REVISED
FINAL
ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)
FOR
INTERIM REMOVAL ACTION

AT

YELLOW SUBMARINE UST (BUILDING 101) SITE
(IRP SITE ST-06)
ROME, NEW YORK

Prepared For:

U.S. Army Corps of Engineers
Kansas City District

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1.0 INTRODUCTION

This Engineering Evaluation/Cost Analysis (EE/CA) report has been prepared by Law Environmental Inc. in accordance with the CEMRK Scope of Work for Delivery Order No. 0040, dated September 20, 1991. The EE/CA is based on the EPA Memorandum "Outline of EE/CA Guidance," dated March 30, 1988.

The focus of this EE/CA report is an underground storage tank (UST) located at Building #101 commonly referred to as the "Yellow Submarine." This UST formerly held plating wastes associated with the now closed metal plating shop in Building #101. Griffiss AFB intends to perform an Interim Removal Action at this site.

The objectives of this EE/CA report are to:

1) Satisfy environmental review requirements for removal actions;

2) Satisfy administrative record requirements for improved documentation of removal action selection; and

3) Provide a framework for evaluating and selecting alternative technologies. The only purpose of this Interim Removal Action is source removal (removal of the UST).

Public participation is required for the Interim Removal Action and the overall Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process. In accordance with this process, Griffiss Air Force Base (GAFB) developed and received regulator approval for its "Community Relations Plan," dated May 1991. The Community Relations Plan describes a program for involving the local community in the process of developing remedial actions at GAFB. It outlines the process of community involvement through meetings, document availability and public comment throughout the

remediation effort. This EE/CA report will be incorporated into the Administrative Record (AR) which will be available for public review at the Environmental Management Branch office of the 416th Support Group at Griffiss Air Force Base.

2.0 SITE CHARACTERIZATION

This section describes the relevant characteristics of Griffiss Air Force Base and the Yellow Submarine (Building #101) site. Site background information and analytical data are also included.

2.1 GRIFFISS AIR FORCE BASE (GAFB) DESCRIPTION

Griffiss Air Force Base (GAFB) is in the lowlands of the Mohawk River Valley in Oneida County, approximately 2 miles northeast of Rome, New York (see Figure 2-1). Approximately 4,500 permanent military personnel are assigned to the base, and 3,000 civilians are employed at GAFB. The base consists of approximately 3,900 contiguous acres at an average elevation of 504 feet, NGVD (National Geodetic Vertical Datum). The base is bordered by small towns and rural areas.

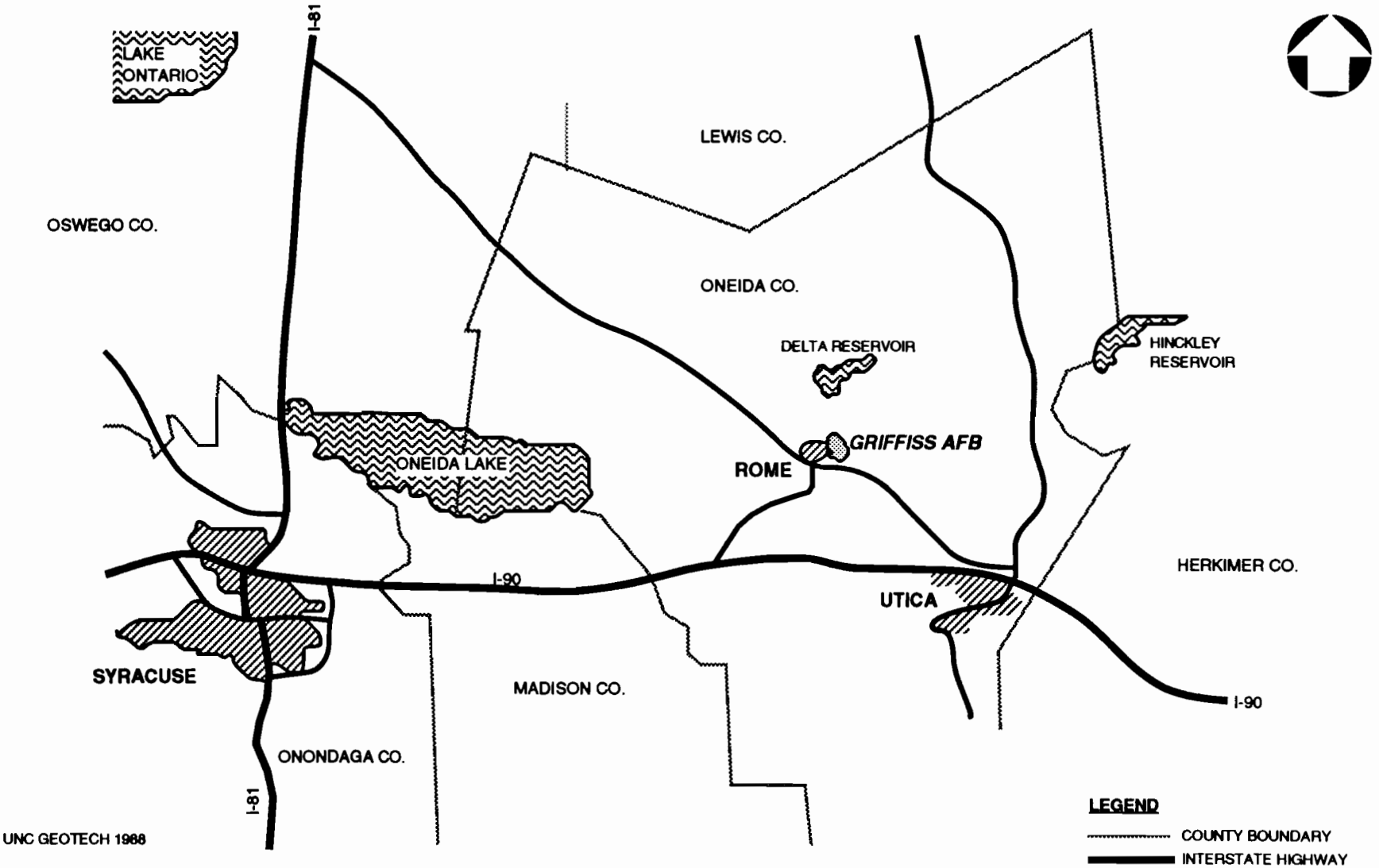
GAFB is organized with the 416th Wing as the host unit under the supervision of Air Combat Command (ACC). The primary mission of the Wing is the maintenance and implementation of effective aerial refueling operations, while providing bombardment capabilities on a global scale. Construction of GAFB, previously named Rome Air Depot, began on August 2, 1941, with the base becoming operational by February 1, 1942. On September 20, 1948, the depot was renamed in honor of Lieutenant Colonel Townsend E. Griffiss. A map of Griffiss AFB is shown as Figure 2-2.

The mission of the base has changed many times over the years. The U.S. Air Force (USAF), in performing its primary mission of national defense, has frequently engaged in operations that deal with toxic and hazardous materials which have been located in various places at GAFB.

FIGURE 2-1

LOCATION MAP OF GRIFFISS AIR FORCE BASE AND VICINITY

GRIFFISS AIR FORCE BASE, NEW YORK



SOURCE: UNC GEOTECH 1988

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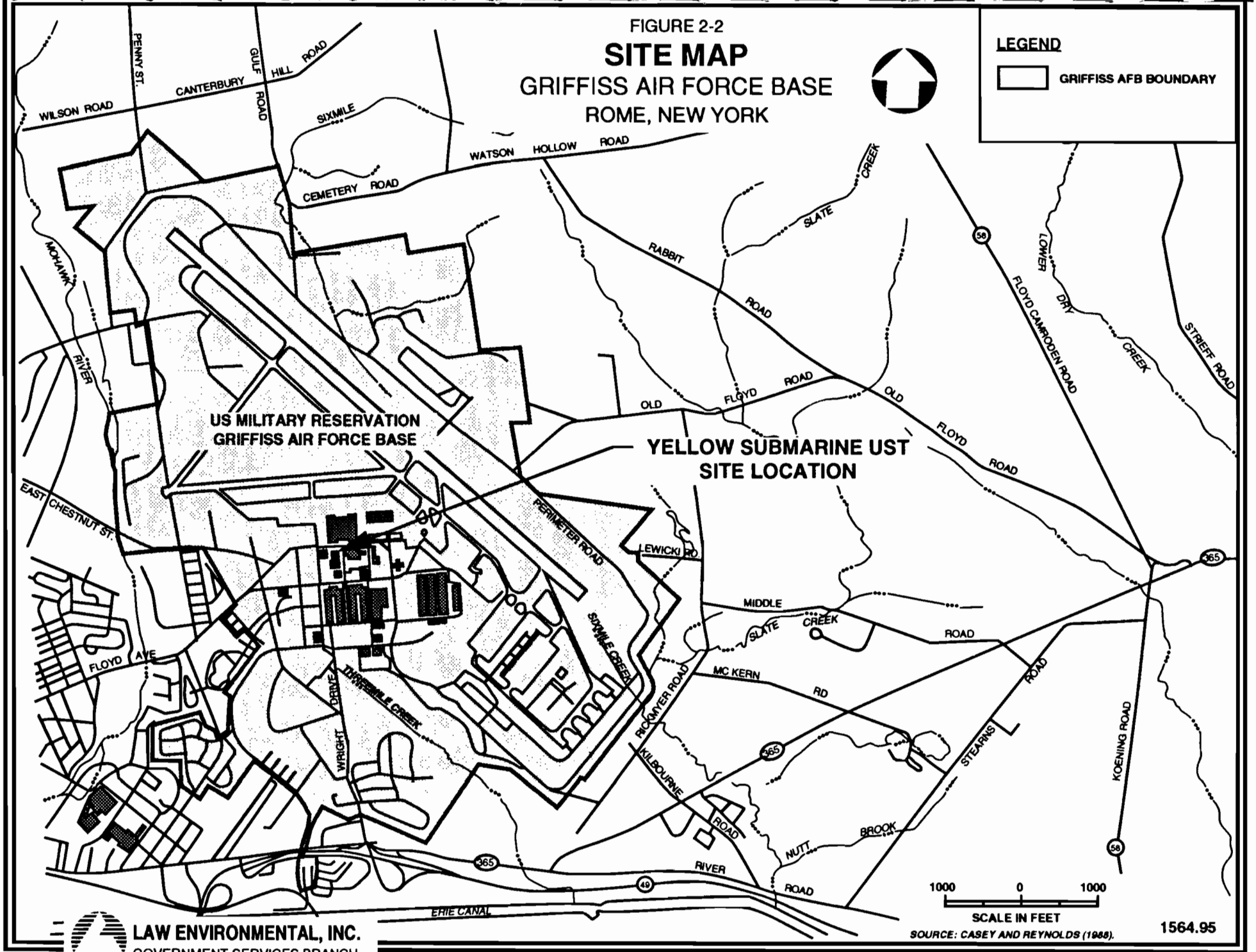
FIGURE 2-2

SITE MAP

GRIFFISS AIR FORCE BASE

ROME, NEW YORK



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GOVERNMENT SERVICES BRANCH

Installation geology consists of relatively flat-lying, well-drained granular glacial and alluvial sediments occurring in thin to moderate thicknesses, overlying the Utica Shale (bedrock). The unconsolidated sediments form the most significant aquifers; however, ground water may occur locally at relatively shallow depths under water table (unconfined) conditions. The Mohawk River borders the base to the west and south. The drainage basins of Six Mile and Three Mile creeks discharge surface waters to the New York State Barge Canal, located south of the Base.

In and around the creeks are several state-designated wetlands. The relatively flat topography and abundant precipitation received yearly at GAFB designates this area as a ground-water recharge zone.

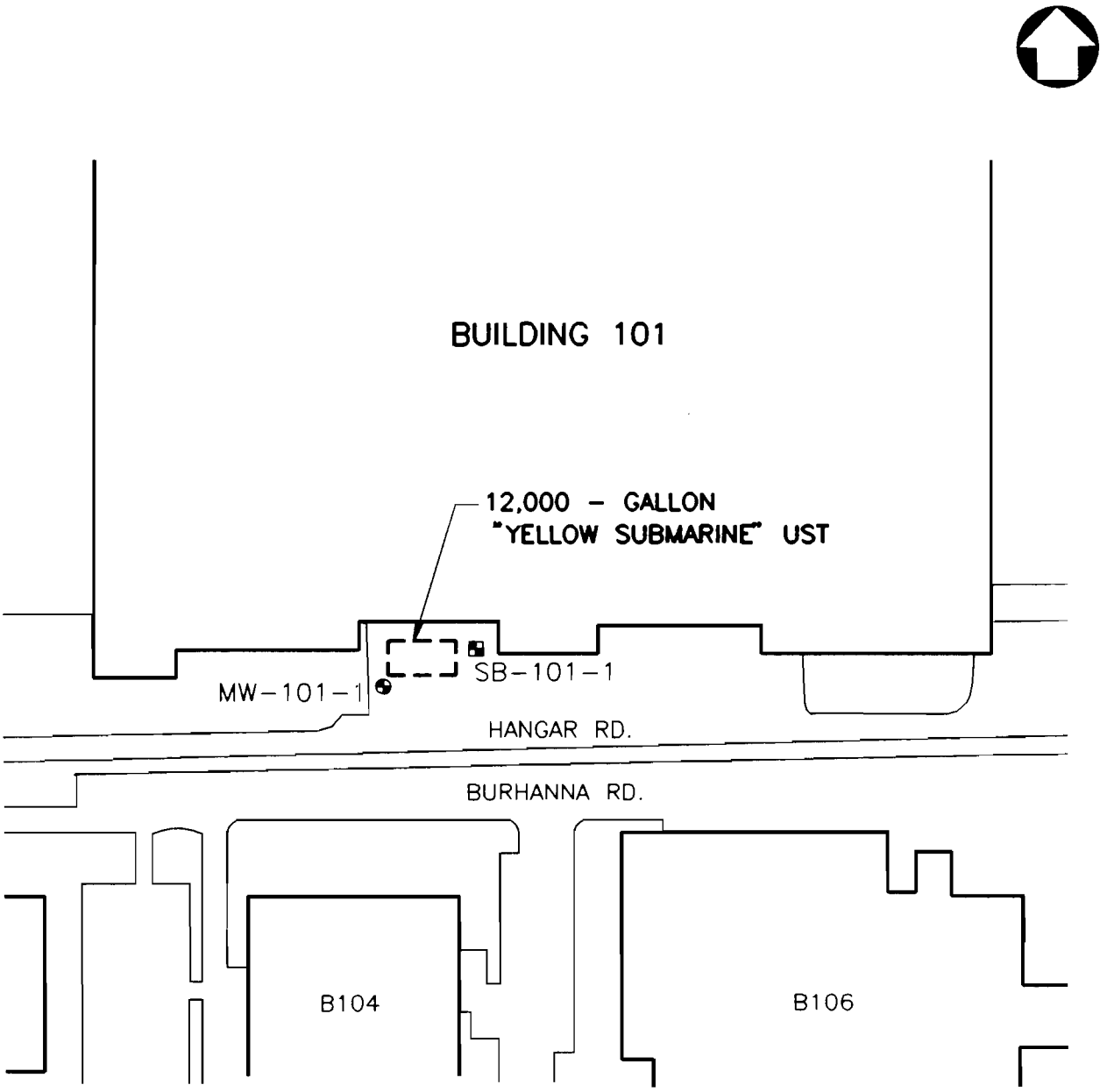
2.2 SITE-SPECIFIC DESCRIPTION

A reinforced fiberglass, 12,000-gallon capacity, underground storage tank (UST) known as the "Yellow Submarine" is located approximately 15 feet from the south edge of Building #101 (see Figure 2-3). The UST is situated within a small graveled area of approximately 20 feet by 30 feet (see Figure 2-4). The graveled area is adjacent to the personnel parking area for Building #101. The UST measures approximately 10 feet in diameter by 20 feet in length and the tank bottom rests on a concrete pad approximately 15.5 feet below grade (see Figure 2-5). A partially buried vault above the UST houses a pump station. A row of steel bollards surround the perimeter of the gravel-covered area to protect the aboveground portion of the Yellow Submarine. A soil boring (SB-101-1) and monitoring well (MW-101-1) were installed at the site. Based on these, the site soils were determined to be primarily loose sands and gravels. Ground-water levels were measured at a depth of approximately 11.5 feet.

FIGURE 2-3

LOCATION OF YELLOW SUBMARINE UST - BUILDING 101

GRIFFISS AFB ROME, NEW YORK



SOURCE:
GRIFFISS AFB COMPREHENSIVE BASE MAP
FURNISHED BY GRIFFISS AFB.

LEGEND

- EXISTING MONITORING WELL
- EXISTING SOIL BORING

0 200

SCALE IN FEET

1564LJ07

FIGURE 2-4

YELLOW SUBMARINE UST – BUILDING 101

GRIFFISS AFB ROME, NEW YORK

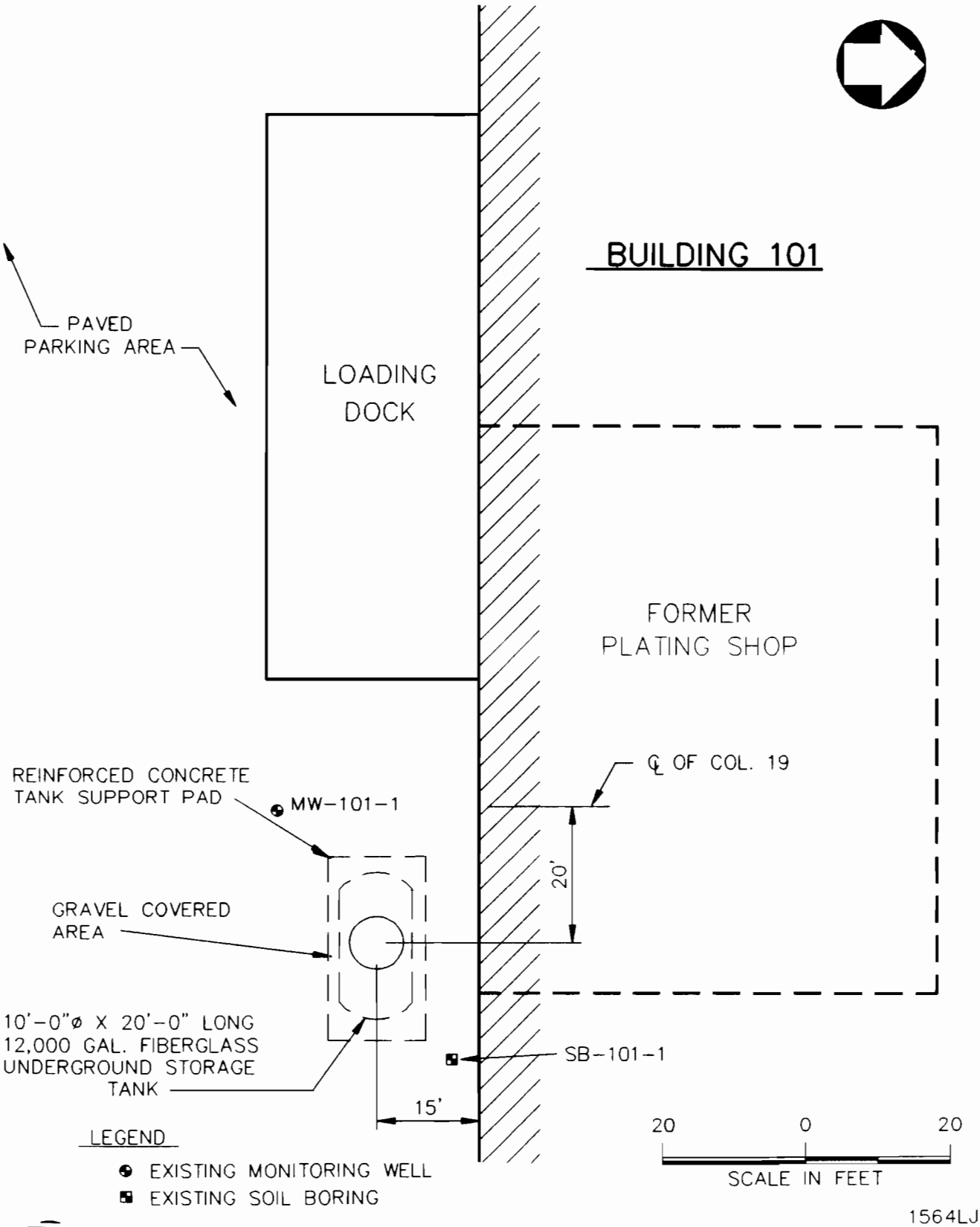
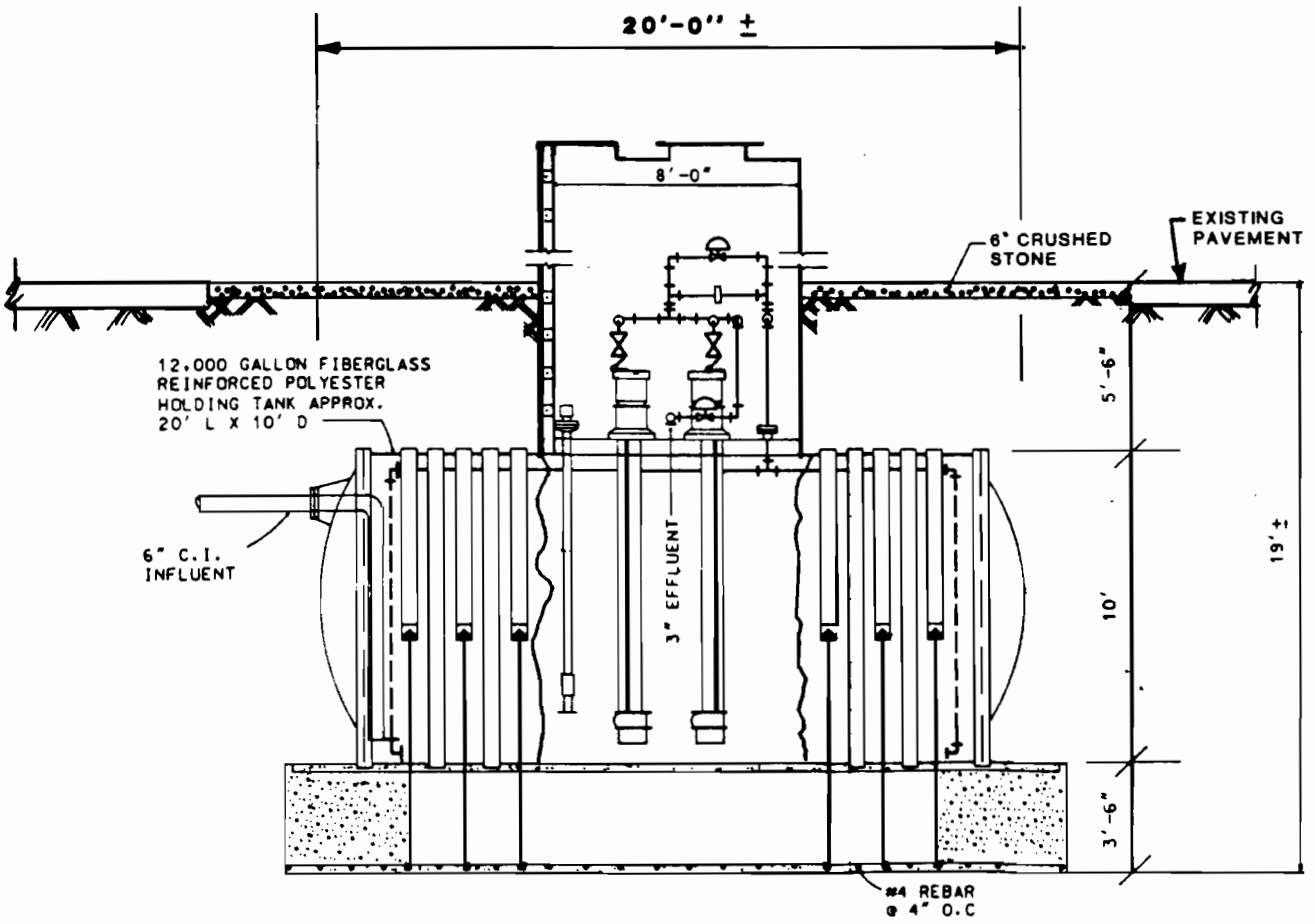


FIGURE 2-5

YELLOW SUBMARINE UST
TANK DETAIL

GRIFFISS AFB ROME, NEW YORK



NOTE: INFLUENT AND EFFLUENT PIPING SEALED-OFF DURING UST ABANDONMENT IN 1987

2.3 SITE BACKGROUND

The Yellow Submarine UST was used as a holding and dilution tank for plating wastes, having been placed in service in 1973. The UST received effluent from floor drains and sinks from a metal plating shop located within Building #101. The plating shop was closed and rendered inoperable in 1989. Plating shop activities included anodizing, chrome plating, cadmium plating, nickel plating, and chemical stripping of old finishes. The Yellow Submarine UST held effluent before discharging it into the sanitary sewer system. The UST reportedly received less than 20 gallons per day of plating washdown and approximately 10 gallons per year of plating solids and plating bath solution. All influent and effluent piping associated with the UST was reportedly sealed in 1987 when the tank was taken out of service.

Law Environmental, Government Services Branch (LEGS), has been contracted by the U.S. Army Corps of Engineers, Kansas City District, to develop a list of AOCs for inclusion in the Griffiss Air Force Base (GAFB) Remedial Investigation (RI). The AOC List was required to satisfy the requirements under the Interagency Agreement (IAG) signed between the United States Air Force Strategic Air Command, the State of New York, and the Environmental Protection Agency (EPA) Region II. The "Yellow Submarine" UST site was recommended as an Area of Concern (AOC) February 5, 1991, in a report prepared by Law Environmental, Inc.

An AOC, as defined by the IAG, can be described as a site where hazardous substances are or may have been placed or may come to be located. The AOC list includes locations of potential or suspected contamination, as well as locations of known or actual contamination. The discernible source AOCs require study and determination as to the type of remediation, if any, which may be necessary. These include, but are not limited to, areas and facilities such as landfills, surface impoundments, waste piles,

elementary neutralization units, container storage areas, closed and abandoned units, hazardous waste storage tanks, known past or present solid or hazardous waste treatment and disposal areas, or areas where hazardous substances could have been released. The Environmental Site Characterization Summary for the Yellow Submarine UST site from the AOC study is included in Appendix A.

2.4 ANALYTICAL DATA

Chemical sampling of the Yellow Submarine UST contents (water and sludge) has been performed as a portion of this scope of services. This data is presented in Table 2-1 (sludge sample 101-UST-101 SL is a duplicate for sample 101-UST-1 SL). In both the water and sludge sample, the highest inorganic concentrations were determined for lead and chromium. Cyanide was also detected. The highest organic concentrations were determined for tetrachloroethylene and 1,2-trans-dichloroethylene.

A ground-water sample was collected from a newly installed monitoring well and was analyzed for volatile organics (EPA Method 8240) and total and dissolved metals. Low to moderate levels of trichloroethylene (36 µg/L), tetrachloroethylene (56 µg/L), total lead (0.098 mg/L), and total chromium (0.118 mg/L) were detected. New York ground-water quality standards specified in Part 701.15 were exceeded for lead, chromium, tetrachloroethylene, and trichloroethylene. Complete results are presented in Table 2-2.

TABLE 2-1

CHEMICAL SAMPLING PARAMETERS AND RESULTS
Building 101 "Yellow Submarine" UST Site
Griffiss Air Force Base, New York

PARAMETER	101-UST-101SL	101-UST-1SL	101-UST-1AQ
Metals by ICAP - Method 6010:			
Cadmium	26.2 mg/kg	0.131 mg/L	140 mg/kg
Chromium	167 mg/kg	0.836 mg/L	670 mg/kg
Cyanide	2.35 mg/kg	.094 mg/L	6.64 mg/kg
Lead	218 mg/kg	2.46 mg/L	1060 mg/kg
Nickel	19.97 mg/kg	0.065 mg/L	71.6 mg/kg
Silver	<0.05 mg/kg	<0.01 mg/L	<0.05 mg/kg
Volatile Organics By GCMS - Method 8240:			
1,1,1-Trichloroethane	<8600 µg/kg	<250 µg/L	<270 µg/kg
1,1,2,2-Tetrachloroethane	<8600 µg/kg	<250 µg/L	<270 µg/kg
1,1,2-Trichloroethane	<8600 µg/kg	<250 µg/L	<270 µg/kg
1,1-Dichloroethane	<8600 µg/kg	<250 µg/L	<270 µg/kg
1,1-Dichloroethylene (1,1-Dichloroethene)	<8600 µg/kg	<250 µg/L	600 µg/kg
1,2-Dichloropropane	<8600 µg/kg	<250 µg/L	<540 µg/kg
1,2-Dichlorothane	<8600 µg/kg	<250 µg/L	<270 µg/kg
1,2-Trans-Dichloroethylene	210000# µg/kg	240 J µg/L	79000 µg/kg
1,3-Dichloropropylene (1,3-Dichloropropene)	<8600 µg/kg	<250 µg/L	<540 µg/kg
2-Chloroethylvinyl ether	<8600 µg/kg	<250 µg/L	<540 µg/kg
Acrolein	<86000 µg/kg	<250 µg/L	<27000 µg/kg
Acrylonitrile	<86000 µg/kg	<250 µg/L	<27000 µg/kg
Benzene	1900J µg/kg	<250 µg/L	<270 µg/kg
Bromoform (Tribromomethane)	<8600 µg/kg	<250 µg/L	<270 µg/kg
Carbon Tetrachloride (Tetrachloromethane)	<8600 µg/kg	<250 µg/L	<270 µg/kg
Chlorobenzene	<8600 µg/kg	<250 µg/L	<270 µg/kg
Chlorodibromomethane (Dibromochloromethane)	<8600 µg/kg	<250 µg/L	<270 µg/kg
Chloroethane	<17000 µg/kg	<500 µg/L	<100 µg/kg
Chloroform(Trichloromethane)	<8600 µg/kg	<250 µg/L	<270 µg/kg
Dichlorobromomethane (Bromodichloremethane)	<8600 µg/kg	<250 µg/L	<270 µg/kg
Ethylbenzene	<8600 µg/kg	<250 µg/L	190 µg/kg
Methyl bromide (Bromomethane)	<17000 µg/kg	<500 µg/L	<540 µg/kg
Methyl chloride (Chloromethane)	<17000 µg/kg	<500 µg/L	<540 µg/kg
Methylene chloride (Dichloromethane)	6600JB µg/kg	180 JB µg/L	190 µg/kg
Tetrachloroethylene (Tetrachloroethene)	6000000# µg/kg	7300 µg/L	6000000# µg/kg
Toluene	6200J µg/kg	<250 µg/L	820 µg/kg
Trichloroethylene (Trichloroethene)	1700000# µg/kg	1800 µg/L	960000 µg/kg
Vinyl chloride (Chloroethylene:Chloroethene)	<17000 µg/kg	<500 µg/L	<540 µg/kg

\# Concentration over the upper range limit (URL)
* Results from the diluted sample
AQ Aqueous Sample
J Concentration estimated
B Also found in associated method blank.
SL Sludge Sample

TABLE 2-2

POSITIVE RESULTS
GROUND-WATER SAMPLE
Building 101 "Yellow Submarine" UST Site
Griffiss Air Force Base, New York

PARAMETER	101 MW1	101 MW101*
Total Lead	0.098 mg/L	0.090 mg/L
Total Chromium	ND	0.118 mg/L
Cyanide	0.01 mg/L	ND
Methylene Chloride	ND	2.1 µg/L
Tetrachloroethylene	56 µg/L	48 µg/L
1,2-Dichloroethylene	4.1 µg/L	3.9 µg/L
Trichloroethylene	36 µg/L	31 µg/L
Toluene	1.4 µg/L	3.1 µg/L

* Duplicate sample

3.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

This section discusses the statutory limits on removal actions, the removal action scope and schedule, and applicable or relevant and appropriate requirements (ARARs).

3.1 STATUTORY LIMITS ON REMOVAL ACTIONS

In 1980, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as CERCLA or Superfund, which was amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA). Under CERCLA section 104, the federal government is empowered to respond to releases of hazardous substances and pollutants or contaminants. SARA amended section 104 to increase the maximum funding and time limits on removal actions from $1 million and 6 months to $2 million and 12 months. The funding and time limits were enacted in order to expedite remediation without exaggerated cost and effort.

3.2 REMOVAL ACTION SCOPE

The objective of the Interim Removal Action for the Yellow Submarine UST site is closure of the UST.

The items which need to be addressed during closure include but are not limited to:

UST Contents Sampling
Removal of tank contents
Tank inerting procedures
Interior and exterior tank cleaning procedures
Tank removal including concrete foundation
Soil sampling

Tank, tank bottom, and contaminated waters disposal
Excavation dewatering

Removal of contaminated soil, if encountered, will be required to facilitate tank removal. The excavated soil will be stored on site in large roll-off containers pending results of analytical soil sampling which will determine the appropriate method of disposal. The results of these tests will determine if the soil must be disposed of off site as a hazardous waste, disposed of in a Part 360 permitted landfill, or reused as clean backfill. Additional contaminated soil may also be removed; however, the excavation bracing system required to perform the tank removal will significantly restrict over-excavation.

Soil cleanup standards will allow soil to be free of enough contaminated material so contaminants will not leach to ground water. To confirm actual site-specific leaching potential, the TCLP will be used. If the concentrations of constituents of concern are below 6 NYCRR Part 703.5 Ground-Water Quality Standards, the soil is not considered a threat to ground-water quality. This is considered to be a conservative clean-up value. Additional study and discussions with the NYDEC and USEPA could result in higher clean-up values based on site-specific conditions. However, the TCLP/N.Y. State Ground-Water Quality Standards will be used as a preliminary goal for the site. The ground-water standards are as follows:

Cadmium	10 ppb
Chromium	50 ppb
Cyanide	100 ppb
Lead	25 ppb
Silver	50 ppb
1,1-Dichloroethylene	5 ppb
trans-1,2-dichloroethylene	5 ppb
Benzene	0.7 ppb

Ethylbenzene	5 ppb
Methylene chloride	5 ppb
Tetrachloroethylene	5 ppb
Toluene	5 ppb
Trichloroethylene	5 ppb

If, due to site conditions, complete excavation of contaminated soils is unattainable, additional remedial activities may be required. The "Yellow Submarine" UST is a portion of a larger AOC scheduled to undergo a RI/FS phase which requires exposure and risk assessments to be conducted. Additional remedial activities, if required, will be based on this RI/FS process.

Possible threats associated with the tank removal activities include contamination to the environment from the contents of the tank, spill from removal activities, fire and/or explosion dangers, and exposure of contaminants to the public and workers during excavation.

Contamination may be encountered at this site, such as ground-water contamination or soil contamination which cannot be over-excavated. In this case, the site will be further investigated under the terms of the Interagency Agreement. This would probably involve additional investigation of the extent of soil and ground-water contamination.

3.3 REMOVAL SCHEDULE

The Interim Removal Action contract for the Yellow Submarine UST is proposed to be awarded in September 1992. Interim Removal Action should be completed by October 1993. Aside from this time constraint, no other scheduling limitations exist. Weather conditions which may create problems during excavation and testing will be considered during scheduling. The precipitation and

snowfall data obtained from Engineering Science indicates heavy snowfall during the months of December, January and February is likely.

3.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

A basic objective under CERCLA and a requirement of the National Contingency Plan [40 CFR Part 300.45(i)] is that all remedial response actions must comply with the environmental laws which are determined to be "applicable or relevant and appropriate requirements" (ARARs). An ARAR determination is not required for removal actions. However, the EE/CA Guidance Memorandum suggests that removal actions should attain ARARs to the extent possible. Thus, an ARAR identification plan has been prepared as part of this report.

These ARARs are identified on a site-specific basis. In general, the identification process involves comparing a number of site-specific factors with the statutory or regulatory requirements of the relevant environmental laws. These factors may include:

- Hazardous substances present
- Types of remedial actions considered
- Physical characteristics of the site

Removal actions taken under CERCLA may have to comply with several different types of requirements. According to the IAG "with releases of hazardous waste covered by this Agreement, RCRA shall be considered an applicable or relevant ARAR pursuant to Section 121 of CERCLA." Three types of ARARs may be determined: Chemical-specific, Location-specific, and Action-specific. These ARARs are discussed below.

3.4.1 Chemical-Specific ARARs

Chemical-specific ARARs constitute clean-up values which must be achieved. The removal action at the Yellow Submarine site primarily involves removal of the underground tank. The excavation invert and sidewalls will be sampled and analyzed for the presence of hazardous constituents, and contaminated soil may be over excavated, if feasible. No chemical-specific ARARs have been identified for this purpose. However, soil clean-up levels will be determined based on draft NYDEC guidance and direct discussions with NYDEC personnel, as previously discussed in Section 3.2.

Classification of the waste present at the Yellow Submarine Site is an important consideration in the overall removal action process. The tank use (holding plating bath solutions) and the presence of cyanide in the tank indicates that the tank waste should be considered an F007 listed waste under 40 CFR Part 261 and 6 NYCRR Part 371.

3.4.2 Location-Specific ARARs

Location-specific ARARs are regulations, such as those governing wetlands or historic places, which might limit the selection of a remedial or removal action. No location-specific ARARs were identified for this site.

3.4.3 Action-Specific ARARs

Action-specific ARARs are those which pertain to a specific action taken at a site. The proposed action at the Yellow Submarine Site is excavation of the tank to remove it as a possible source of contamination.

The Yellow Submarine tank contained plating process wastes, a listed hazardous waste after 1980. These wastes are considered hazardous and therefore should be handled in accordance with RCRA Subtitle C and 6 NYCRR Part 370-376 regulations. In accordance with RCRA 40 CFR 262.34 (a), the closure of a 90-day accumulation tank must comply with the closure requirements listed in 265.9(a) and (b) and 265.111. These regulations specify closure and post-closure care requirements which are interpreted to be an ARAR for this site. In addition, 6 NYCRR part 373-3.7 general interim status closure and post-closure standards will also apply, as well as 6 NYCRR Part 373-3.10 closure and post-closure standards. CERCLA requires that the requirements of relevant laws be met, without actually obtaining the necessary permits. Thus, the closure and post-closure care requirements will be met through the combined actions of this removal action and the following RI/FS activities.

Under 40 CFR 265.197(a) and (b) and 6 NYCRR Part 373-3.10 (h) (1) and (2), the owner or operator must remove or decontaminate all waste residues and contaminated system components. Contaminated soils and structures and equipment contaminated with waste must be managed as hazardous waste. If all of the contaminated soils can not be removed or decontaminated, the tank system and/or excavation must be closed as a RCRA hazardous waste landfill and GAFB must satisfy all the requirements for landfills.

Under 40 CFR 265.111 and 6 NYCRR Part 373.3.7 (b), GAFB must close the facility in a manner that:

a. Reduces the need for further maintenance

b. Controls, reduces or eliminates the escape of hazardous waste or constituents

The National Contingency Plan (NCP) requires that removal actions shall, as appropriate, begin as soon as possible to abate, prevent, minimize, stabilize, mitigate, or eliminate the threat to human health or welfare or the environment [40 CFR Part 300.415(b)(3)]. Whenever a planning period of at least six months exists before on-site activities must be initiated, the NCP requires that an EE/CA or its equivalent, such as this, shall be conducted [40 CFR Part 300.415(b)(4)]. The NCP states that removal actions shall, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action with respect to the release concerned [40 CFR Part 300.415(c)].

Under 40 CFR Part 300.415(d), the NCP lists several specific actions appropriate to different types of situations. The following actions, which may be appropriate for the planned activities at Building 101, will be considered:

40 CFR 300.415(d)(1)	Fences, warning signs or other security or site control precautions where humans or animals have access to the release.
40 CFR 300.415(d)(2)	Drainage controls (for example, run-off and run-on diversion) where needed to reduce the migration of hazardous substances or pollutants or contaminants off site, or to prevent precipitation or run off from other sources (for example, flooding) from entering the release area from other areas.
40 CFR 300.415(d)(6)	Excavation, consolidation, or removal of highly contaminated soils from drainage or other areas where such actions will reduce the spread of, or direct contact with, the contamination.

40 CFR 300.415(d)(7)	Removal of drums, barrels, tanks, or other bulk containers that contain hazardous substances, pollutants or contaminants where it will reduce the likelihood of spillage; leakage; exposure to humans, animals or the food chain; or fire or explosion.
40 CFR 300.415(d)(8)	Containment, treatment, disposal or incineration of hazardous materials where needed to reduce the likelihood of human, animal, or food-chain exposure.

Disposal of F007 waste remaining in the Yellow Submarine tank will be affected by the 40 CFR Part 268 and 6 NYCRR Part 376 "Land Ban" regulations. The F007 waste will require treatment prior to land disposal to treatment standards listed in 40 CFR Part 268.41 and 6 NYCRR Part 376.4.

As of May 8, 1992, contaminated soil must meet the existing treatment standards for the wastes that contaminated the soil. Therefore, unless the US EPA issues treatment standards specific to contaminated soil, excavated soil from the tank removal will have to be treated to the F007 standards listed above before disposal.

Clean soil will be used to backfill the tank pit excavation. Therefore, the Federal and State "Land Ban" regulations will not apply to backfilling of the excavation. Clean soil will be determined based on non-detect limits as presented in the N.Y. State "Contained-In" guidance.

Soil cleanup standards will be derived considering protection of ground-water quality (see Section 3.2). New York State Ground-Water Quality Standards are promulgated in 6 NYCRR Part 703, and will be used in deriving soil cleanup standards.

4.0 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

Law Environmental, Inc. understands that CEMRK and GAFB have requested an interim removal action for addressing the potential environmental threats from the Yellow Submarine UST. Based upon our experience, we suggest two alternatives for environmentally safe closure of this UST:

- Closure by removal
- Closure in place

The following sections present our analysis of each alternative and comparison of the two.

5.0 ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section includes an analysis of each alternative with respect to effectiveness, ease of implementation, and cost. Additional analysis criteria are presented in the EE/CA guidance document. We also have included a description of both alternatives in order to facilitate analysis. All alternatives could be accomplished in 8 to 12 months, depending on weather and contractual considerations.

5.1 ALTERNATIVE 1 - CLOSURE BY REMOVAL

The following factors constitute closure by removal of the Yellow Submarine tank system:

- The tank system is emptied and cleaned of liquids and sludge. The tank contents and wash water will be disposed of off site as a hazardous waste.
- The tank site is excavated and ancillary piping is removed or capped and left in place.
- The tank is removed from the ground.
- The excavation zone is sampled and analyzed for contaminants.
- Excavated soil will be analyzed and characterized as either a hazardous or non-hazardous soil. Hazardous soil will be disposed of off site. Contaminated non-hazardous soil will also be disposed off site. Clean soil will be reused as backfill.

5.1.1 Analysis of Alternative 1

The alternative of closure by removal of the Yellow Submarine UST is analyzed below based upon its effectiveness, ease of implementation, and cost.

Effectiveness

Closure by removal is an effective means of permanently closing a UST system. By removing the tank and ancillary piping, the original source of contamination, or potential contamination, no longer exists. Tank system removal also facilitates identification and remediation of contaminated soils. However, if significant tank leakage has occurred, this alternative will not in itself reduce potential threats posed by extensive soil or ground-water contamination.

Ease of Implementation

Tank removal is a proven method of closure and can comply with relevant ARARs. Contractors to provide these services are generally readily available. The proximity of the tank to Building 101 and the required excavation will require detailed consideration of structural impacts to the building. A carefully designed and installed bracing system will be required to limit movement of the adjacent buildings.

Cost

On the basis of the information available at this time and Law Environmental's past experience with similar sites, we have prepared the following cost estimate for removing the UST system:

UST Removal

- UST removal
- Misc. demolition
- UST contents removal and disposal
- Site improvements
- Soil sampling and removal
- Excavation dewatering and disposal

APPROXIMATE TOTAL COST FOR ALTERNATIVE 1	$ 215,000

5.2 ALTERNATIVE 2 - CLOSURE IN PLACE

Closure in place of the Yellow Submarine UST system would include the following elements:

- The tank system is emptied and cleaned of liquids and sludge.
- The tank system ancillary piping is capped and abandoned in place.
- The tank is filled with a solid inert material, such as sand and/or cement slurry.
- Soil test borings are advanced around the tank system to evaluate for possible contaminant releases.

5.2.1 Analysis of Alternative 2

The alternative of closure in place of the Yellow Submarine UST system is analyzed below based upon its effectiveness, ease of implementation, and cost.

Effectiveness

Although the regulatory agencies typically prefer removal as the method for tank system closure, in-place closure is also effective. Advantages include the ease at which closure in place can remove the tank system as a possible contaminant source. Also, less time is required to perform this procedure. Dewatering of the excavation zone is not required for closure in place of a UST system.

Ease of Implementation

In-place closure is an effective, efficient method if no soil contamination is encountered during the sampling activities. If a contaminant release from the tank has occurred, it is likely the tank would have to be excavated during remediation activities. In this case, closure in place would be very inefficient. If excavation of contaminated soils is not required, impacts on the adjacent building would be avoided.

Cost

Based on the information available at this time and our past experience with similar sites, we have prepared the following cost estimate for in-place closure of the tank system:

UST Closure In Place	
• UST closure in place	
• UST contents removal and disposal	
• Soil sampling	
APPROXIMATE TOTAL COST FOR ALTERNATIVE 2	$ 54,000

6.0 COMPARATIVE ANALYSIS

Based on the analysis of each alternative for removing the tank system and our experience, Law Environmental has identified the following advantages of each alternative.

Advantages

The advantages of closure by removal include:

- Soil samples can be obtained from directly beneath the tank and piping during the removal activities.
- The UST system is removed from the site, reducing the potential for interference with future construction or excavation activities.
- Contaminated soils can be removed during closure activities.

The advantages of closure in place are:

- Adjacent buildings or structures are in less danger of structural damage because excavation activities are shallow to nonexistent.
- The tank and associated piping do not need to be disassembled and disposed off site.
- Dewatering of an excavation zone is not required.

Disadvantages

The disadvantages of closure by removal include:

- Excavation braces will be required to protect the adjacent building.

- Dewatering and disposal of contaminated ground water will be required.

- Disposal of the tank, piping, and associated debris will be required.

The disadvantages of closure in place include:

- The tank presents an obstacle to future site development.

- The tank will require long-term maintenance.

- The site will require long-term monitoring.

- The soil surrounding the tank cannot be directly observed or sampled.

7.0 PROPOSED REMOVAL ACTION

Because of the accessibility and location of the Yellow Submarine UST and the potential of contaminated soil beneath the tank, Law Environmental recommends the tank and its associated piping be removed. This will eliminate the tank system as a possible source of contamination and will facilitate the remediation of contaminated soils. Also, removal is the regulatory agency's preferred method for tank system closure.

We anticipate the Yellow Submarine tank can be removed without incident and in a efficient, cost-effective manner. The cost for tank system removal is approximately $215,000.

The following lists details of the proposed action:

1. A braced excavation (soldier piles, lagging, pre-stressed struts, and walers) will be performed to allow removal of the tank.

2. Excavated soil will be stored on site in large "roll-off" containers. A soil sample will be selected from each 50 cubic yards of soil. Both TCLP extraction and total analysis will be performed on the soil, with both the extract and total soil analyzed for volatile organics (extract - EPA Method 524; soil - EPA Method 8240) and selected metals (barium, chromium, and nickel - EPA Method 6010; cadmium - EPA Methods 6010 and 7131; and lead - EPA Methods 6010 and 7421). These results will determine if the soil must be disposed of off site as a hazardous waste, disposed of in a Part 360 permitted landfill, or reused as clean backfill.

3. The tank will be pumped dry, cleaned, and removed. The tank contents (liquids and sludges) will be disposed of off site as a hazardous waste. The tank itself, once drained, will not be

considered hazardous and may be disposed of off site. Piping coming into the tanks will be drained and capped at the excavation limits.

4. Dewatering water is proposed to be discharged to the Rome POTW. Pre-treatment is not anticipated based on current ground-water standards and preliminary discussions with the Rome POTW. Sampling will be in accordance with POTW requirements, however, as a minimum will include daily analysis for volatile organics (EPA Method 8240) and selected metals (barium, cadmium, chromium, nickel, and lead - EPA Method 6010). Based on experience with similar sites, Law has determined the need for dewatering the excavation pit to provide adequately dry conditions for UST removal and soil sampling. Information from past dewatering projects at Griffiss AFB indicate that ground-water quantities should be less than 50,000 gallons per day. Preliminary discussions with officials at the permitted City of Rome Publicly Owned Treatment Works (POTW) indicated they can accept up to 85,000 gallons per day (discharged from 12:00 AM to 5:00 AM), a formal application will be submitted to obtain permission to discharge the ground water to the GAFB sanitary sewer system. This application will ensure that all POTW requirements such as acceptable quantities, pre-treatment standards, discharge times, etc., are met. In the event the POTW cannot accept the anticipated quantity of ground water, a specific permit for discharge to surface waters under an SPDES program will be applied for.

5. The excavation invert and sidewalls will be sampled and analyzed (see next section).

6. The excavation will be backfilled and the excavation bracing system removed.

8.0 CONFIRMATION SAMPLING

Soil sampling of the tank pit and the excavated soil pile will be performed during the closure activities to evaluate the potential presence of volatile organics, cyanide, and heavy metals. The sampling will be performed in accordance with the NYSDEC Bureau of Spill Prevention and Response Draft "Proposed New York State Petroleum Contaminated Soil Guidance" (September 24, 1990) as discussed in the following sections.

8.1 NUMBER OF SAMPLES

After observations indicate the removal of obvious contamination, confirmatory samples will be obtained. Excavation side-walls will be sampled at a distance approximately one-third up from the bottom of the excavation. Two grab samples will be obtained from the bottom of the excavation, one from each end of the tank. The bottom samples will be taken no less than three inches from the surface of the pit floor. All side-wall and bottom samples will be taken from random locations on the floor and walls of the pit. Two additional samples shall be taken from two to three feet below the bottom of the excavation. This constitutes eight total samples.

Soil verification samples will be collected from contaminated and potentially uncontaminated soil volumes at the site. One sample will be collected from each 50 cubic yards of excavated soil. The soil sample will be collected from homogeneous soils based on appearance, staining, moisture content and grain size distribution. Samples will be taken from within the pile, and surface soil will not be used as sampling material. The objective of the sampling will be to characterize contamination of the soil pile, and consideration will be given to the following factors in deciding from where in the pile the samples will be obtained:

- how the soil was stockpiled
- apparently contaminated soil based on visual evidence
- size of the pile.

8.2 CLEANUP LEVELS

Soil cleanup levels will be consistent with the chemical-specific ARARs discussed in Section 3.4.1.

8.3 METHODS AND ANALYSES

TCLP extraction will be performed on the tank pit excavation soil samples. The extract will be analyzed for volatile organics by EPA Method 524.

The samples obtained from the excavated soil pile will be analyzed for non-liquid waste hazardous characteristics (ignitability, reactivity and toxicity) in accordance with 6 NYCRR Part 371. To determine if the soil passes the "contained-in" criteria, TCLP extraction will be performed, and the extract will be analyzed for volatile organics by EPA Method 524 and metals (cadmium, chromium, lead and nickel) by EPA methods 6010, 7131, and 7421. To determine if the soils can be used as clean backfill, the samples will be analyzed directly for volatile organics (EPA method 8240), cadmium, chromium, lead, and nickel (EPA method 6010).

APPENDIX A

Areas of Concern (AOC)
Environmental Site Characterization

for

The Yellow Submarine UST (Bldg. #101) Site

ENVIRONMENTAL SITE CHARACTERIZATION

GRIFFISS AIR FORCE BASE
Rome, New York

Date Prepared: April 22, 1992 U.S. Army Corps of Engineers Contract No. DACW 41-89-D-0124

Law Environmental, Inc. Government Services Division Job No. 11-0568/ML-5

A. GENERAL

1. Site Name: Bldg. 101 Yellow Submarine Inactive Holding Tank and Battery Acid Disposal Pit
2. Air Force Installation Restoration Program Identifier No.: ST-06 Other Name: None
3. Map Location No.: 5
4. Key Words: Tank

B. DESCRIPTION

1. Location (Approximate): Outside Building 101 near the Plating Shop.
2. Type: Half Buried Tank
3. Design Features: A 12,000 gallon holding tank for plating wastes installed in 1973. Plating wastes were internally recirculated and diluted by plating shop sink drains.
4. Operating History: The tank was used to receive effluent from plating shop floor drains and sinks, prior to discharge into the base sanitary sewer system. This system was closed and rendered inoperable in 1987. Sometime prior to installation of the tank, the effluent was initially discharged into storm drains that discharged to Three Mile Creek. At the time of the tank installation in 1973, the effluent drained to the sanitary sewer system. The Battery Acid Disposal Pit was located inside Bldg. 101 and consisted of a 2-foot square by 8-feet deep pit in the concrete floor covered by a steel grate. Neutralized battery acid was poured into the pit to percolate into the soil as a disposal method. The pit was reportedly excavated and cemented closed in 1985.
5. Period of Operation: Unknown to 1987
6. Site Features: Half buried tank; no sign of soil staining of stressed vegetation.

C. CONTAMINANT PROFILE

1. Types and Approximate Quantities of Waste Material: Received <20 gallons/day of plating washdown and 10 gal/yr of plating solids and plating bath solution.

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2. History of Spills/Releases: Prior to the installation of the holding tank, plating shop effluent was reportedly discharged into surface waters (Three Mile Creek) via the storm sewer system.
3. Contaminants: No data available.
4. Contaminated Media: No data available.
5. Potential Migration Pathways: There has been no indication of contaminant release associated with this site.

D. PRESENT MONITORING SYSTEM: This site is presently not monitored for contaminants.

E. THREAT POSED TO HUMAN HEALTH OR ENVIRONMENT: There is no direct evidence to indicate this site as a threat to human health or the environment.

F. FACILITY STATUS: Tank out of service as of 1987. No identification of contaminant releases. No leaks or known spills have been reported. Battery acid disposal pit closed in 1985.

G. REGULATORY STATUS: Inoperable, abandoned holding tank. Designated as AOC pursuant to Resolution of Disputes, effective 13 March 1992.