Burial Grounds Operable Unit

Presented by John Russell

Waste Operations Task Force

July 21, 2005

BGOU Strategic Cleanup Initiatives

Scope:

Conduct a RI, baseline risk assessment, evaluation and selection of remedies, and implementation of actions as necessary.

Site Cleanup Objective:

- Protect industrial workers from direct contact exposure to contaminated soil and sediment.
- Protect off-site residents by preventing exposure to contaminated groundwater.

Projected Scope Assumptions:

- In situ stabilization/capping of burial grounds.
- Excavation prohibited and access to some areas restricted, as appropriate.
- Installation of an integrated groundwater monitoring system.
- Re-evaluation of long-term effectiveness of the in situ stabilization/capping remedy as part of D&D of operating gaseous diffusion plant to determine whether additional actions are warranted.

BGOU Site Management Plan Information

Phase I

Accelerate investigation and action at burial grounds posing a current potential off-site groundwater risk as part of Phase I activities. Implement mitigating actions as necessary for protections of plant workers during the ongoing plant operations.

Phase II

Evaluate the long-term effectiveness of existing remedies installed during Phase I and take additional actions as necessary to achieve protectiveness consistent with the future end-state objectives associated with post-shutdown plant conditions.

BGOU RI/FS Goals

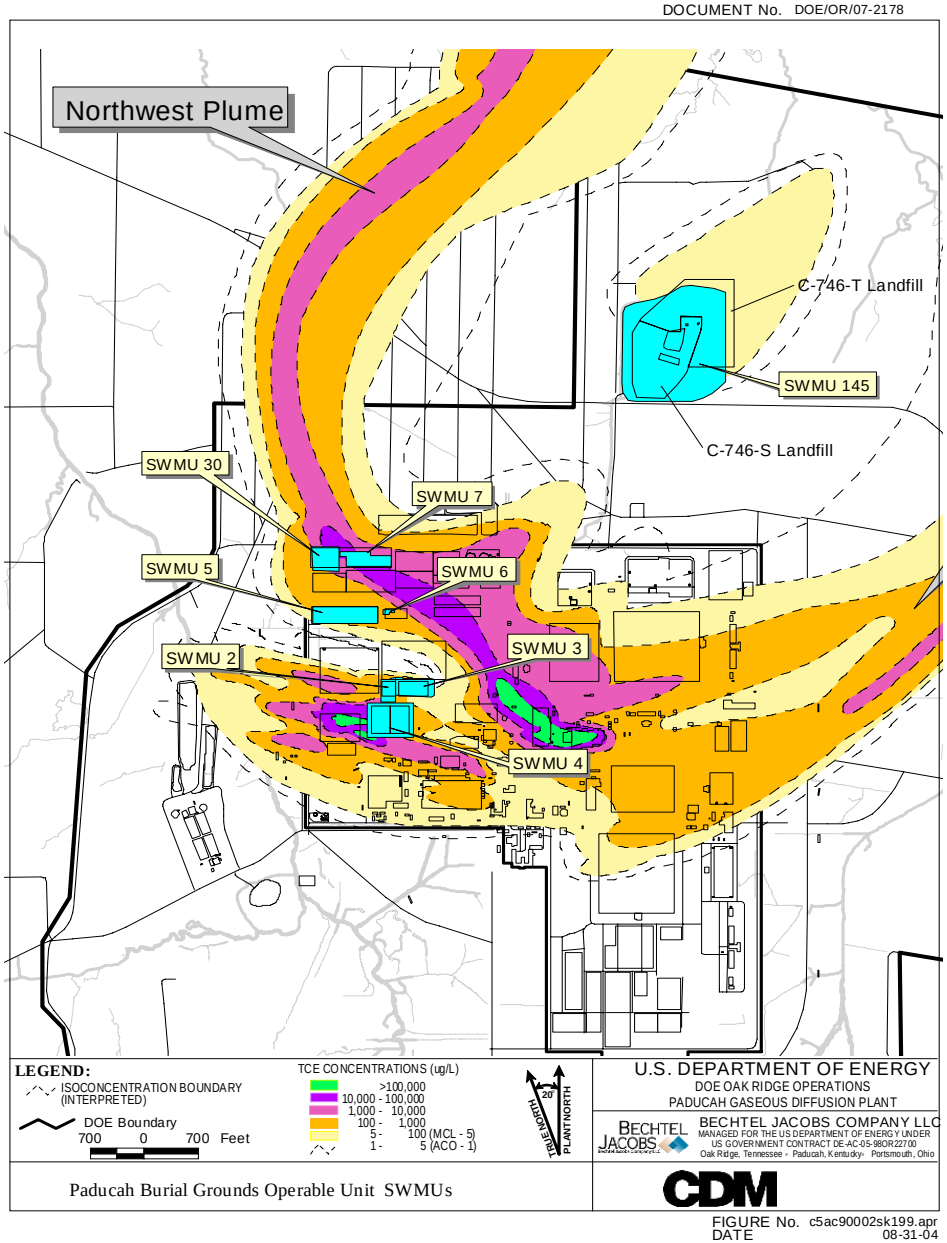
- Goal 1: Characterize Nature of Source Zone
- Goal 2: Define Extent of Source Zone and Contamination in Soil and Other Secondary Sources at All Units
- Goal 3: Determine surface and Subsurface Transport Mechanisms and Pathways
- Goal 4: Support evaluation of Remedial Technologies

BGOU Site Management Plan

Conduct a RI, baseline risk assessment, evaluation and selection of remedies, and implementation of actions as necessary for the following burial grounds:

- C-749 (SWMU 2),
- C-404 (SWMU 3),
- C-747 (SWMU 4),
- C-746-F (SWMU 5),
- C-747-B (SWMU 6),
- C-747-A (SWMUs 7 and 30, which includes the area beneath SWMU 12),
- The residential/inert borrow area and old North-South Diversion Ditch disposal trench (SWMU 145), and
- Additional disposal areas that might exist beneath the scrap yards.

Burial Grounds Operable Unit SWMUs



BGOU Scoping Document Status

- BGOU Scoping Document Submitted November 25, 2004
- Meetings held in December 2004 and January 2005 to discuss initial comments
- Received formal regulator comments on February 28, 2005
- Meeting held with the regulators on March 17, 2005
- Resolved comments – concerns were incorporated into the Work Plan – due June 30, 2005

BGOU RI/FS Schedule

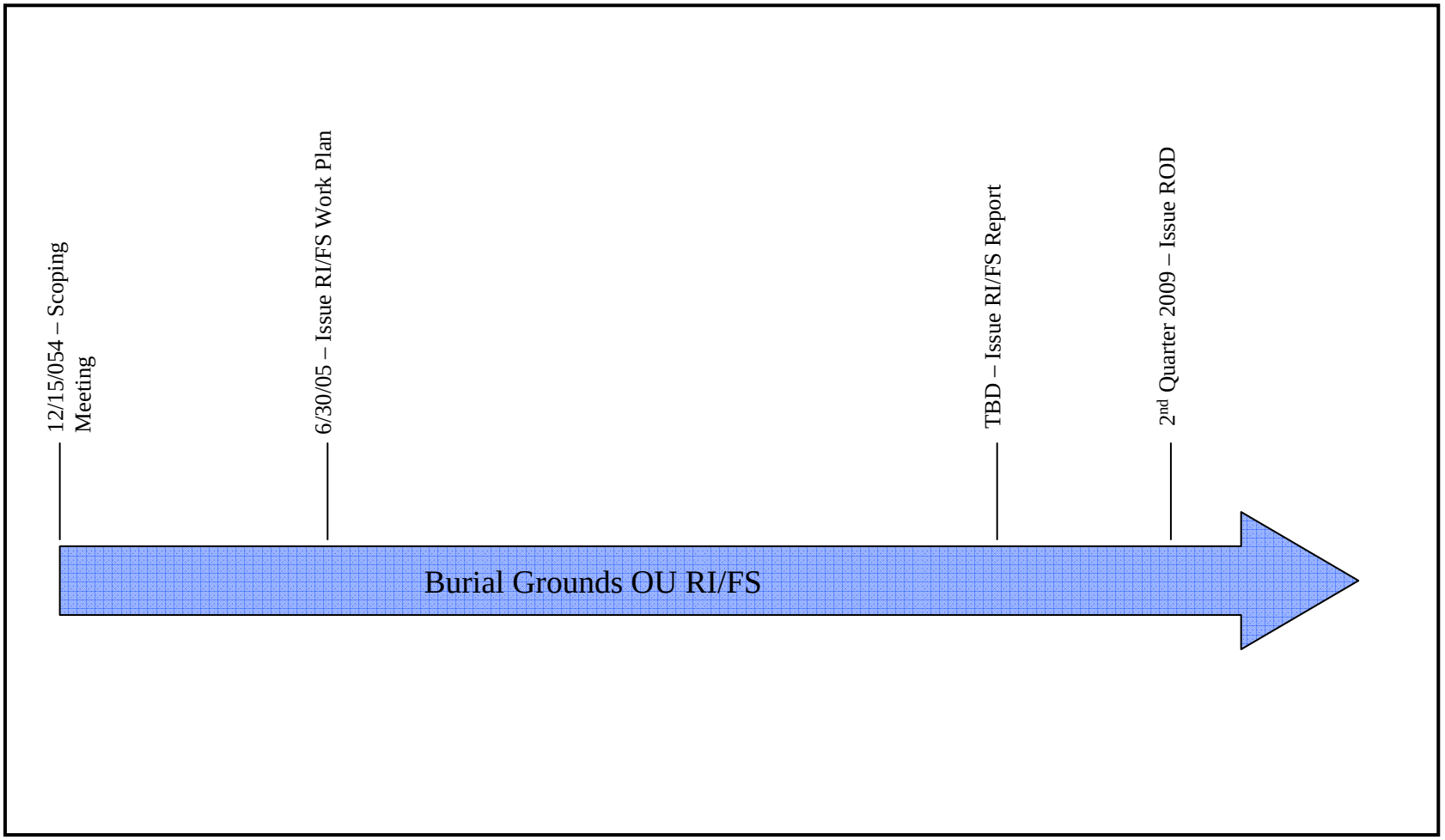


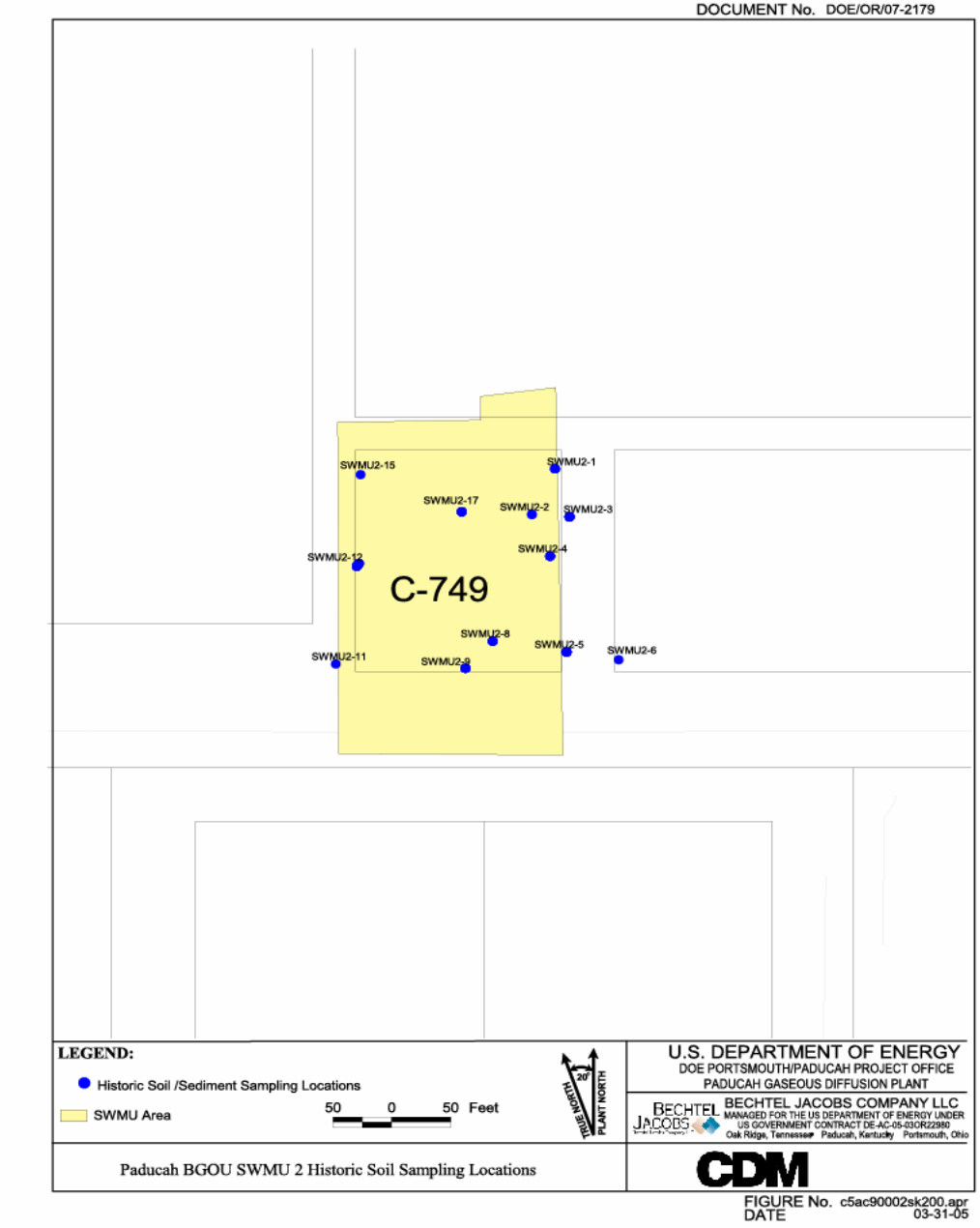
Fig. 2.3. BGOU RI/FS schedule.

SWMU 2
C-749 Uranium Burial Ground

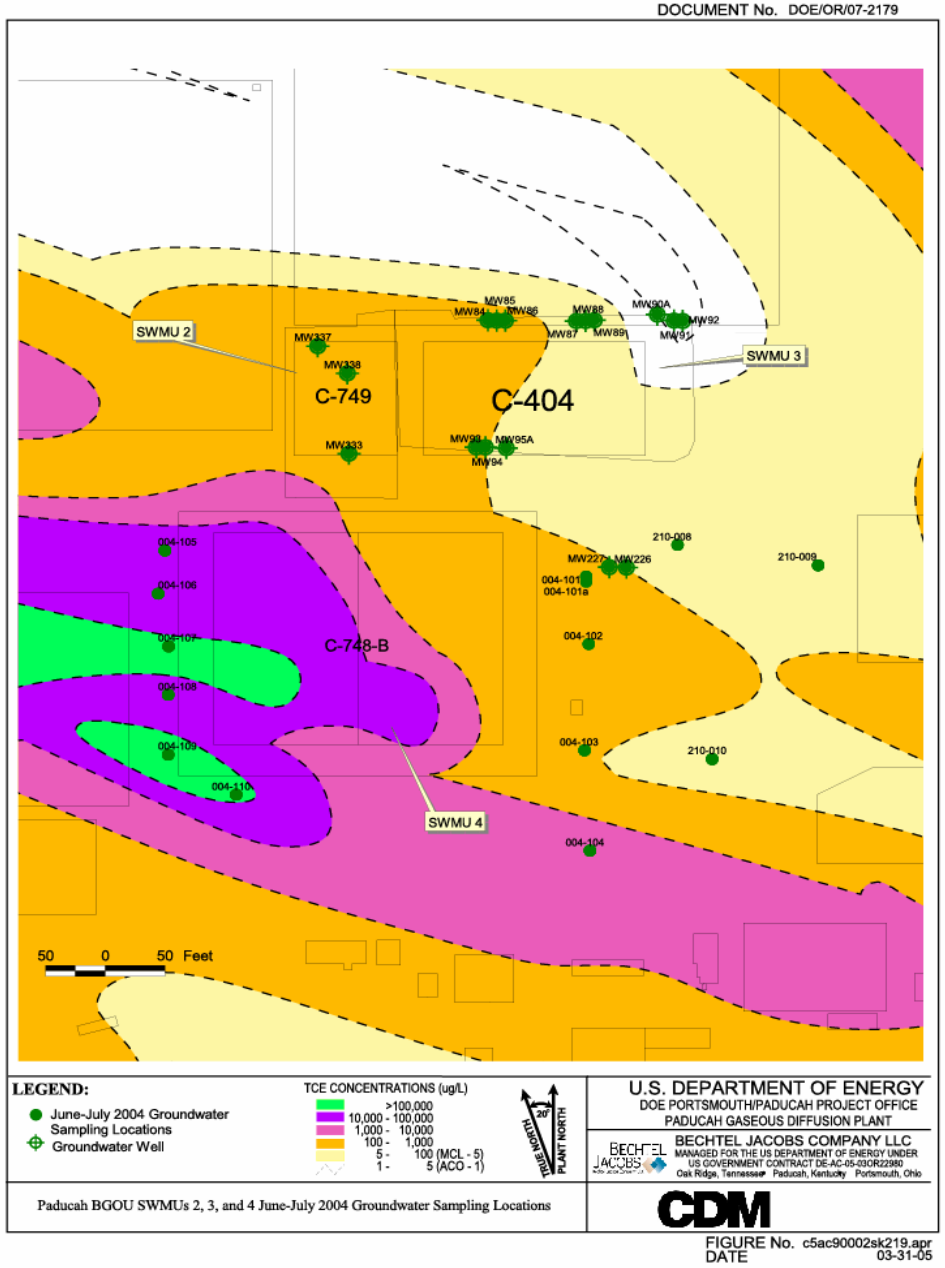
Site Background and History

- Area of approximately 32,000 ft^2 with dimensions of approximately 160 by 200 ft
- During use, pits were excavated to an estimated depth of 7 to 17 feet
- After use, the area was covered with a 6-inch thick clay cap and a 18-inch thick soil layer covered with vegetation
- Used from 1951 to 1977 for the disposal of uranium and uranium-contaminated wastes. (270 tons of uranium, 59,000 gallons of oil, 450 gallons of TCE, drummed wastes consist primarily of uranium from machine shop turnings, shavings, and sawdust, most waste in the unit is believed to consist of pyrophoric uranium metal.

SWMU 2
Historical Soil Sampling Locations



SWMUs 2, 3, and 4 June-July 2004 Groundwater Monitoring Locations



SWMU 2
Summary of Additional Data Needs

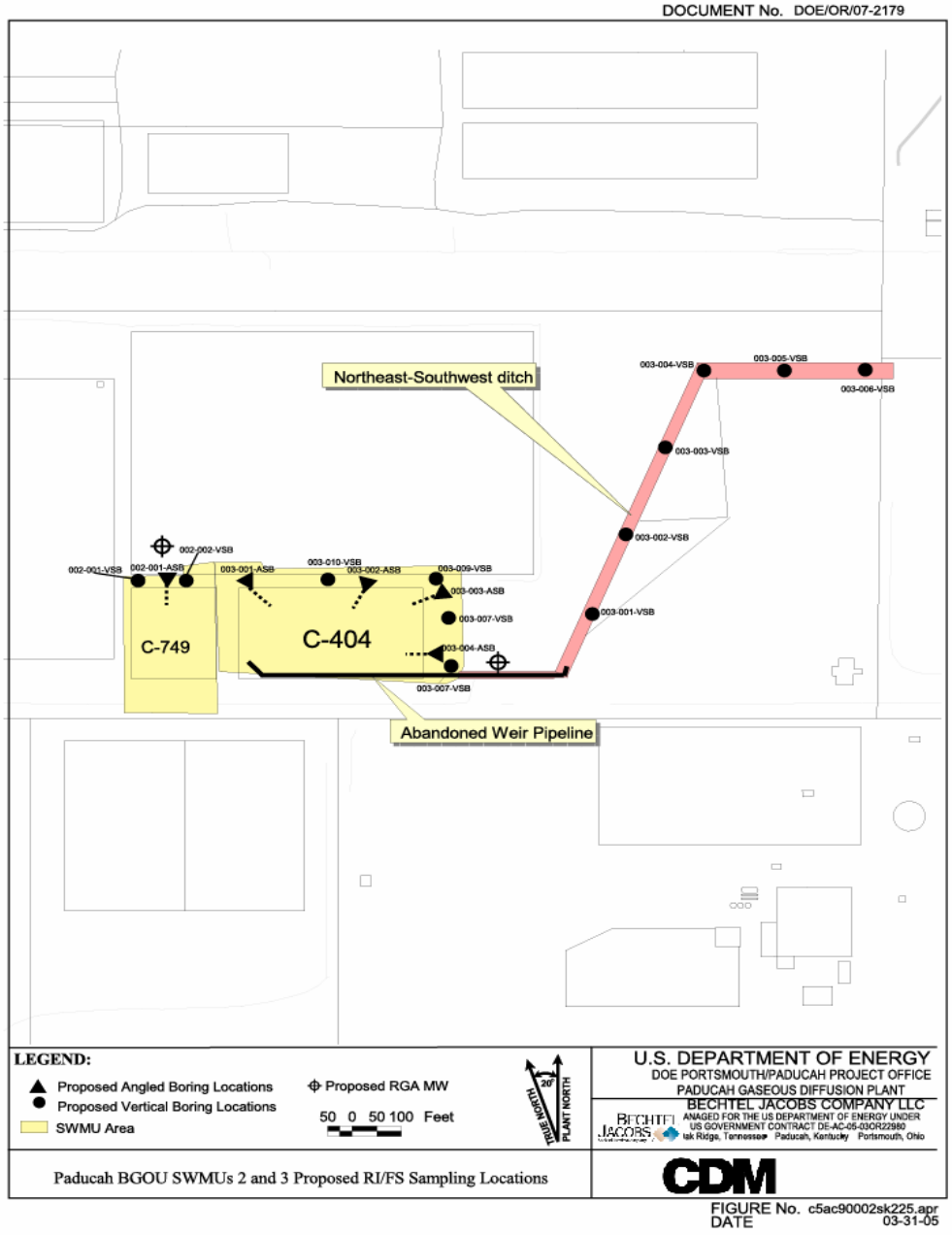
Data Gaps

There are no soil data from under the burial area. There is no suitable up-gradient or down-gradient well currently available for which background samples can be collected.

Sampling Strategy

- Drill one angle boring under the burial area and collect soil samples and one UCRS groundwater sample (if possible). Drill two vertical borings down-gradient of SWMU 2.
- Collect two sediment samples.
- Sample existing RGA up-gradient and down-gradient wells, if feasible, or install and sample new up-gradient and down-gradient wells. These wells will be up-gradient and down-gradient to SWMU 2 and 3.

SWMUs 2 and 3
Proposed RI/FS Sampling Locations



SWMU 3
C-404 Low-level Radioactive Waste Burial Ground

Site Background and History

- Approximately 1.2 acres located in the west-central portion of the secured area
- Originally constructed as a rectangular above-ground surface impoundment measuring 387 feet by 137 feet with a floor area of approximately 53,000 ft^2
- The floor of the surface impoundment was constructed of well-tamped earth, and clay dikes provided a depth of 6 feet
- In March 2003, an additional 37,000 ft^2 was added to the SWMU when a ditch area, which ran northeast-southwest and just east of SWMU 3, was included.

SWMU 3
C-404 Low-level Radioactive Waste Burial Ground

Site Background and History

- Operated as a surface impoundment from approximately 1952 until early 1957
- Influents to the impoundment originated from C-400
- Converted to a solid waste disposal facility in 1957 for solid uranium-contaminated wastes
- Contains uranium precipitated from aqueous solutions, UF4, uranium metal, uranium oxides, and radioactively contaminated trash
- A partial clay cap was installed on the eastern end of the landfill in 1982

SWMU 3
C-404 Low-level Radioactive Waste Burial Ground

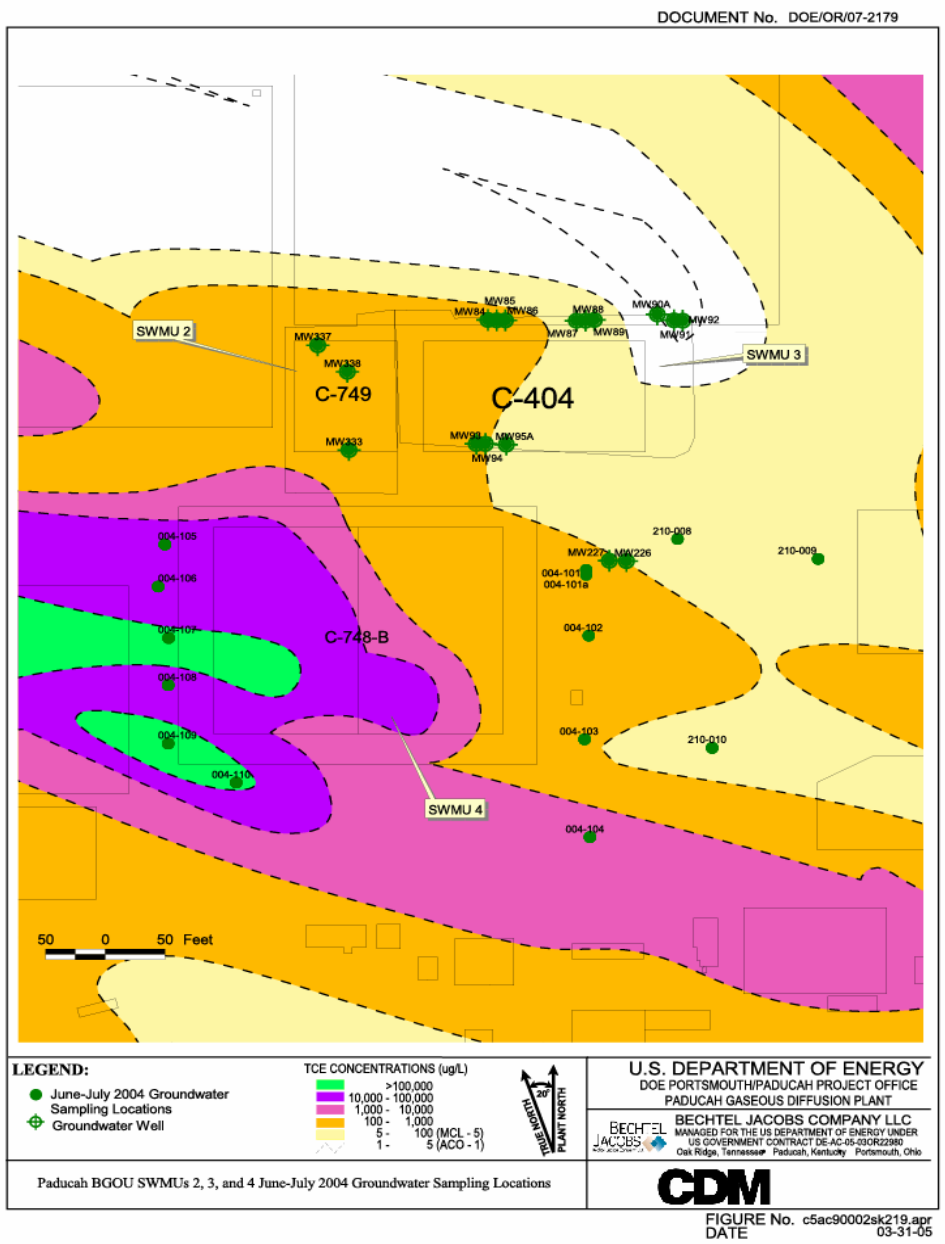
Site Background and History

- The landfill was covered with a RCRA multi-layered cap and certified closed in 1987
- Currently regulated under RCRA as a land disposal unit and is required to comply with a RCRA post-closure permit issued in 1992
- Primarily, groundwater monitoring is required

Previous Investigations

- No remedial investigations
- Post closure monitoring for groundwater

SWMUs 2, 3, and 4 June-July 2004 Groundwater Monitoring Locations



SWMU 3
Summary of Additional Data Needs

Data Gaps

There are no soil data from under the burial area or at depth. There is no suitable up-gradient well currently available from which background samples can be collected. There is potential contamination along ditches and in former ditch area(s).

Sampling Strategies

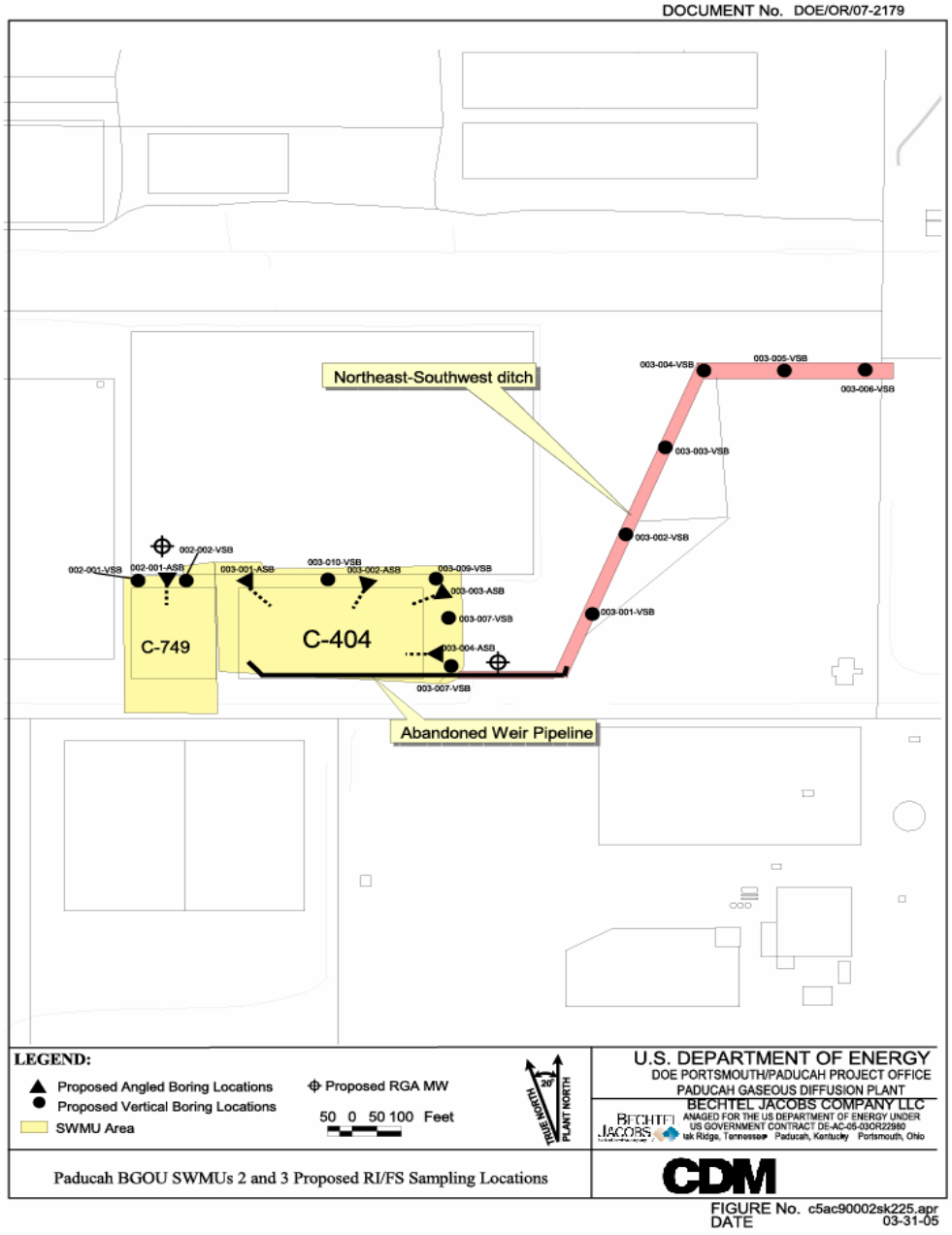
- Drill four vertical and four angle borings around, and under, the burial cell, and collect soil samples and UCRS groundwater samples (if possible).

- Sampling existing RGA up-gradient and down-gradient wells (not part of the current network), if feasible, or install and sample new up-gradient and down-gradient wells. These wells will be up-gradient and down-gradient to SWMUs 2 and 3.

- Collect four sediment samples.

- Collect surface and shallow subsurface soil samples from six vertical borings from the ditches and ditch leading to the NSDD.

SWMUs 2 and 3
Proposed RI/FS Sampling Locations



SWMU 4
C-747 Contaminated Burial Yard

Site Background and History

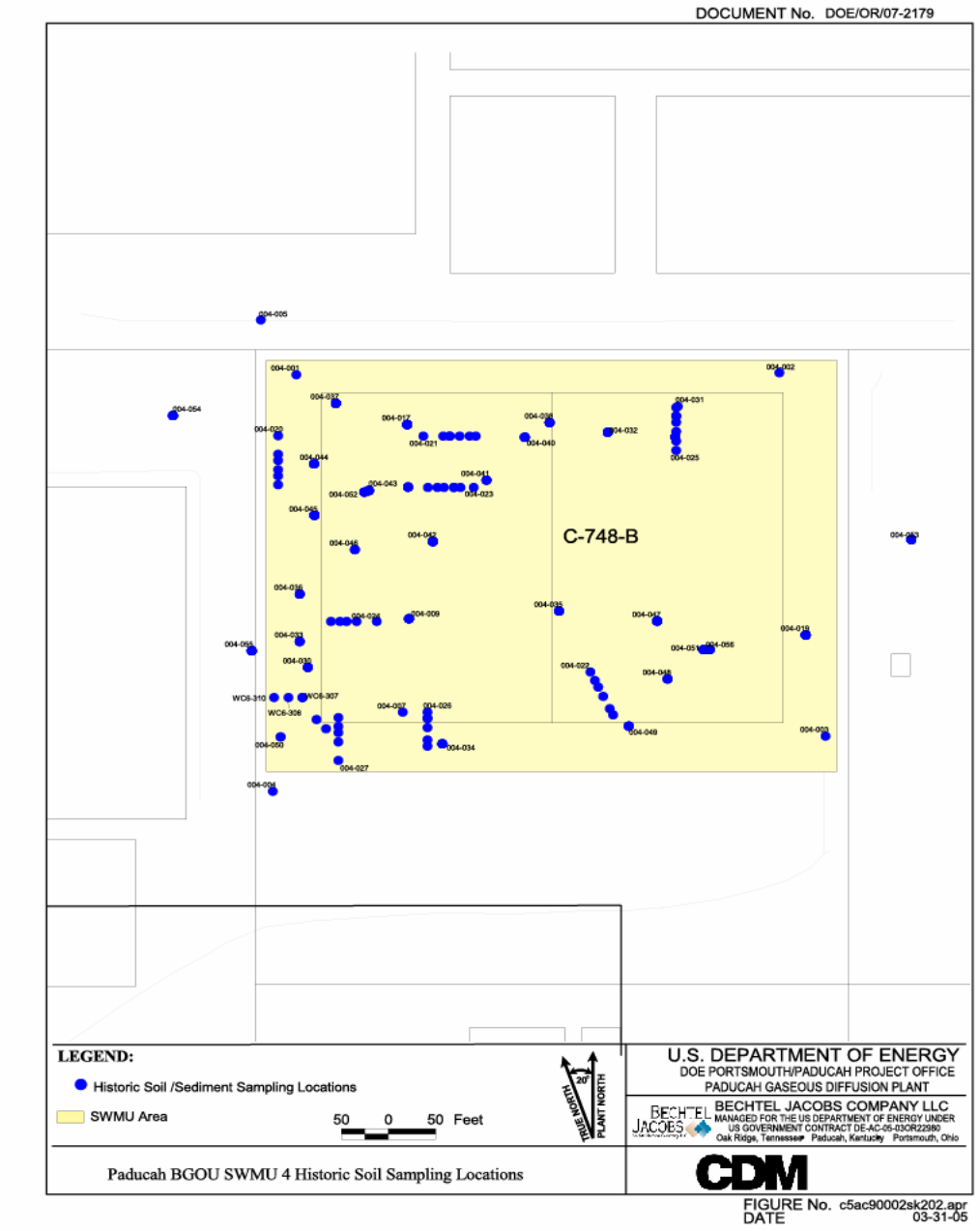
- Located in western section of the PGDP
- Operated from 1951 to 1958
- Literature indicates the burial yard consists of two pits measuring 50 ft x 50 ft and 50 ft x 150 ft, which were excavated to a depth of approximately 15 ft below ground surface
- Surface water drains to the north, east, and west with discharge eventually into KPDES Outfall 015
- Pits were used for the disposal of contaminated and uncontaminated debris (e.g., steel, Monel, etc.)
- Contaminated debris was associated with natural and slightly depleted uranium from C-410 UF6 feet plant

SWMU 4
C-747 Contaminated Burial Yard

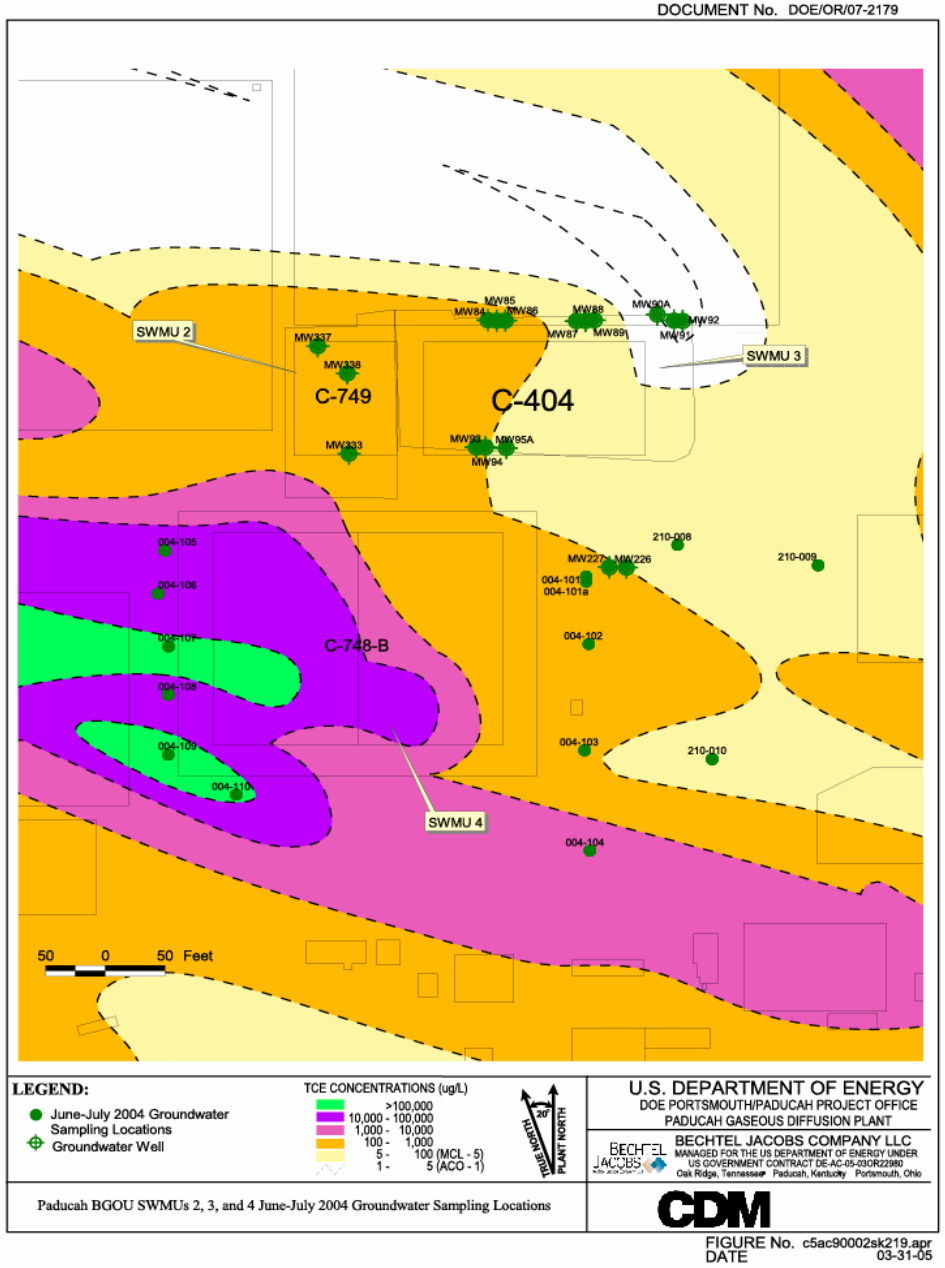
Site Background and History

- Specific locations of burial pits are unknown
- Literature indicates that SWMU is a potential source for ^{99}Tc and TCE
- May have received sludges designated for disposal at C-404 burial grounds as well as ^{99}TC, magnesium fluoride, and uranium-contaminated solid waste
- Total volume of wastes disposed within the SWMU is unknown
- Debris covered with 2 ft to 3 ft of soil, then covered with 6 inches of clay in 1982

SWMU 4
Historical Soil Sampling Locations



SWMUs 2, 3, and 4 June-July 2004 Groundwater Monitoring Locations



SWMU 4
Summary of Additional Data Needs

Data Gaps

None identified. The site has been characterized sufficiently to meet RI/FS goals.

SWMU 5
C-746-F Classified Burial Yard

Site Background and History

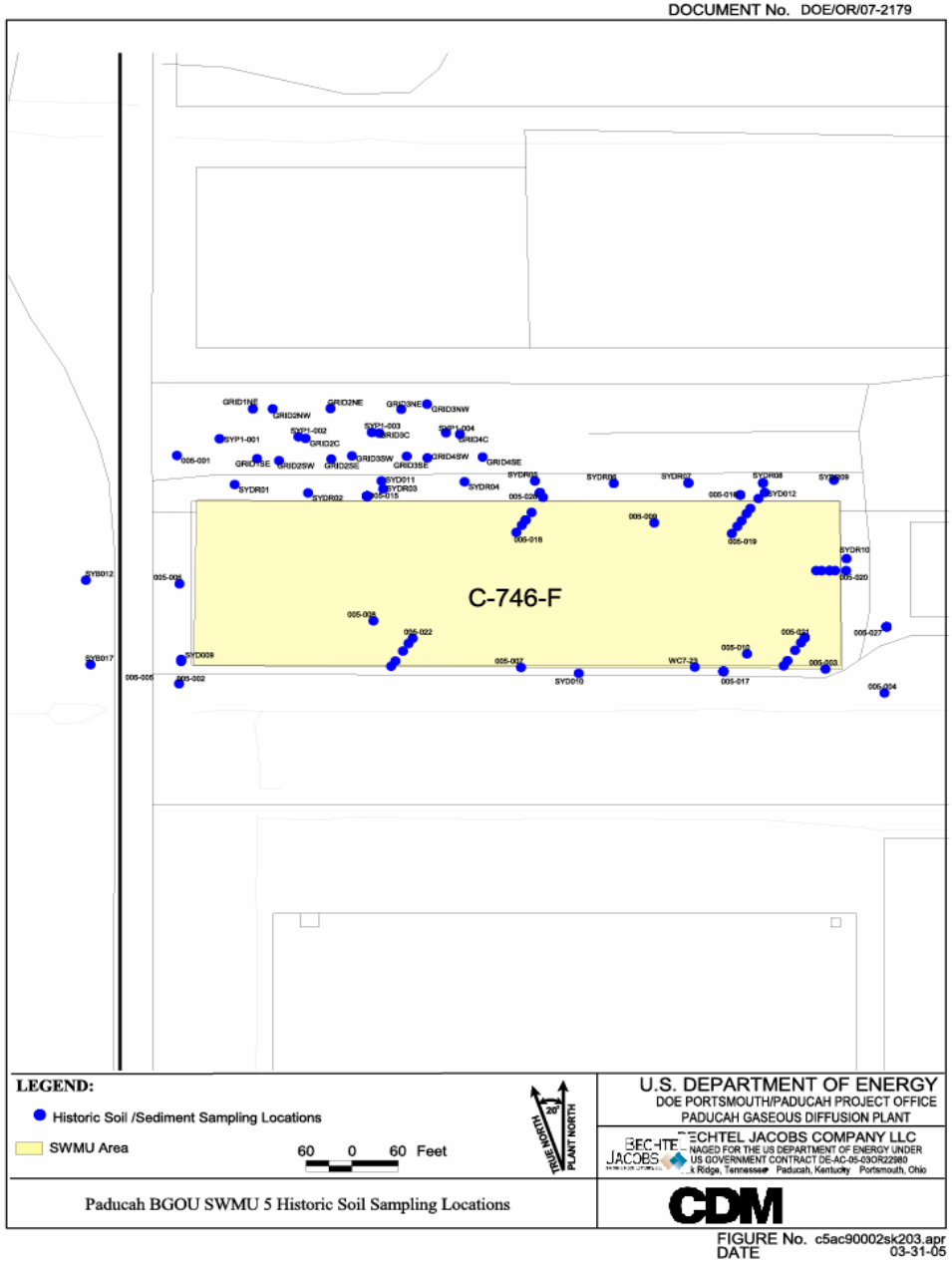
- Located in western section of the PGDP
- Operated from 1965 to 1987
- Literature indicates operating area was approximately 168,000 ft^2
- Disposal pits were located on a grid system and consisted of 10 ft x 10 ft cells excavated to depths of 6 to 15 ft below ground surface
- Literature indicates that pits were used for the burial of security-classified weapons components, some radionuclide-contaminated scrap metal, and slag from nickel and aluminum smelters
- Some of the wastes may be chemically unstable and/or incompatible compounds or metals (speculation based on underground fire in SE corner of SWMU boundary which burned for several weeks in 1976)

SWMU 5
C-746-F Classified Burial Yard

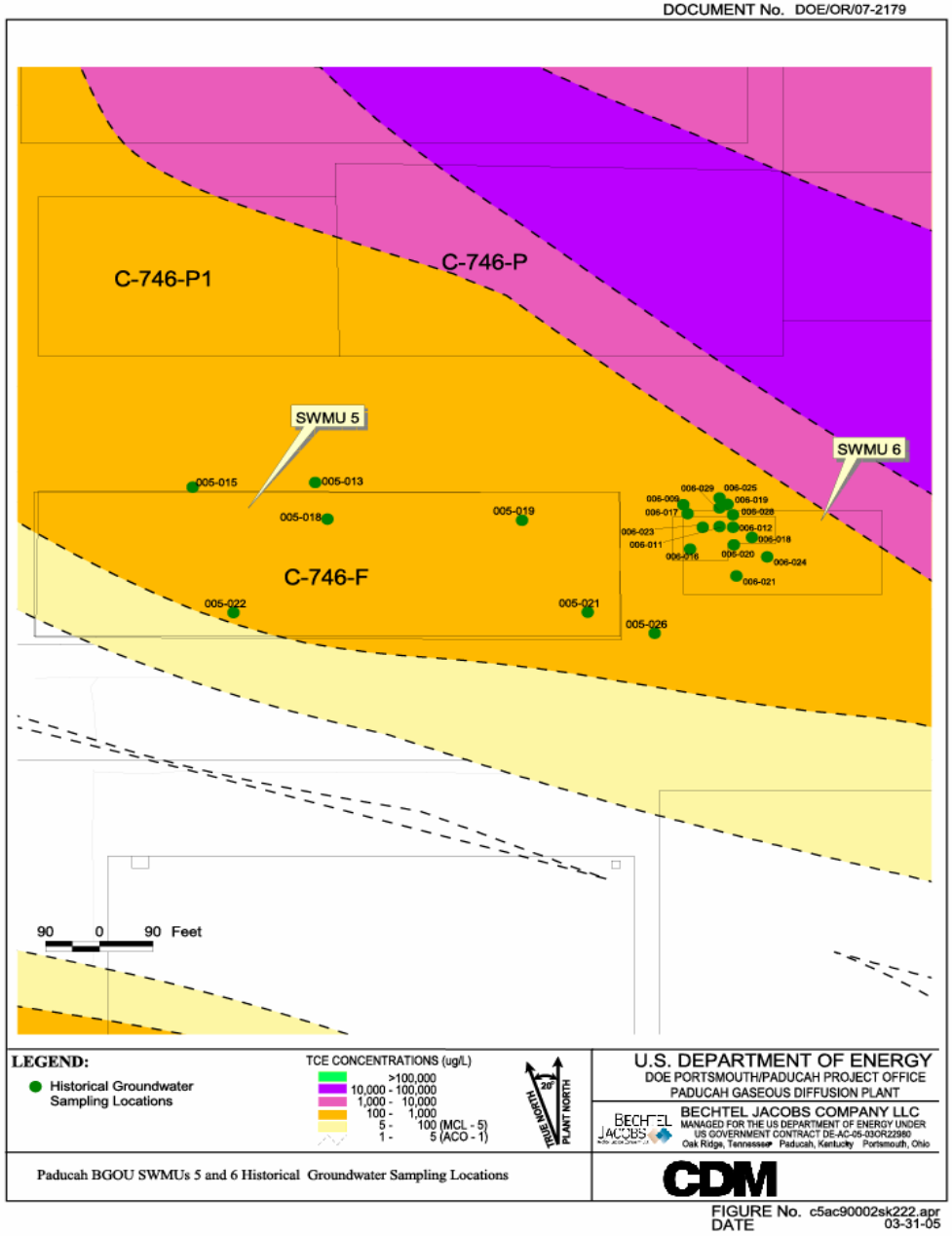
Site Background and History

- Waste placed in disposal pits was covered with 2 to 3 ft of soil
- Total quantity and specific types of wastes buried at the yard are unknown
- Surface water drains to the north, west, and south with discharge into KPDES Outfall 001
- Historical records indicate that contaminants associated with SWMU 5 may include ^{99}Tc, uranium, ^{60}Co, tritium, and ^{182}Ta
- Site is not believed to be a source of TCE contamination

SWMU 5
Historical Soil Sampling Locations



SWMUs 5 and 6
Historical Groundwater Sampling Locations



SWMU 5
Summary of Additional Data Needs

Data Gaps

No field data gaps are identified. Records concerning the environmentally hazardous nature of buried classified material should be supplied during the work plan implementation.

Data Collection Strategy

DOE will provide regulatory agencies with available records related to potential environmental concerns associated with buried wastes.

SWMU 6
C-747-B Burial Ground

Site Background and History

- Located in western section of PGDP east of SWMU 5
- Operated from 1960 to 1976
- Literature indicates that there are five separate burial cells (identified as Areas H, I, J, K, and L) that cover an area of 5200 ft^2
- Depth of cells is reported to be 6 ft to 10 ft below ground surface
- No previous investigations have been conducted specifically at SWMU 6

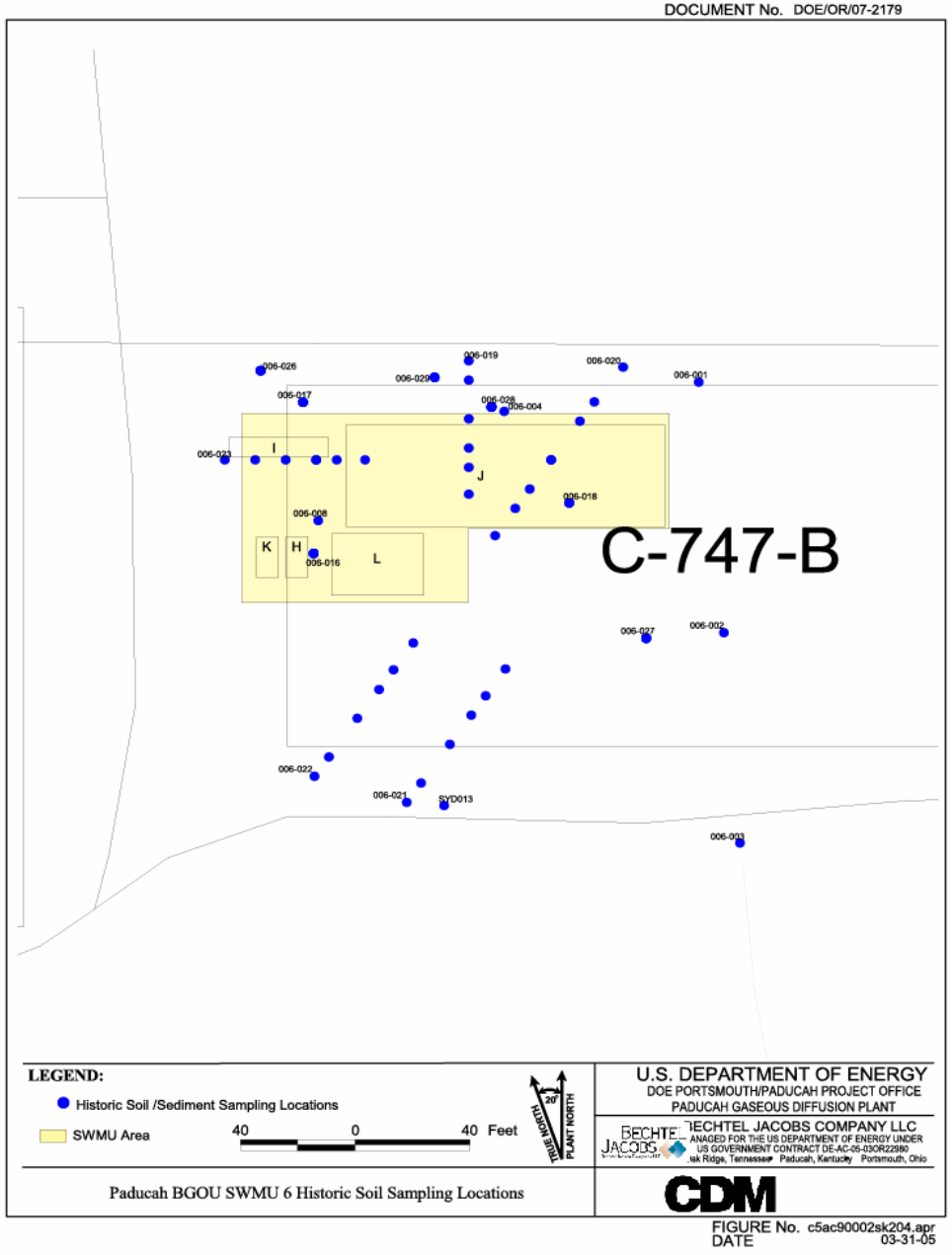
SWMU 6
C-747-B Burial Ground

Site Background and History

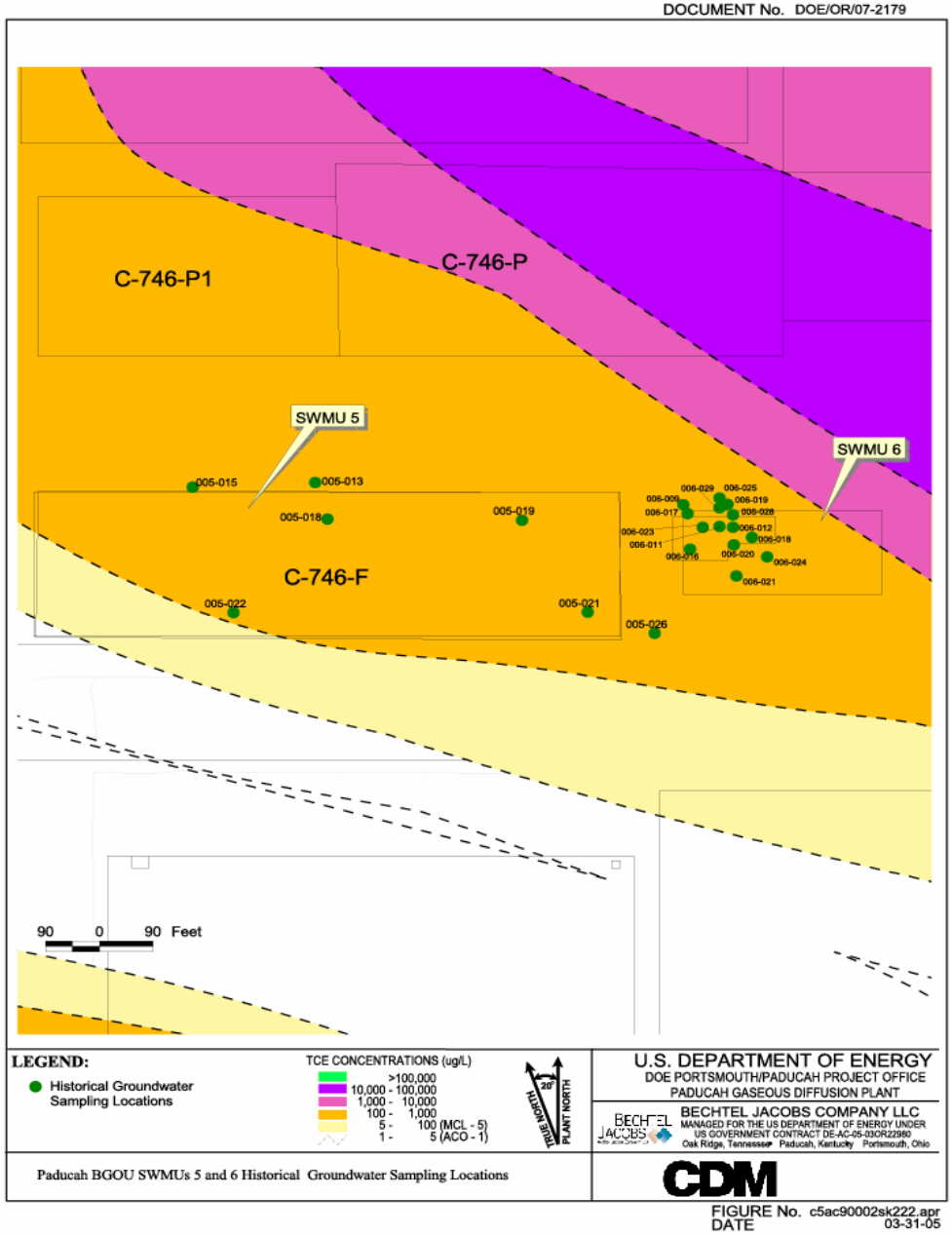
Known Waste Inventories

- Area H: 75 ft^3 magnesium scrap
- Area I: 8 exhaust fans contaminated with perchloric acid
- Area J: 1100 ft^3 aluminum scrap
- Area K: 150 ft^3 magnesium scrap
- Area L: UF_6 condenser

SWMU 6
Historical Soil Sampling Locations



SWMUs 5 and 6
Historical Groundwater Sampling Locations



SWMU 6
Summary of Additional Data Needs

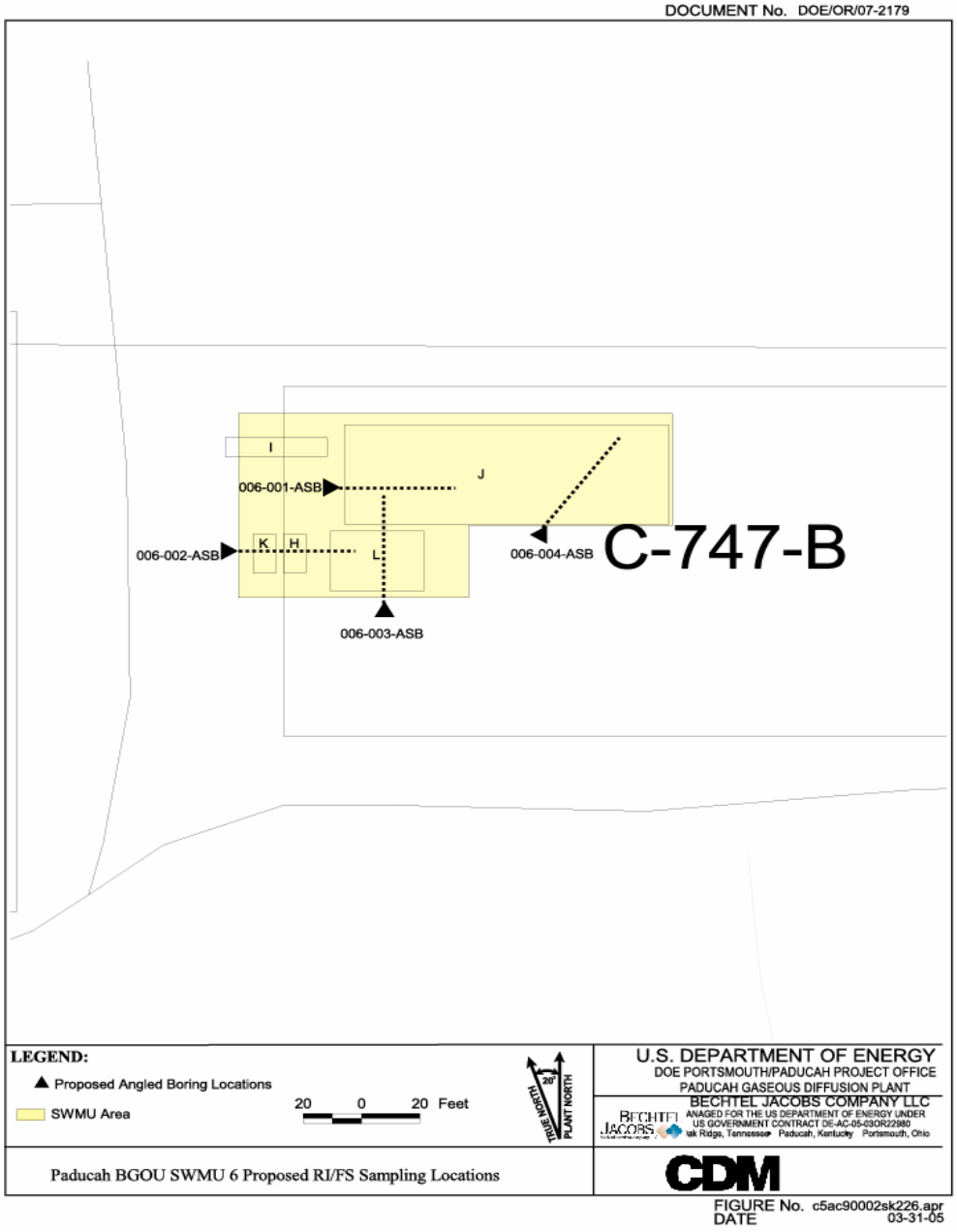
Data Gaps

There are no metallic uranium and limited uranium from previous investigations. Some areas under the cells are not well characterized due to a previous inability to access the areas.

Sampling Strategy

Drill four angle borings near the location where the highest contamination was found previously. Collect soil samples and UCRS groundwater samples (if possible).

SWMU 6
Proposed RI/FS Sampling Locations



SWMU 7
C-747-A Burial Ground

Site Background and History

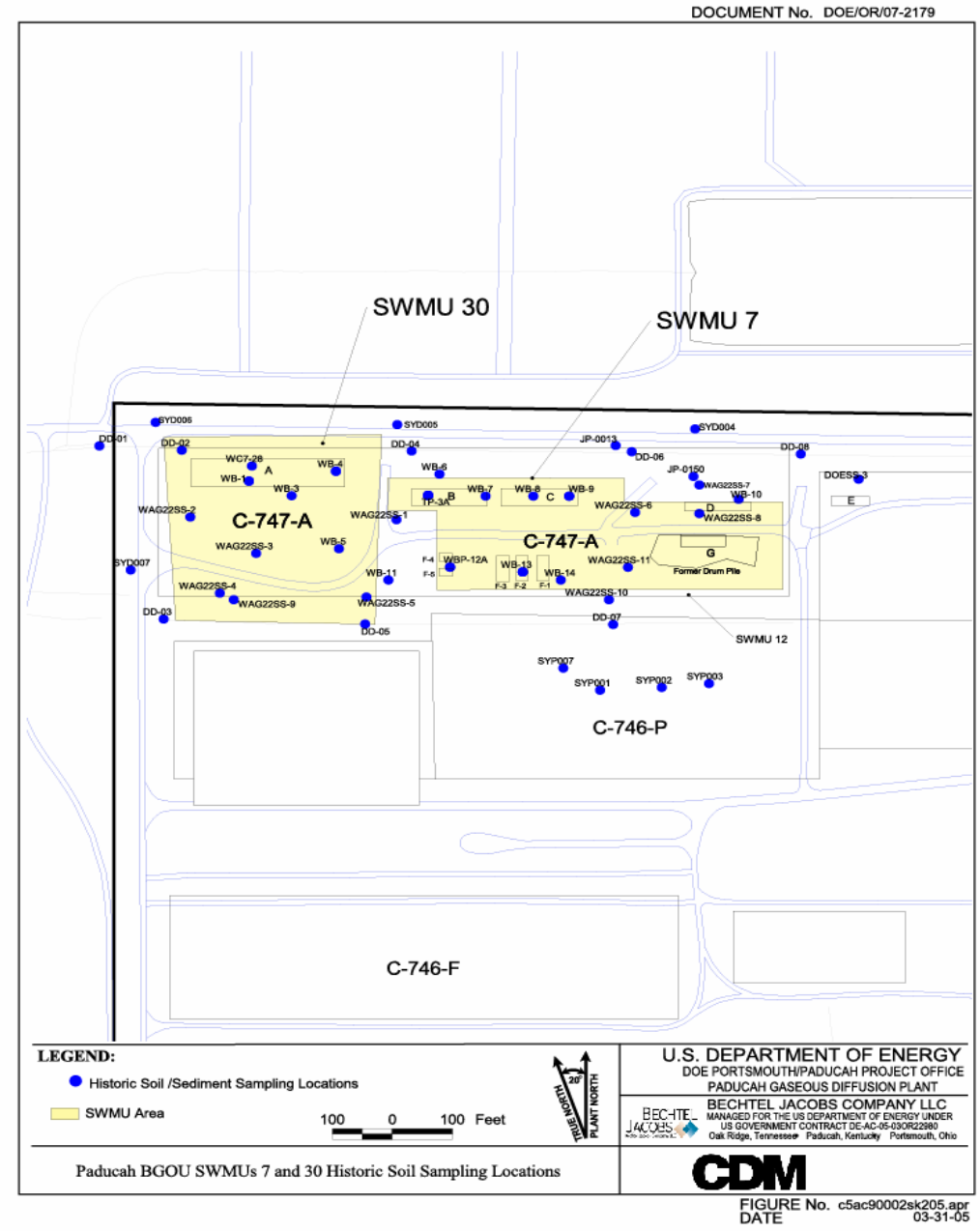
- Comprised the eastern two-thirds of C-747-A
- Bounded on the north and south sides by perimeter ditches, on the west side by the C-747-A Burn Area (SWMU 30), and on the east side by the C-746-E Contaminated Scrap Yard
- Covers approximately 240,900 ft^2 and includes five discrete burial pit areas (Burial Pits B, C, D, F, and G)
  - Pit B: 10,200 ft^2
  - Pit C: 9,600 ft^2
  - Pit D: 2,100 ft^2
  - Pit F: five areas each ≤ 1,800 ft^2
  - Pit G: 3,300 ft^2

SWMU 7
C-747-A Burial Ground

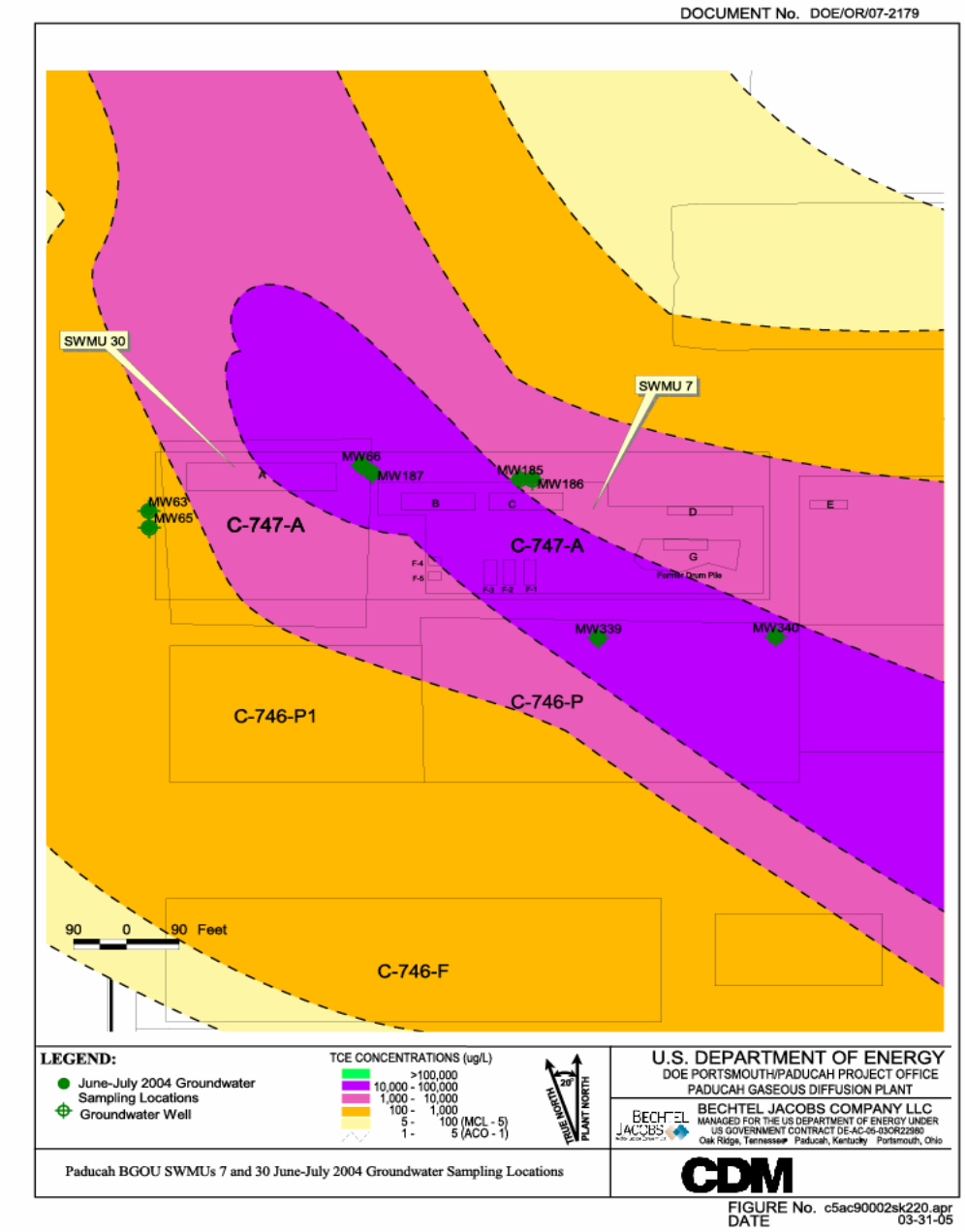
Site Background and History

- Records indicate the burial pits were excavated to a depth of 6 to 7 ft below the surface, filled with wastes, and covered with approximately 3 ft of earth
- TB-3 of Phase II Site Investigation discovered waste to a depth of 10 ft on the west side of Burial Pit B
- Drum Mountain previously removed from area
- Burial Pits B, C, and G were used for disposal of noncombustible, contaminated and uncontaminated trash, material and equipment. Contaminated concrete removed from the C-410 Feed Plant during May and June 1960 was place in Burial Pit D
- The F Burial Pit was used for disposal of uranium-contaminated scrap metal and equipment. Empty uranium and magnesium powder drums were also reported to have been buried in Burial Pit F

SWMUs 7 and 30
Historical Soil Sampling Locations



SWMUs 7 and 30 June-July 2004 Groundwater Monitoring Locations



SWMU 30
C-747-A Burn Area

Site Background and History

- Includes the western one-third of C-747-A
- Consists of a historical burn-and-burial pit (Burial Pit A) and the location of a former incinerator
- Bounded on the north and south sides by ditches, on the west side by Patrol Road, and on the east side by SWMU 7
- Encompasses approximately 128,000 ft^2. The pit is reported to have been excavated to a depth of 12 ft and covered with 4 ft on earth.
- Used from 1951 to 1970 to burn combustible trash which may have contained uranium contamination
- Ash and debris were buried below ground in Burial Pit A beginning in 1962, when use of an on-site incinerator was discontinued
- Research identified images of the incinerator at the location

SWMUs 7 and 30
Summary of Additional Data Needs

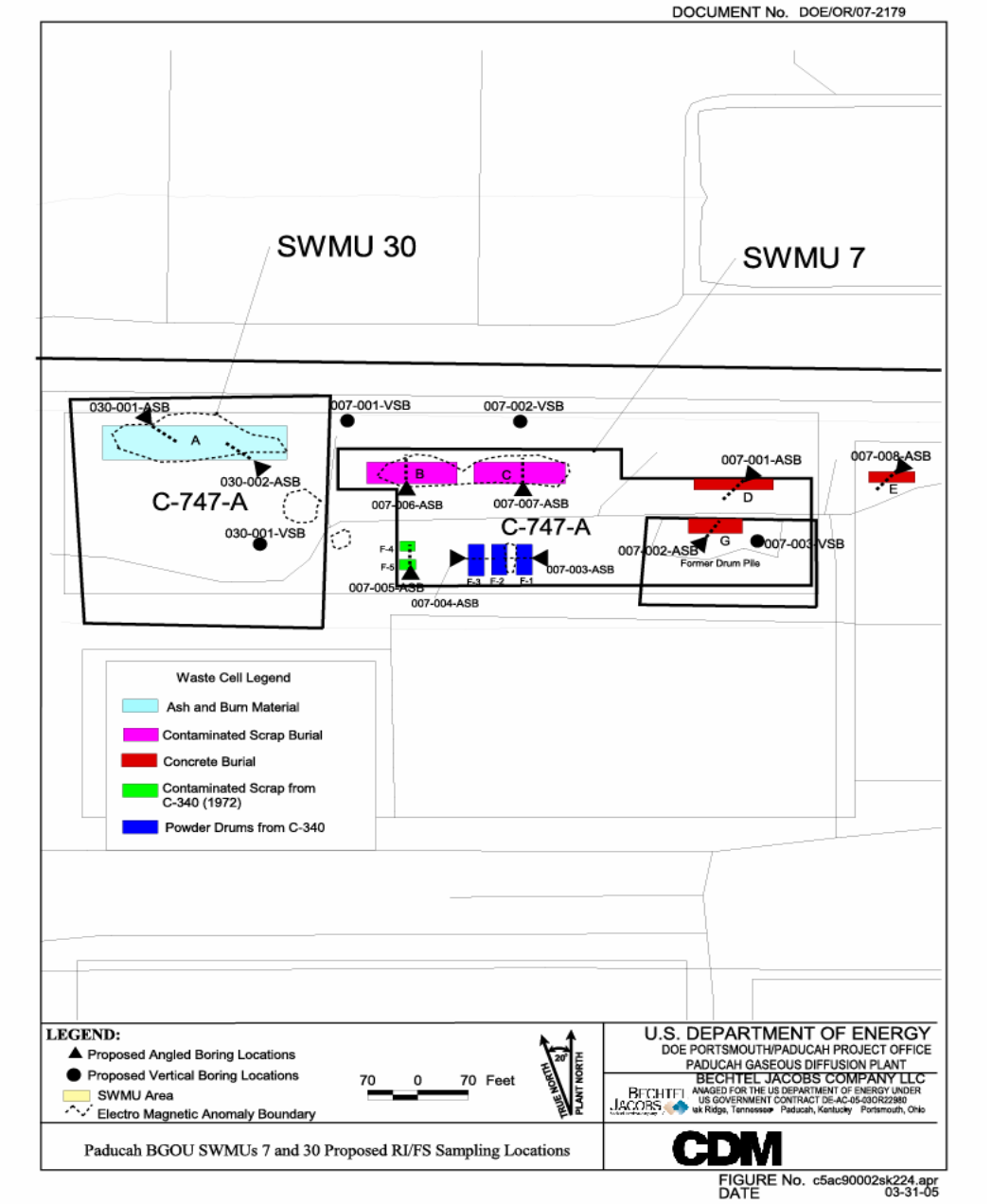
Data Gaps

TCE contamination from the burial pits is from an unknown source. No boreholes at depth are sufficient to determine the full extent of contamination under the cells. Boundaries of burial cells need to be better defined – no definitive boundaries – only estimates. Areas under the former Drum Mountain should be characterized. Anomalous areas between SWMUs 7 and 30 and Pit E should be delineated and investigated.

Sampling Strategy

- Conduct a geophysical survey to determine the pit boundaries where uncertainties have been identified and to define the anomalous areas.
- Drill 11 angle borings (one under each pit) and collect soil samples and UCRS groundwater samples (if possible).
- Drill two vertical borings (one in the incinerator area and one at the former Drum Mountain location) and collect soil samples and UCRS groundwater samples (if possible).
- Drill two vertical borings and collect soil samples north of the pits to evaluate TCE contamination in shallow groundwater. Collect soil samples and UCRS groundwater samples (if possible).
- Drill up to three additional contingency vertical borings in any of the areas where the vertical borings identified contamination. Collect soil samples and UCRS groundwater samples (if possible).
- Conduct a radiological surface walkover with up to 20 contingency grab samples for radiological analysis.

SWMUs 7 and 30
Proposed RI/FS Sampling Locations

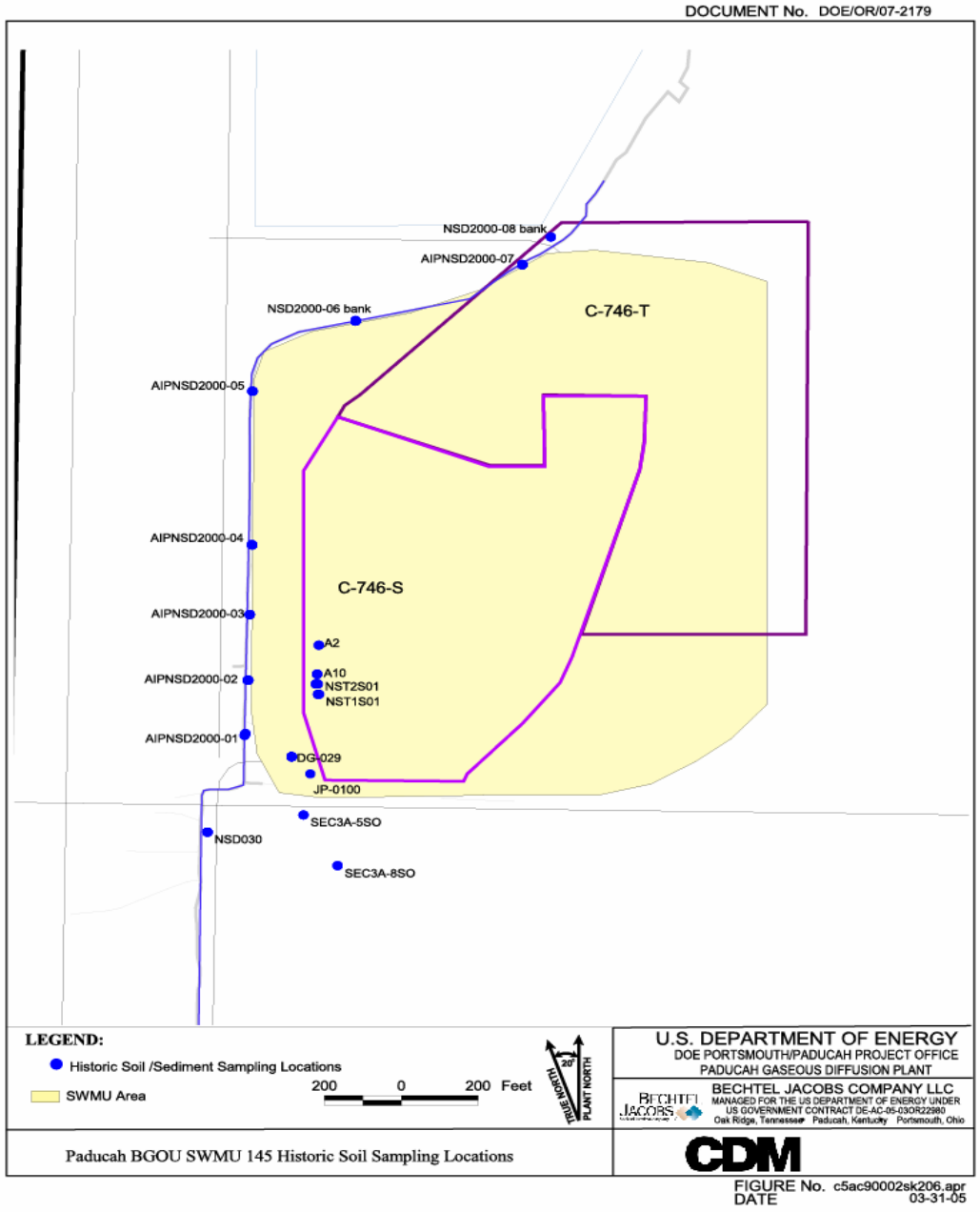


SWMU 145
Residential/Inert Landfill Borrow Area

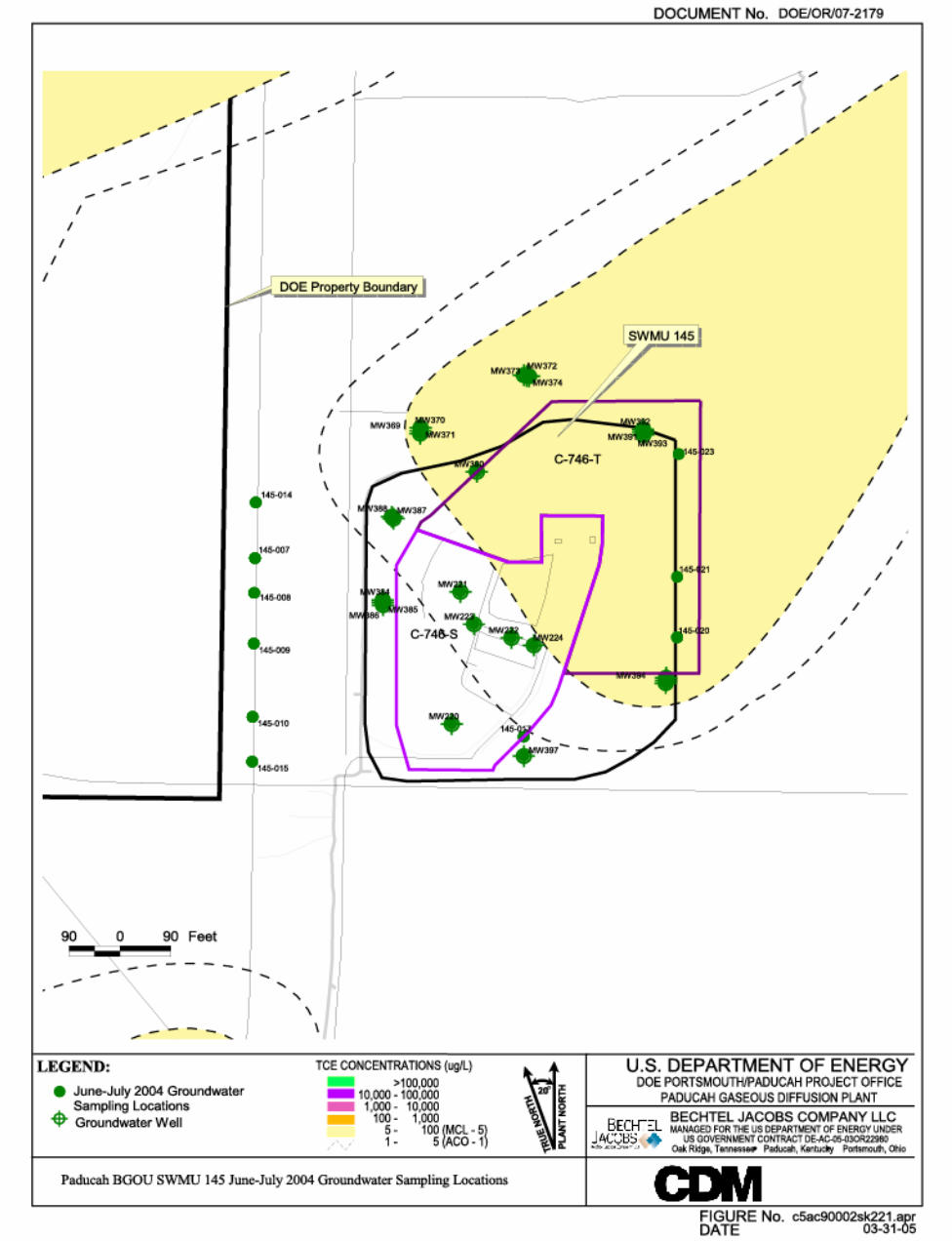
Site Background and History

- Approximately 44 acres located north of the PGDP security area
- Began operation in the early 1950s
- C-746-S&T Landfills are located on top of SWMU 145
- Area was used by the contractor for the construction of the PGDP to discard all types of scrap and waste materials
- Use of the area for discarding of scrap and waste by subcontractors was continued until the early 1980s
- Construction debris such as concrete, roofing materials, wire, wood, shingles with asbestos, and welding rods are expected to have been disposed of in the area

SWMU 145
Historical Soil Sampling Locations



SWMU 145 June-July 2004 Groundwater Monitoring Locations



SWMU 145
Summary of Additional Data Needs

Data Gaps

There are no soil data from within or under the burial area. Surface radiological levels are unknown.

Sampling Strategy

- Conduct a geophysical survey to determine the pit boundaries where uncertainties have been identified.
- Drill seven angle borings and collect soil samples and UCRS groundwater samples (if possible). If geophysical survey does not determine appropriate pits to angle beneath, then vertical borings will be utilized.
- Conduct a radiological surface walkover with up to 10 contingency grab samples for radiological analysis in areas not defined by the C-746-S&T Landfills.

SWMU 145
Proposed RI/FS Sampling Locations

DOCUMENT No. DOE/OR/07-2179