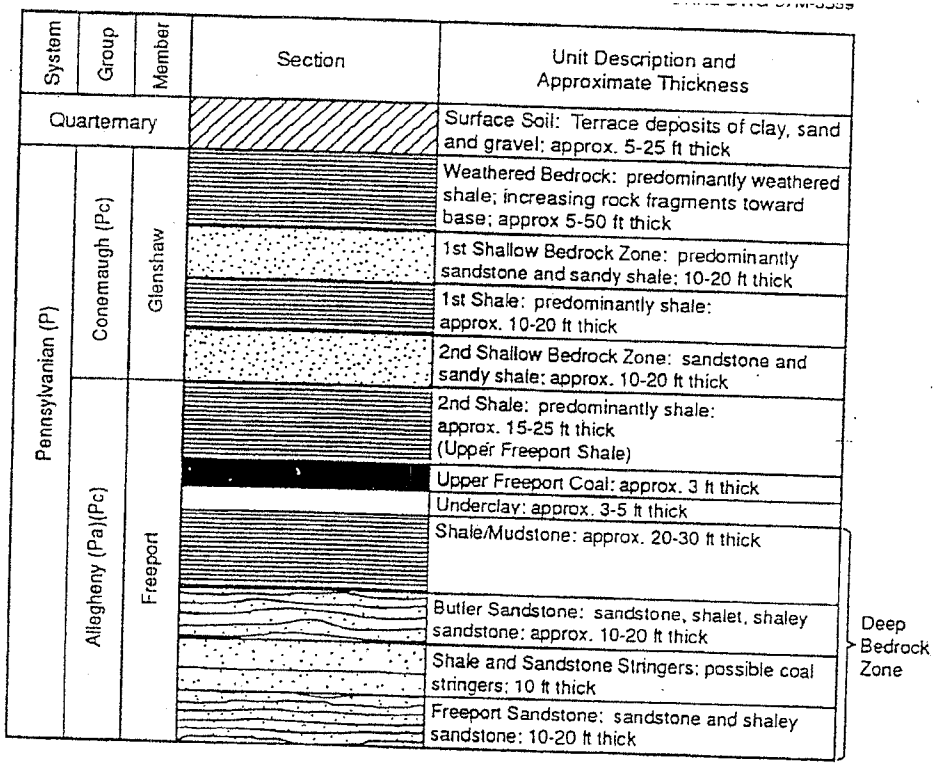

Figure D-1 Stratigraphic column (from NRC, 1997)

ATTACHMENT E
AERIAL PHOTO

ATTACHMENT F

REFERENCES

REFERENCES

1. Nuclear Regulatory Commission, Office of Nuclear Materials Safety and Safeguards, 1997. *Draft Environmental Impact Statement Decommissioning of Babcock & Wilcox Shallow Land Disposal Area in Parks Township, Pennsylvania,* Docket No. 70-3085, License No. SNM-2001, August 1997.

2. Ogden Environmental and Energy Services Co., Inc., 1996. *Site Evaluation Parks Shallow Land Disposal Area Site PADEP Contract No. ME 93936, Work Assignment No. 20-019 Draft Parks Shallow Land Disposal Area Review,* Submitted to Commonwealth of Pennsylvania Department of Environmental Protection, January, 1996.

3. EPA 1991. *EPA Guidance for Performing Preliminary Assessments Under CERCLA,* Publication 9345.0-01A, September, 1991.

4. ARCO, Babcock & Wilcox, 1995. *Parks Shallow Land Disposal Facility Site Characterization Report, Revision 4,* May 1995.

5. DOE Letter 05/00. Letter from Department of Energy dated May 25, 2000 to Director of Civil Works, USACE, subject being eligibility of SLDA for FUSRAP.

6. Pennsylvania Department of Environmental Protection (PADEP), 1999, Act 54, *Report on Effects of Underground Coal Mining,* June, 1999.

ATTACHMENT G

USACE HEADQUARTERS AND THE GREAT LAKES AND OHIO RIVER DIVISION DIRECTIONS

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:
CECW-BA

FEB 22 2002

SUBJECT: Parks Township Shallow Land Disposal Area (SLDA) – Draft Preliminary Assessment (PA) Report

MEMORANDUM FOR COMMANDER, GREAT LAKES AND OHIO RIVER DIVISION

1. References:

a. Section 8143, Department of Defense Appropriations Act, 2002, P.L. 107-117.

b. CELRD-MT-M memorandum, 18 September 2001, SAB.

2. The Act language referenced in 1a directs the Secretary of the Army, acting through the Chief of Engineers, to clean up radioactive waste at SLDA, consistent with our Memorandum of Understanding with the Nuclear Regulatory Commission. It also directs the Secretary of the Army to seek to recover response costs from the appropriate responsible parties in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Request that you proceed to carry out the Act language.

3. Since reference 1a provides specific statutory direction regarding SLDA, I am returning the draft PA, which was transmitted to this office by reference 1b, for appropriate revisions.

4. The point of contact for this action is Ms. Tomiann McDaniel, (202) 761-4363.

ROBERT F. VINING
Chief, Program Management Division
Directorate of Civil Works

Encl

CF:
CEMP-RS (McDaniel)
CENWO-HX-S (Roth)
CELRP-DE
CELRB-DE

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DIVISION, GREAT LAKES AND OHIO RIVER
CORPS OF ENGINEERS
P.O. BOX 1159
CINCINNATI, OHIO 45201-1159

REPLY TO
ATTENTION OF

CELRD-MT-M

28 February 2002

MEMORANDUM FOR COMMANDER, PITTSBURGH DISTRICT

SUBJECT: Parks Township Shallow Land Disposal Area (SLDA) - Draft Preliminary Assessment (PA) Report

1. Reference memorandum, CECW-BA, 22 February 2002, Subject: Parks Township Shallow Land Disposal Area (SLDA) - Draft Preliminary Assessment (PA) Report

2. Referenced memorandum is provided for your action, including informing stakeholders and Congressional interests.

3. The POC for CELRD is Mr. Thomas Hempfling, CELRD-MT-M, (312) 353-6351.

FOR THE COMMANDER:

PAUL D. ROBINSON
Director
Military and Technical

Encl

CF:
CEMP-RS
CELRB-DE