# 1.0 PROJECT DESCRIPTION

## 1.1 INTRODUCTION

The Phase I Remedial Investigation (RI) of Erie Burning Grounds (EBG) at the Ravenna Army Ammunition Plant (RVAAP), Ohio (Figure 1-1) will evaluate the presence and distribution of contaminants in soil, surface water, and sediment with respect to facility-wide background criteria for all significant media.

This Phase I RI Sampling and Analysis Plan (SAP) Addendum for the EBG at RVAAP has been prepared by Science Applications International Corporation (SAIC) under contract DACA62-94-D-0029, Delivery Order No. 0072, with the U.S. Army Corps of Engineers (USACE), Louisville District. This SAP Addendum has been developed to tier under and supplement the *Facility-Wide Sampling and Analysis Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 1996a). The Facility-wide SAP provides the base documentation, technical procedures, and investigative protocols for conducting RIs under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at RVAAP, whereas this SAP Addendum includes all of the sampling and analysis objectives, rationale, planned activities, and criteria specific to the Phase I RI at EBG. Consequently, the Phase I RI cannot be implemented without the guidance provided in both documents. Where appropriate, the SAP Addendum contains references to the Facility-wide SAP for standard procedures and protocols.

Both the Facility-wide SAP and this SAP Addendum have been developed following the USACE guidance document, *Requirements for the Preparation of Sampling and Analysis Plans, EM200-1-3, September 1994* (USACE 1994), to collectively meet the requirements established by the Ohio Environmental Protection Agency (Ohio EPA), Northeast District, and the U.S. Environmental Protection Agency (EPA), Region V, for conducting CERCLA investigations.

## 1.2 EBG HISTORY AND CONTAMINANTS

The RVAAP is located in northeastern Ohio in Portage and Trumbull Counties and lies about 16 km (10 miles) east of Ravenna, Ohio (Figure 1-1). Operations at the facility date to 1940 and include the storage, handling, and packing of military ammunition and explosives. The facility encompasses 8,668 hectares (21,419 acres) and is jointly operated by the Industrial Operations Command (IOC) of the U.S. Army and the National Guard Bureau. The IOC controls environmental areas of concern (AOCs) and bulk explosives storage areas. A detailed history of process operations and waste disposal processes for each AOC at RVAAP (Figure 1-2) is presented in the *Preliminary Assessment for the Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 1996b). The following is a summary of the history and related contaminants for EBG.

EBG (Figure 1-3), designated as AOC RVAAP-2, was in operation from 1941 to 1951. The Phase I RI characterization area covers approximately 14.2 hectares (35 acres) and encompasses the known operational area of EBG. The burning grounds are situated on the northeastern corner of the facility. The site was used to conduct open burning of explosives and related materials. Prior to purchase by the Army in 1940, the site may have been used for brick manufacturing (Jacobs Engineering 1989). Bulk, obsolete, nonspecification explosives, propellants, rags, and Army rail cars used for transporting explosives across the installation were treated at EBG.

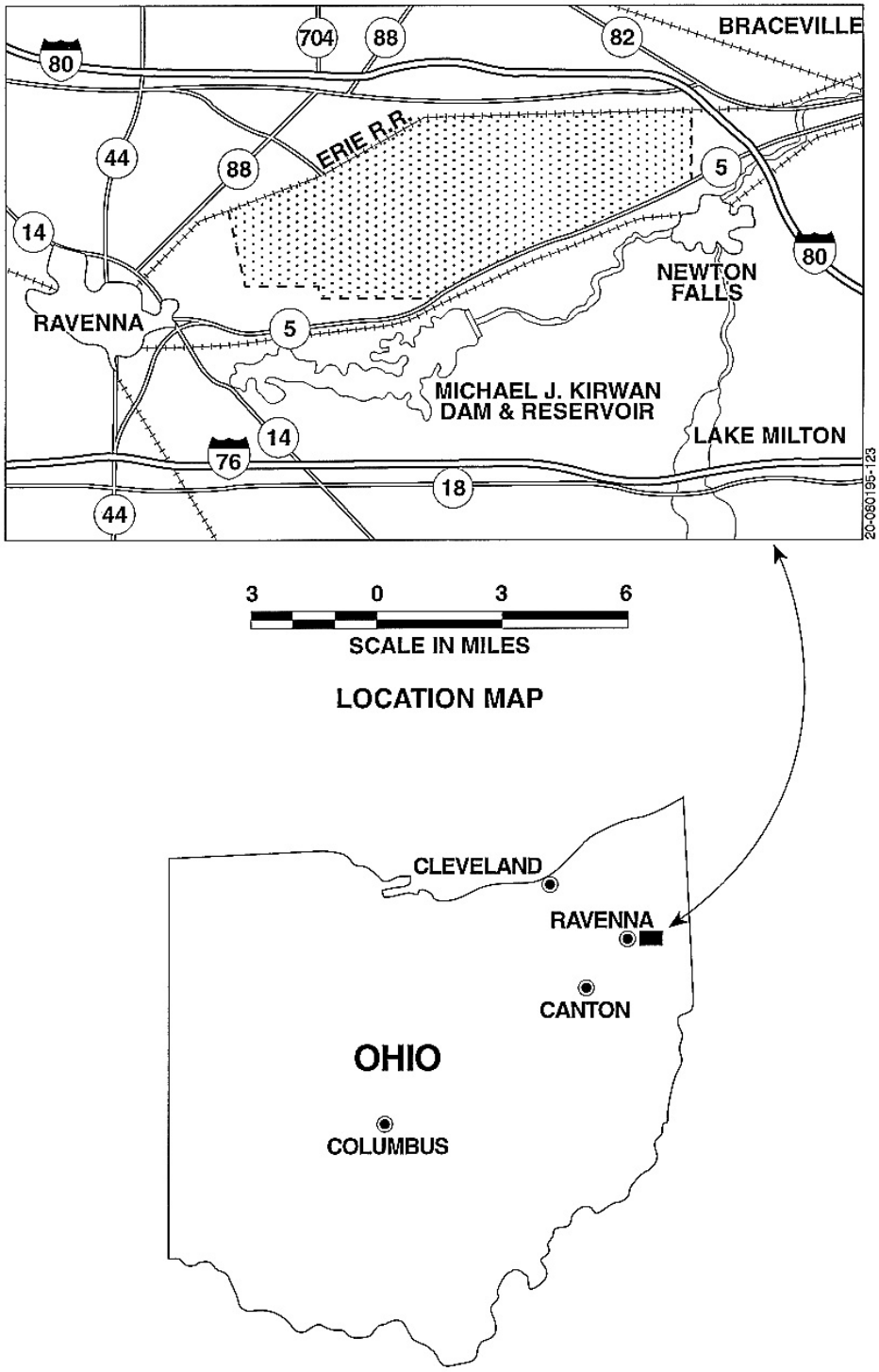


**Figure 1-1. General Location and Orientation of RVAAP**

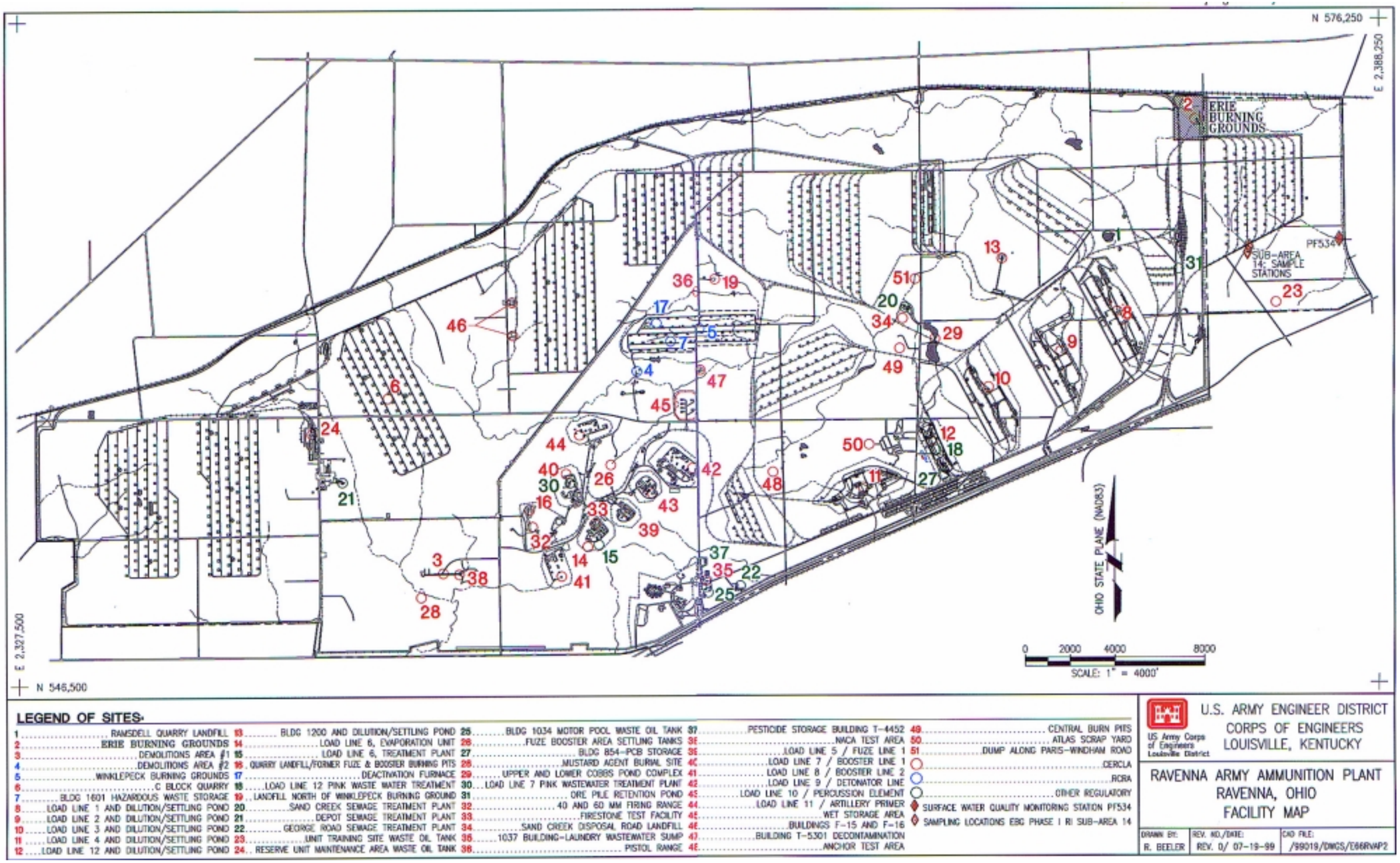


**Figure 1-2. RVAAP Installation Map**

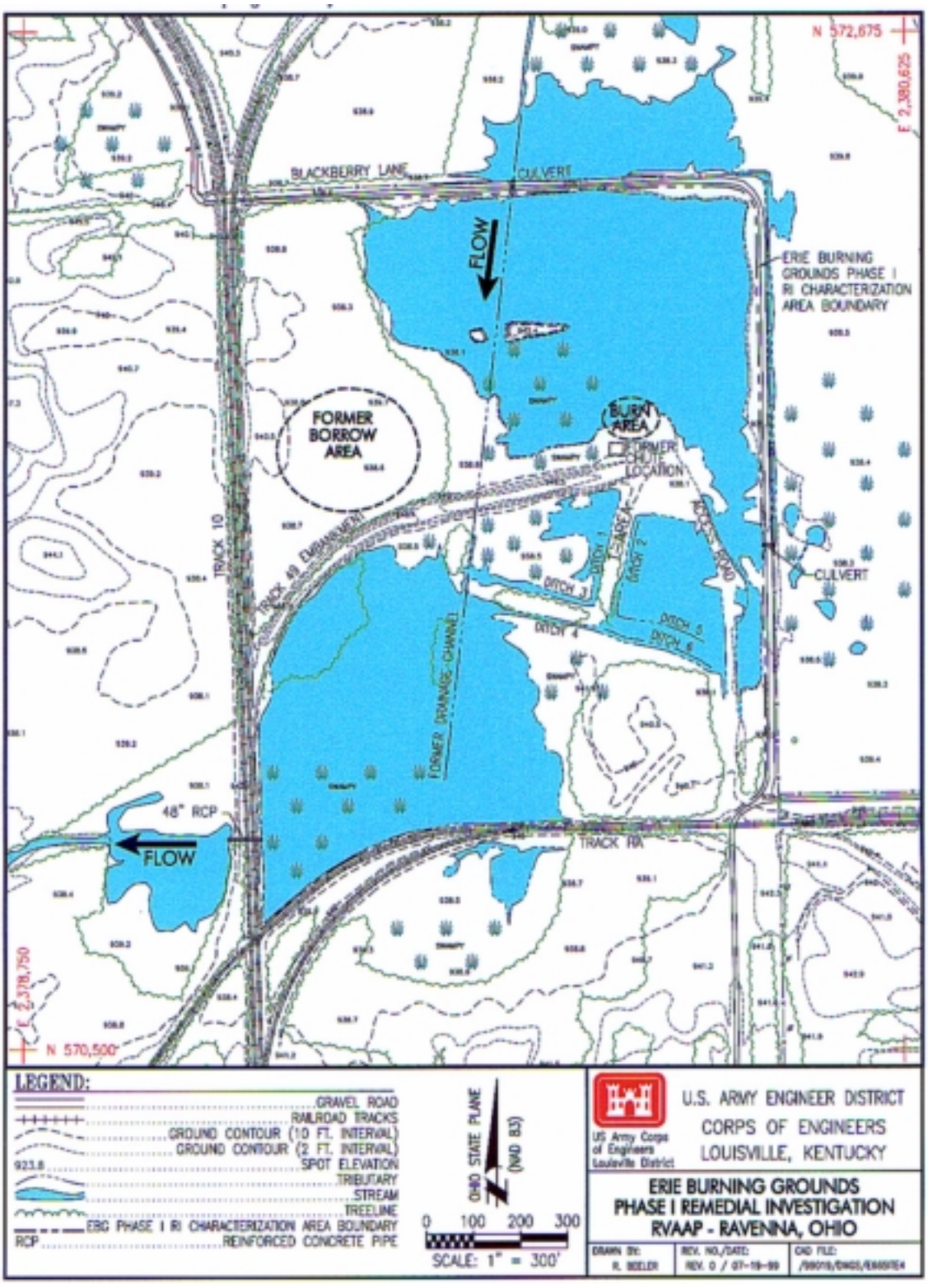


**Figure 1-3. Erie Burning Grounds Site Map**

Aerial photos of the site from the 1940s and 1950s depict open box cars staged at the end of the rail spur, known as Track 49. Presumably, materials were either tipped out of the cars on either side of the embankment to be burned, or entire box cars were ignited on the track to destroy their contents. Evidence of activity in the aerial photos is indicated at the northeastern terminus of the rail spur, where it meets the gravel approach road. Engineering drawings dated 1941 show a waste chute on the north side of Track 49 approximately 200 feet from the terminus; the chute leads to a designated burning area on the drawings. Three pairs of trenches, now approximately 4 feet deep, were dug at EBG, perhaps to collect water and to serve as containment barriers for fires set with waste explosives placed in the "T-Area" between the trenches. These ditches were connected to the original creek channel that flowed through the approximate center of the site, about 300 feet west of the "T-Area." A borrow area between Track 10 and Track 49 may potentially have been used for disposal by open burning. Unspecified large metal items were also treated to remove explosive residues. Metal items were salvaged and processed as scrap (Jacobs Engineering 1989). Ash residues from open burning remained on the site.

The principal sources of contaminants are the ash residues derived from the burning of TNT, RDX, and propellants. These residues potentially contain small amounts of explosives and heavy metals. Estimates of the quantities of wastes disposed by burning at EBG have reached as high as one million pounds (Jacobs Engineering 1989), but it is unknown if this figure is accurate.

Current conditions at EBG differ greatly from those during its active life. The area became a wetland in the early 1990s as a consequence of the plugging of a culvert and beaver damming of small streams that drained the burning grounds. Four main surface water basins now occupy the lowlands at the site. The largest surface water basin north of Track 49 (see Figure 1-3) has periodically drained on its own. The current depth of the water in the pond reaches a maximum of 5 feet within the former drainage channel, but is generally less than 1 foot in most areas. Wetlands extend to the north and east beyond EBG. Surface water within EBG is connected to these adjacent wetlands by a number of culverts beneath Blackberry Lane along the east and north border of the site. Surface water flow is from the north into EBG with drainage from the site to the southwest through a 48-inch diameter reinforced concrete pipe (RCP) beneath Track 10. Also, culverts beneath Blackberry Lane along southeastern portion of the site may direct flow from the west into EBG.

The areas that remain above water (Figure 1-3) are: (1) the railroad embankment and track, (2) the gravel access road, (3) a portion of the elevated "T-area" between the two pairs of parallel trenches, (4) the portion of the site northwest of the soil borrow area, and (5) a wooded area adjacent to the "T-Area" near the southeast corner of EBG. Dense brush vegetation now covers the portions of the site that are not submerged.

## 1.3 SUMMARY OF EXISTING DATA

Appendix A presents a summary of the previous investigations performed at EBG. Three previous investigations have been conducted: (1) Soil and Sediment Analyses, RVAAP (Mogul Corporation 1982); (2) Water Quality Surveillance Program (USATHAMA 1980-1992); and (3) Relative Risk Site Evaluation (USACHPPM 1996). Figures 1-4 and 1-5 present the locations and media sampled during the Water Quality Surveillance Program and Relative Risk Site Evaluation. Location data for the 1982 Mogul Corporation study are not available. Table 1-1 summarizes the chemical analytical data relevant to this RI. Historical data are of limited usefulness because data quality documentation is lacking, older analytical methods had lower degrees of precision and accuracy, and detection limits were generally higher for older analyses (i.e., early and mid-1980s data).

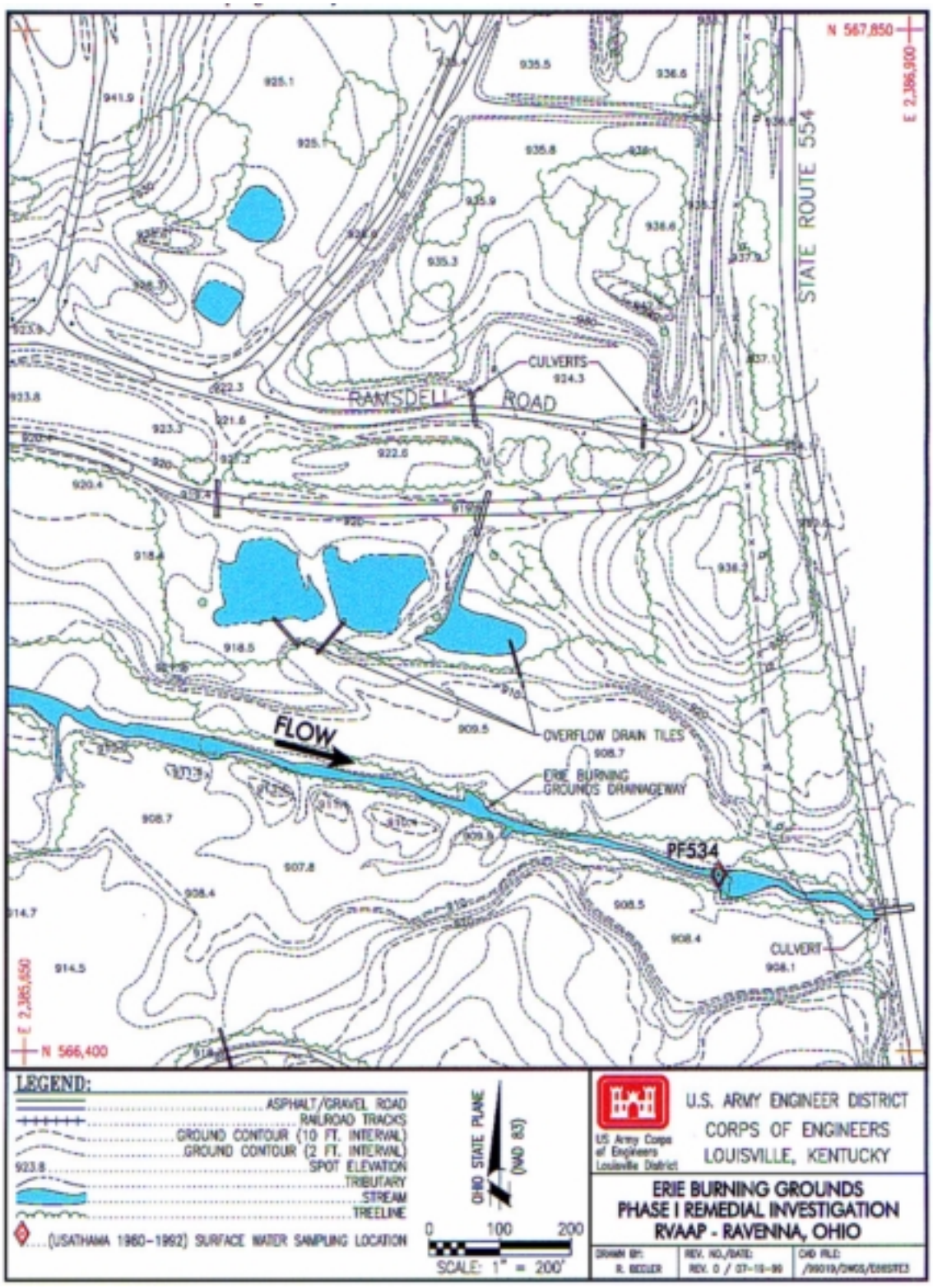


**Figure 1-4. Historical Surface Water Sample Location PF 534, Water Quality Surveillance Program**

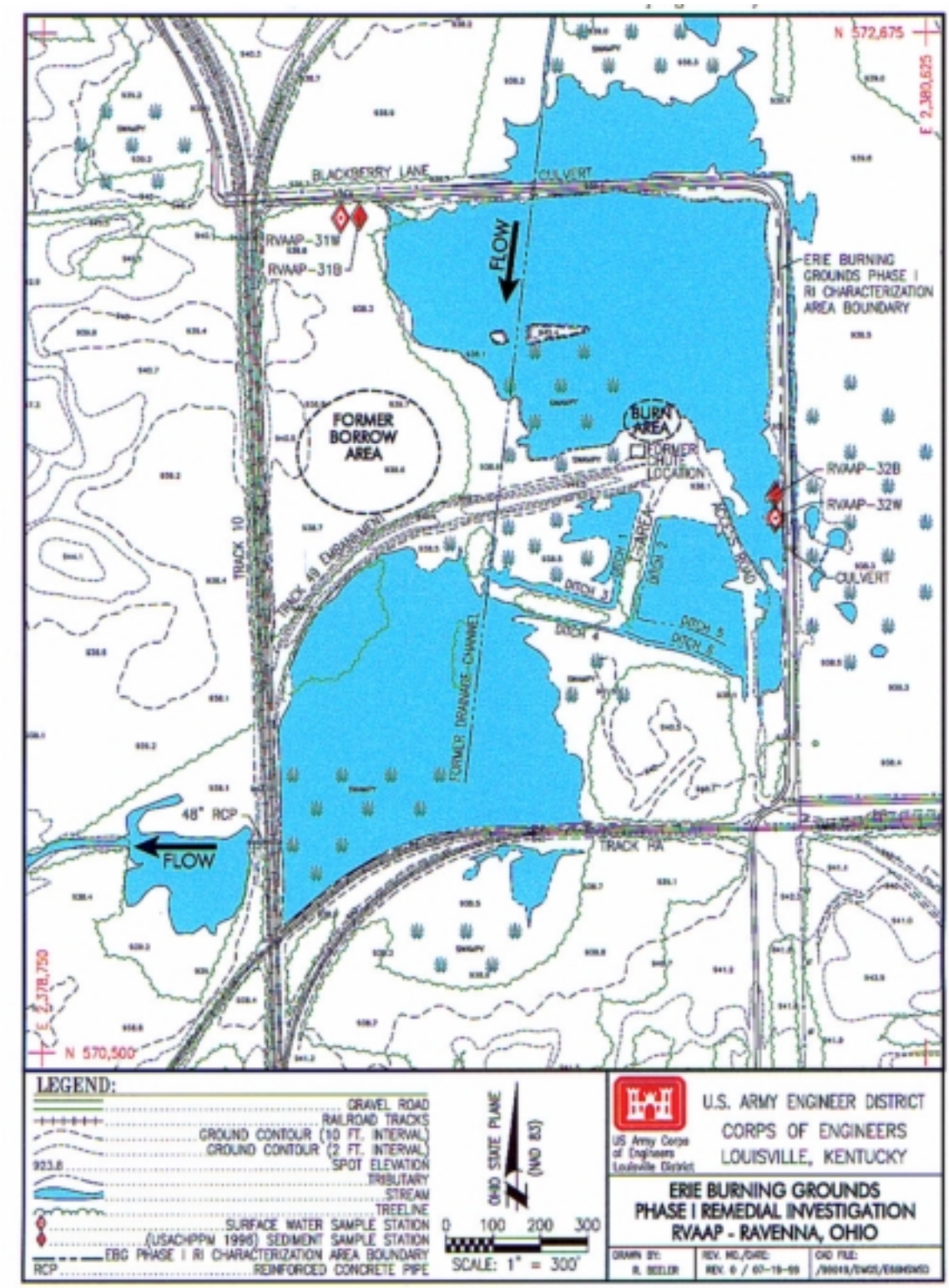


**Figure 1-5. Historical Surface Water/Sediment Sample Locations, Relative Risk Site Evaluation**

**Table 1-1. Summary of Historical Analytical Data**

| Parameter | Minimum | Maximum | Mean[a] | No. of Detects per No. of Results |
|---|---|---|---|---|
| *Sampling Program: PF 534 Surveillance (water, µg/L)[b]* | | | | |
| RDX | 64[c] | 64[c] | 64[c] | 1/9[c] |
| Chromium, hexavalent | 11 | 11 | 11 | 1/9 |
| Copper | 10 | 25 | 17.5 | 2/9 |
| Zinc | 20 | 99 | 43.5 | 4/9 |
| *Sampling Program: RRSE (surface water, µg/L)[d]* | | | | |
| Arsenic | 4 | 4 | 4 | 1/2 |
| Barium | 27 | 29 | 28 | 2/2 |
| Copper | 29 | 29 | 29 | 1/2 |
| Lead | 11 | 16 | 135 | 2/2 |
| *Sampling Program: RRSE (sediment, mg/kg)[d]* | | | | |
| Arsenic | 3.99 | 9.94 | 6.96 | 2/2 |
| Barium | 35.7 | 113 | 74.4 | 2/2 |
| Chromium | 3.61 | 18.6 | 11.1 | 2/2 |
| Copper | 5.31 | 32.8 | 19.06 | 2/2 |
| Zinc | 38.3 | 217 | 127.65 | 2/2 |

aMean value includes only detected values.
[b]*Source:* USATHAMA 1980-1992.
[c]Subsequent reanalysis of the sample showed no detectable RDX.
[d]*Source:* USACHPPM 1996.
Sample summary shows detections of potential contaminants of concern at EBG only.
RRSE—Relative Risk Site Evaluation

The 1982 investigation by Mogul Corporation included soil sampling at five locations within EBG, followed by analyses for explosives TNT and RDX. Samples from EBG had non-detectable quantities of these analytes.

The Water Quality Surveillance Program was conducted at nine sampling locations throughout RVAAP. Of the sample locations, the one of interest to this study was a Parshall flume located near the eastern boundary of the installation, adjacent to Route 534 (station PF 534; see Figures 1-2 and 1-4). All surface water drainage that exits EBG discharges off the installation through this sampling point. However, the station includes drainage from a large area in addition to EBG. Copper, chromium, hexavalent chromium, lead, zinc, TNT, and RDX were monitored annually in surface water. Cadmium was added to the annual list of metal analytes between 1988 and 1992. Indicator parameters such as pH, temperature, specific conductance, dissolved oxygen, oil and grease, total suspended solids, fecal coliform, and biochemical oxygen demand were monitored quarterly. Total organic carbon, total Kjehldal nitrogen, nitrate, nitrite, and phosphorus were evaluated semi-annually. Samples collected and analyzed from station PF 534 between 1980 to 1992 had no detectable quantities of explosives, with the exception of a November 5, 1987 sample (RDX at 64 µg/L) that was subsequently reanalyzed with a result of <0.25 µg/L. Low concentrations of zinc and copper were occasionally detected. Hexavalent chromium was detected on one occasion in 1985.

The Relative Risk Site Evaluation (RRSE) performed for EBG was limited to the evaluation of surface water and sediment. Two samples each of surface water and sediment were analyzed for explosives and metals, as shown in Figure 1-5. For surface water, only lead exceeded the RRSE standard criteria,

and the contaminant hazard factor was determined to be "moderate." However, a potential migration pathway was identified and a potential receptor point (recreational users with no site controls) was identified. On this basis, the surface water/human endpoint was assessed as a "high" relative risk. For sediment, concentrations of arsenic, barium, chromium, copper, and zinc were detectable, but maximum concentrations were well below the RRSE standard criteria. Accordingly, the contaminant hazard factor was determined to be "minimal." However, a migration pathway (surface water) and potential receptor (recreational user) were identified. Thus, the sediment/human endpoint was assessed as a "moderate" relative risk.

In addition to these historical investigations, a site reconnaissance was conducted on November 30, 1998 by IOC, USACE, Ohio EPA, and SAIC staff to examine site conditions and determine optimal locations for sampling. Results of the reconnaissance are incorporated into the conceptual site model and aided in development of data quality objectives (DQOs) in Chapter 3.0. Field notes from the reconnaissance are contained in Appendix B.

## 1.4 SPECIFIC SAMPLING AND ANALYSIS PROBLEMS

Heavy understory plant growth at EBG will require extensive clearing by hand in some areas. It is not known whether ordnance and explosives (OE) is present on the site; however, OE clearance (avoidance) will be performed prior to and during the sampling effort. Sediment and surface water sampling within the four surface water basins presents specific issues regarding transport of materials and visual reconnaissance and avoidance for OE. Sampling within these basins will require the use of waders and personal flotation devices. A small boat will be required for transport of sampling equipment and supplies. Clearance and avoidance for OE within the surface water basins will rely primarily on instrumentation. In addition, the shallow water now covering the former burning areas presents difficulty in visually locating sampling points relative to locations showing evidence of historical activity or potentially contaminated areas.

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