WORK PLAN
REMOVAL ACTION AT SITE 49
NAVAL AIR WEAPONS STATION
CHINA LAKE, CALIFORNIA

DELIVERY ORDER NUMBER 0018
CONTRACT NO. N62474-93-D-2151

Submitted to:

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Revision 1

October, 1995

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Approved by: _____ Date: 9 Oct 95
IT Contractor Quality Control
Program Manager

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List of Acronyms and Abbreviations

CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CLPL	China Lake Propulsion Laboratory
CQC	Construction Quality Control
CQCP	Contractor Quality Control Plan
CY	Cubic Yards
DO	Delivery Order
EE/CA	Engineering Evaluation/Cost Analysis
EFA-WEST	Engineering Field Activity, West
EPA	U.S. Environmental Protection Agency
GPR	Ground-penetrating Radar
SHSP	Site Health & Safety Plan
IRP	Installation Restoration Program
IT	IT Corporation
KW	Kilowatt
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
NA	Not Analyzed
NAWC	Naval Air Weapons Center
NAWS	Naval Air Weapons Station, China Lake, California
NFESC	Naval Facilities Engineering Service Center
PPE	Personal Protective Equipment
RAC	Remedial Action Contract
R&D	Research & Development
SSHO	Site Safety and Health Officer
SWPL	Salt Wells Propulsion Laboratory
UXO	Unexploded Ordnance
WESTDIV	Western Division, Naval Facilities Engineering Command

1.0 Project Objectives

1.1 Background

The Engineering Field Activity (EFA), West is conducting work under the Installation Restoration Program (IRP) at the Naval Air Weapons Station (NAWS) in China Lake, California (Figure 1). Remedial investigations at several sites have proceeded to the point where removal actions are deemed necessary. A revised Engineering Evaluation/Cost Analysis (EE/CA) for Site 49 was recently completed by personnel from the NAWS Environmental Project Office (Navy, 1995a). The EE/CA includes an evaluation of the removal action described in this Work Plan.

Site 49 is located southwest of Salt Wells Valley and is comprised of the China Lake and Salt Wells Propulsion Laboratories (CLPL/SWPL), as shown in Figure 2. NAWS China Lake has decided to implement the removal action specified in the EE/CA for the site; this Work Plan addresses the selected removal action for Site 49 as listed below:

Site Description	Media Addressed in Work Plan	Removal Action
Site 49: CLPL & SWPL Evaporation Ponds and Sumps	Soil, demolition debris, liner materials, and wash water from decontamination activity	Excavation w/Class I and Class III Disposal, Thermal Treatment, and Reuse/Recycling

The purpose of this Delivery Order is to perform all work necessary to complete the removal action at IRP Sites 13, 31, 32, and 49. This Work Plan focuses specifically on Site 49; the EE/CA for Sites 13, 31, and 32 is undergoing further regulatory agency review and has not been finalized.

In addition to this Work Plan, other documents associated with this Delivery Order include a Site Health and Safety Plan (SHSP), a Contractor Quality Control Plan (CQCP), and an Implementation Report. Specific work tasks outlined in this plan include permit requirements, site mobilization, geophysical clearance work, excavation and backfill activities, decontamination activities, soil sampling, and site demobilization.

IT Corporation (IT) has prepared this Work Plan under the technical direction of a professional engineer registered in the State of California. The Work Plan is provided to assist EFA-WEST in fulfilling its obligations to NAWS China Lake. The Work Plan is based on the Scope of Work provided by EFA-WEST dated 15 December 1994. This work will be performed under Delivery Order No. 0018 on Contract No. N62474-93-D-2151 (Remedial Action Contract [RAC]).

1.2 Scope of Work

The Scope of Work in this Work Plan addresses remedial activities at Site 49 only. A separate Work Plan will be prepared for Sites 13, 31, and 32 when the EE/CA for these sites has been finalized. The removal action for Site 49 includes the excavation and off-site disposal of soil, sludge, and demolition debris and will be performed in accordance with the alternatives selected from the EE/CA (Navy, 1995a). Groundwater beneath Site 49 is not addressed in the current removal action. The action will be taken pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as a non-time critical action and will conform to the requirements of Federal and State hazardous waste regulations (Code of Federal Regulations [CFR] and California Code of Regulations [CCR]). The Scope of Work includes the furnishing of all labor, materials, tools, equipment, and services necessary for a complete project according to the terms and conditions of the RAC.

1.3 Site Description

This section presents a description of Site 49, construction details for the Site 49 ponds, and details of the wastes to be remediated during this removal action. Refer to Appendix A for site plans and utility drawings for the Site 49 ponds and sumps.

1.3.1 Site 49

Site 49 consists of twenty-one wastewater evaporation ponds and associated appurtenances, located at both the CLPL and the SWPL facilities. A twenty-second pond, pond number 10181, is currently in use as a cooling water percolation pond and is not included in the Site 49 removal activities. The Site 49 ponds were constructed in the early 1980s to replace the existing industrial wastewater drainage system for the CLPL and SWPL facilities. Wastewater from the CLPL and SWPL facilities were, and continue to be, generated from various research and development (R&D) activities, which include the formulation, scale-up,

analysis, testing, casting, and pressing of various solid and liquid propellants and explosives (Navy, 1995a). The appurtenances for the Site 49 ponds include underground and surface piping, concrete splash pads, concrete influent channels, concrete sediment settling sumps, solids separators, and leak detection pits. The settling structures were used for the separation of explosive-laden sludge from the wastewater prior to discharge of the wastewater to the ponds (Navy, 1995a). The boundaries for Site 49 are shown on the site plan in Figure 3.

1.3.2 Pond Construction

The ponds were constructed with earthen berms that slope upward from grade at an inclination of 3:1 (horizontal:vertical) both inside and outside of the pond. The tops of the berms are approximately five feet wide, relatively level, and contain a chain-link fence around each pond for security purposes. The ponds vary in depth from 5.3 to 14.4 feet (Navy, 1995a).

All of the ponds were originally constructed with double clay liner systems consisting of multiple layers of compacted soil and clay. From top to bottom, these layers are as follows: a 4-inch-thick earth cover; an 8-inch-thick compacted upper clay component; a 3-inch-thick clean, rolled earth layer (used as a leak-detection layer); and a 4-inch thick compacted lower clay component (Navy, 1995a). A diagram of the typical clay-lined pond construction is shown in Figure 4.

In the mid 1980s, inspection of the leak detection pits for the ponds indicated that several of the ponds showed leakage through the upper clay layer. Based upon these observations, a total of seven ponds were rehabilitated in 1989 with the removal of the clay layers and leak detection layer (upper 15 inches of the original pond construction), followed by the installation of a synthetic liner system. The synthetic liner system installed in the seven ponds consists of the following layers (top to bottom): a 45-mil synthetic geomembrane; a 4-inch-thick gravel layer (used for leak detection); a 200-mil non-woven geotextile; and a 45-mil synthetic liner (Navy, 1995a). A diagram of the typical synthetic liner system installed in the ponds is shown in Figure 5.

Each of the clay- and synthetic-lined ponds in this removal action served one or more R&D buildings at CLPL and SWPL (refer to Appendix A for site plans and utility drawings for

each pond). Wastewater generated by these buildings was delivered to each pond via abovegrade and belowgrade plumbing which consisted of either vitrified clay or steel pipe draining to various settling structures prior to discharge into each pond. For the purposes of this Work Plan, these settling structures are collectively referred to as sumps. The specifications for each evaporation pond are provided in Table 1 of this Work Plan.

1.3.3 Site 49 Wastes

The Site 49 removal action addresses solid waste materials present within the ponds, the sumps, and the drain piping associated with each pond system. These wastes include the contents and construction materials of each pond (dried sludges, liner soil, and synthetic liner materials where applicable), dried sludges and wash water in the pond sumps, and the sumps and piping. Wastewater from R&D activities contained settleable solids and dissolved solids. Settleable solids, the majority of the waste generated, were deposited into the sumps prior to discharge to the ponds. The dissolved solids are believed to have been deposited in the ponds as sludge after evaporation of the wastewater. A summary of analytical results for the pond sludges are presented in Table 2.

Wastes associated with the Site 49 ponds are placed in five groups: sludges from sumps; sludges and soil from the ponds; concrete fixtures and pads included in the pond design; piping; and the synthetic liner materials. The removal action for Site 49 consists of the following approaches to the five waste groups:

1. <u>Sump Sludge - High Explosive Content</u> - Removal of the sludge from the sumps, followed by either on-base open detonation or off-site disposal (incineration, stabilization/solidification, or landfilling) depending upon the concentrations of contaminants and/or explosives. The volume of sludge to be removed from the sumps is estimated at 118 cubic yards. Sources for the sludge include the wastewater sumps, clarifiers, and traps (collectively referred to herein as sumps) and the piping used to discharge the wastewater from the R&D buildings to the sumps. Analytical testing of the sludge formerly located or currently present in the sumps shows some of the sludge may contain explosive compounds at concentrations of greater than 15 percent by volume. Therefore, removal of the sludge will be performed by IT personnel trained in explosive ordnance disposal (EOD) practices. These personnel will follow the guidelines provided by the base for removing and handling explosive compounds.

More detailed information related to the sump and pipe cleaning is provided in Section 2.0.

2. Pond Sludge and Pond Soil - Excavation/removal of the sludge and contaminated soil from the ponds, off-site stabilization/solidification, off-site incineration, and off-site disposal. The volume of contaminated sludge in the ponds, based on an assumed thickness of two inches in clay-lined ponds and 0.5-inches in synthetic-lined ponds, is 43 cubic yards.

   Contaminated pond soil requiring removal and treatment is assumed to include:

   - The upper 23 inches of each clay-lined pond, including the 4-inch-thick earthen cover, the upper and lower 8-inch-thick clay layers, and the 3-inch-thick leak detection layer;

   - The 8-inch-thick lower clay layer for each synthetic-lined pond.

   The total estimated volume of waste in this group is 4,780 cubic yards. The sludge from the clay-and synthetic-lined ponds will be segregated from the pond soil by scraping the sludge from each pond surface prior to excavation. For synthetic-lined ponds, scraping of the sludge will be followed by pressure washing and collection of the wash solution into appropriate containers. All excavated pond soil will be stockpiled by pond, sampled, and characterized to determine the suitable method for disposal. More detailed information regarding the removal, stockpiling, and sampling of the pond soil and sludge is provided in Section 2.0.

3. Concrete - Decontamination, closure in place, excavation/removal, and off-site disposal or recycling. Sources for the concrete include the settling sumps, drainage channels, and splash pads associated with some of the pond systems. The amount of concrete is estimated to be 1,121 cubic yards (2,270 tons). Chip samples of the concrete will be collected and analyzed to determine whether the concrete is contaminated. Contaminated concrete will be sent off-site for disposal; concrete that is not contaminated will be either salvaged on-site, recycled off-site, or will remain in place.

Gravel - Excavation/removal and off-site disposal or on- or off-site recycling. The 4-inch-thick gravel leak detection layer for each synthetic-lined pond will be excavated after removal of the upper synthetic liner, segregated by pond and stockpiled, sampled, and either disposed of off-site or recycled. No on-site treatment of the gravel is expected. More detailed information regarding the activities associated with the concrete and gravel from Site 49 is provided in Section 2.0.

4. Synthetic Liners - Pressure washing, excavation/removal, and off-site disposal at a Class I landfill (if hazardous), or a Class III landfill if nonhazardous. Only the top liner of the synthetic-lined ponds is assumed to be contaminated and will be pressure washed prior to removal from each pond. Once exhumed, the 200-mil geotextile and lower 45-mil geomembrane will be sampled, pressure washed if necessary, and disposed of off-site. The total weight of the liner material from the seven ponds is approximately 10 tons. More information regarding liner sampling and disposal is provided in Section 2.0.

5. Piping - Exhumation, pressure washing, dismantling, and disposal as appropriate. The majority of the piping expected to be encountered is vitrified clay; the remainder of the piping is either mild steel or stainless steel. The total weight of the piping is estimated at 20 tons. Once the piping has been exposed, the piping will be pressure washed to remove any solids present, dismantled and either containerized or stockpiled prior to disposal. Metal piping will be wipe sampled to determine whether the piping is contaminated; samples of the clay piping will be collected and analyzed for contamination. Additional information regarding cleaning and removal of the piping is provided in Section 2.0.

1.4 General Geology and Hydrogeology

The following general geologic and hydrogeologic information has been excerpted from the EE/CA for Site 49 (Navy, 1995a) and the preliminary assessment report for the CLPL and SWPL evaporation ponds (Dames & Moore, 1988). Figures identified in the referenced documents are not reproduced in this Work Plan.

The CLPL is located on a topographic drainage divide between Indian Wells Valley and Salt Wells Valley. The SWPL is located to the east of the CLPL on the west flank of Salt

Wells Valley. Indian Wells Valley and Salt Wells Valley are separated in this area by Lone Butte which is part of the Argus Mountain Range (Dames & Moore, 1988).

The drainage divide upon which the CLPL is located is formed by near-surface and surface exposures of basement crystalline rock. Faults extend along the southeast and west sides of CLPL. Uplift of basement rock relative to the adjacent valleys has occurred along these faults. In the western and northern portions of CLPL the basement rock are overlain by unconsolidated alluvium and possibly older, semi-consolidated or lithified sedimentary rock. The thickness of the alluvium and sedimentary formations in the CLPL area is unknown. According to Dutcher and Moyle (1973), the alluvium consists of sand, gravel, silt, and clay. Older formations in the area are comprised of volcanics, siltstone, sandstone, limestone, shale, clay and conglomerate (Dames & Moore, 1988).

Little information is available regarding the subsurface geology of Salt Wells Valley. The SWPL is underlain by alluvium of unknown thickness. On the western flank of the Salt Wells Valley the alluvium rests either directly on basement rock, or on older sedimentary formations above the basement rock (Dames & Moore, 1988).

According to Dutcher and Moyle (1973), the unconsolidated alluvium in the Indian Wells Valley yields large quantities of good quality water to wells. Some wells in the Indian Wells Valley penetrate alluvial fan deposits perched on the flanks of the mountain ranges around the edge of the valley. These wells have shown yields on the order of a few gallons per minute, suitable for limited domestic and livestock applications.

Drinking water is provided to the City of Ridgecrest and outlying residences from water wells installed in the deep aquifer of the Indian Wells Hydrologic Unit. Many of the residences located on County land, as well as the Ridgecrest Community Hospital, are supplied from private water wells. Water needs for the SWPL are met by water from the Ridgecrest well field (Navy, 1995a).

The general groundwater flow direction in the vicinity of the CLPL is most likely west-southwest toward the Ridgecrest well field. The general groundwater flow direction in the vicinity of the SWPL is most likely east-northeast toward Salt Wells Valley. The current depth to groundwater beneath CLPL and SWPL is not known; however, previous water

level measurements by other contractors at several wells in the area indicate that groundwater is greater than 50 feet below ground surface (Navy, 1995a).

2.0 Project Approach - Site 49

The removal action at Site 49 will consist of the following tasks:

Preparatory Phase

- Obtaining required permits
- Site mobilization
- Geophysical surveying
- Removal and storage of fencing materials

Waste Removal Phase

- Containerizing of sump sludge followed by sump cleaning
- Flushing, cleaning, and removal of piping leading to sumps and ponds
- Cleaning and removal of appurtenances associated with the ponds and sumps
- Closure of sump structures
- Clay-lined pond waste removal
- Synthetic-lined pond waste removal

Soil Screening/Waste Disposal Phase

- Collection and analysis of grab, wipe, and chip samples from excavated and decontaminated materials
- Off-site solidification/stabilization, incineration, and/or disposal of sludge and soil
- Off-site disposal of the piping, concrete, and synthetic liners.

The various elements of the removal action are described in the following sections. These removal activities are summarized by pond and sump identification number in Table 3. Table 3 also lists the types of piping and structures anticipated to be encountered; the planned cleaning method(s); media sampling; and disposal options.

2.1 Preparatory Phase

Activities to be performed prior to excavation of the ponds and sumps at Site 49 include mobilization of personnel and equipment to the project location and delineating underground utilities and obstructions. These preparatory activities are discussed in the following sections.

2.1.1 Obtaining Required Permits

This removal action will be performed under CERCLA as a non-time critical action. All removal activities will take place within the site boundary. Since this is a CERCLA action, no hazardous waste storage, treatment, or disposal permits will be required; however, remedial activities and disposal facilities must meet the substantive requirements of Federal and State hazardous waste regulations.

2.1.2 Site Mobilization

Prior to initiation of the waste removal phase, equipment, materials, and supplies will be mobilized and stored or stockpiled at a predetermined, secured location. The following mobilization activities for Site 49 are listed in the sequence they will occur.

- Mutual coordination and understanding meeting
- Pre-construction meeting
- Mobilization of personnel and equipment. Construction equipment will include, but not be limited to the following:

  - 30 Kilowatt generator
  - 5 cubic yard dump truck(s)
  - 20-foot-long stakebed truck
  - 6,000 lb. all-terrain forklift
  - Track-mounted dozer (Cat D6 or equivalent)
  - Track-mounted excavator (Cat 320L or equivalent)
  - Motor grader (JD 570B or equivalent)
  - Rubber-tire loaders (JD 644 and Cat 918F or equivalent)
  - 20 cy roll-off containers
  - Trash pump
  - Power washer
  - Non-sparking power saw
  - Portable water storage tank(s)

In addition to the construction equipment, site trailers, portable toilets, lighting, health and safety equipment, equipment decontamination facilities, and construction materials will be brought on site in support of the remedial activities.

2.1.3 Removal and Storage of Fencing Materials

During the preparatory phase, the existing six-foot-high chain-link fencing around each pond will be dismantled, bundled, and placed at a to-be-determined location for future use by the Navy. Vertical support poles, gates, and other fence fixtures will be removed from the perimeter of each pond and stored with the bundled fencing at the location to be designated by the Navy.

2.1.4 Geophysical Surveys

Prior to initiating the removal of underground piping associated with the evaporation ponds, geophysical surveys will be conducted at each pond location to delineate piping and underground utilities. Ground-penetrating radar (GPR) will be used to locate non-metallic objects (e.g., vitrified clay piping); a metal detector and line locator will be used to locate metallic piping and utilities (e.g., water lines). As the geophysical surveying work progresses, field personnel will mark the piping and utilities on the ground surface using non-fading marking paint. Available utility drawings (Appendix A) will be consulted to verify the location and identity of the underground utilities and piping encountered prior to the waste removal activities.

2.2 Waste Removal Phase

Upon completion of the preparatory activities, waste removal activities such as sludge and soil removal, cleaning and removal of piping, and removal of rinsate liquids will be performed. These activities are discussed in detail below.

2.2.1 Removal of Sump Sludge and Sump Cleaning

The sumps were intended to remove settleable solids from the wastewater prior to discharge of the wastewater to the evaporation ponds. The sludge remaining in the sumps may contain a high percentage of explosives or reactive chemicals as listed in Table 2. Previous sampling and analysis of sump sludge in 1992 indicates that the sludges present in the sumps may contain as much as 59% explosive material (Navy, 1995a). Furthermore, analytical results of the sludges which indicate low concentrations of explosive compounds

may not accurately reflect the actual explosive nature of the sludges since the contents of the sumps may not be homogenous. Therefore, sludges in the sumps will be handled as if it is an explosive hazard. This approach is consistent with the Naval Air Weapons Center (NAWC) procedures previously used for periodic cleaning of the sumps and cone separators.

A sump cleaning team of four unexploded ordnance (UXO) specialists will perform the sludge removal from the sumps. The work will be performed in PPE as specified in the SHSP. Only non-sparking tools will be used inside the sumps. The four-person sump cleaning team will consist of two UXO specialists designated to enter the sump and two UXO specialists designated as safety observers, assigned to remain outside of the sumps and assist the two specialists working inside the sumps.

The procedures to be followed for sludge removal from the sumps are presented below:

- Communication will be established with the NAWS facility's emergency medical unit prior to entering the sump.
- A decontamination area consisting of a water source and catch basin that drains back into the sump will be established.
- A sturdy overhead support will be rigged with rope for the purpose of delivering and removing equipment and drums to and from the sump work crew and as an emergency egress device. Separate tripods will be erected for safety lines used on each team member. At a minimum, a tripod will be erected over one corner of the sump.
- A drum staging area will be prepared for staging drums filled with sludge. Wooden pallets placed on 10- to 12-mil plastic sheeting will be used to keep the drums from resting on the ground.
- The sump cover will be removed with assistance of a non-sparking chain fall.
- Each sump is considered a confined space workspace; therefore, confined space entry requirements must be followed. Prior to entering each sump, the oxygen level and level of explosive gasses inside will be determined using intrinsically safe monitoring equipment. Oxygen

levels below 19% and explosive levels above 5% will require ventilation until safe levels are established.

- A wooden probe will be used to determine the depth of the sludge.
- The sump work crew will dress in modified Level C PPE (full-face respirators, rubber boots, impermeable disposal garments, rubber gloves, and hard hats). Each person entering the sump will also wear a safety harness connected to a safety line for emergency extraction.
- The two-person work team will lower a wooden ladder into the sump and enter the sump.
- Non-sparking tools and U.S. Department of Transportation (DOT)-approved 16-gallon polyethylene drums will be lowered to the sump cleaning team by the safety observers using a rope. The drums will be placed on an elevated wooden platform to keep the outside of the drum clean.
- Non-sparking (plastic) shovels will be used by the sump cleaning team to load the sump sludge into the DOT-approved polyethylene drums. The workers will avoid harshly scraping the concrete surface of the sump.
- After each drum is filled, the top will be replaced on the drum and the rope and a lifting sling will be used to remove the drum from the sump. The safety observer team will use a hand dolly to transport the filled drums to the drum staging area. This process will be repeated until the bulk of the sludge has been removed from the sump.

After the sludge has been removed from each sump, the sludge-filled drums will be labelled by sump number and transported to the storage area for off-site transportation and disposal. Sludge residue remaining in and on the surface of the sump presents a combustion and explosion hazard to the concrete removal workers in its present state. To mitigate the hazards, a flushing of the concrete surface will be performed and the rinse solutions will be collected and drummed.

Cleaning of the metal cone clarifiers will be done by the same team of UXO specialists. The team will place a 16-gallon polyethylene drum under the cone separator drain and open the drain and release the sludge into the drum. Successive water washes will then be used

to remove any sludge residue remaining. The sludge and wash water will be transported to the storage area in drums for temporary storage and off-site disposal. Sampling and testing of the drummed sludge and rinsate are discussed in Section 2.3.

2.2.2 Flushing, Cleaning, and Removal of Piping

The piping to be cleaned and removed includes vitrified clay half pipe set in concrete channels, buried vitrified clay pipe, and abovegrade and buried metal pipe. Explosive residues may exist in piping associated with each pond, sump, and building. All piping is considered as having the potential for containing explosive residue and presenting a risk of injury to workers. The piping connecting the sump and the associated evaporation pond is most likely free of explosive residues because the majority of explosive sediment should have separated out of suspension in the sump; however, a conservative approach of pressure washing all piping will be used during this removal action.

Metal-covered concrete channels with clay half pipe will be visually inspected. Any deposits of explosive residue will be removed by first wetting the residue and shovelling the material using non-sparking hand shovels into DOT-approved polyethylene drums for transportation and eventual disposal. The concrete channels will then be washed down using a pressure washer and the wash water allowed to collect in the associated sump, or a temporary catch basin placed in the pond, for later removal and disposal.

All buried pipe will first be exposed by backhoe and hand shovels and visually inspected for damage or signs of leakage. Following inspection, a power washer will be used to thoroughly clean the inside of the first section of pipe (assumed to be in 4- to 6-foot sections) of explosive residue deposits which may be present in the buried clay and metal piping. The effluent from the power washing will flow to the associated sump, or a temporary catch basin placed in the pond, for later removal and disposal.

With respect to metal piping, after a section of pipe has been cleaned, a section of pipe will be cut off using either a non-sparking power saw or pipe cutter and removed. The process of cleaning a short section of pipe followed by removal of the section from the excavation will continue until all of the pipe to the sump or pond has been cleaned and removed. The cleaned metal piping will be wipe sampled and tested, as discussed in Section 2.3. The

results of the wipe tests will provide information necessary for proper disposal of the piping material.

Clay piping will be removed following procedures different than procedures used for removing metal piping. Clay piping will first be flushed out and the wash water collected at the associated sump or pond. After cleaning, the clay piping will be removed from the trench using the bucket of the backhoe or by hand. The clay piping will then be either stockpiled or containerized for later disposal at a Class I disposal facility. Sampling and testing of the clay pipe for waste profiling is discussed in Section 2.3.

PPE to be worn by personnel for cleaning and removing piping is specified in the SHSP.

2.2.3 Cleaning, Removal, and Disposal of Associated Appurtenances

Associated appurtenances (metal railings, stairwells, fixtures, etc.) will be cleaned by either steam cleaning or pressure washing. Decontamination liquids will be collected, containerized, labelled, sampled, and analyzed as discussed in Section 2.3. The results of the analytical tests will be used to determine the most appropriate disposal method for the decontamination liquids (i.e., discharge to a sanitary sewer, thermal treatment/incineration, etc.).

Appurtenances will be wipe sampled and the analytical results will determine whether the equipment can be placed in the base's government surplus materials depot or requires off-site disposal. Additional information regarding wipe sampling, analysis, and disposal is presented in Section 2.3.

2.2.4 Closure of Sump Structures

Two options are available for closure of the sump structures: demolition of the concrete structure, followed by excavation; and closure in place. For closure of the concrete structures (either in-place or through demolition/excavation), it will be necessary to collect and analyze concrete chip samples collected from the bottom of each sump. These chip samples will be collected after each sump has been cleaned and prior to coring. To collect soil samples beneath the sumps, it will be necessary to core through the concrete floors of the structures to collect soil samples using a hand auger. Two discrete soil samples will be collected from depths of two feet and five feet below the bottom of the sump structure.

Soil samples collected using a hand auger will be packaged and transported in accordance with Standard Operating Procedures (SOPs) 2.1 and 1.1, respectively, to a State certified, NFESC-accepted laboratory. SOPs 1.1 and 2.1 are provided herein as Appendix B. Analytical methods for the soil samples are discussed in Section 2.3. Concrete chip sample analytical results will be reviewed to determine whether detectable concentrations of contaminants are present within the concrete. Soil sample results will be compared to the most current U.S. Environmental Protection Agency (EPA) Preliminary Remedial Goals (PRGs). For this removal action, the industrial PRG values will be used to evaluate soil sample results.

Possible scenarios to be encountered during the closure of the sump structures include:

1. Uncontaminated concrete and soil beneath the sump, as determined through analysis of concrete chip samples and soil samples - closure of the sump in place;

2. Contaminated concrete, as determined through analysis of concrete chip samples, with uncontaminated soil beneath the sump, as determined through analysis of the soil samples - demolition and excavation of the sump structure, followed by closure of the excavation;

3. Contaminated concrete and soil beneath the sump, as determined through analysis of the concrete chip samples and soil samples - possible demolition and excavation of sump and soil, or return of structure to the IRP for further assessment of contamination (determination on a case-by-case basis by the Navy);

4. Uncontaminated concrete, as determined through analysis of concrete chip samples, with contaminated soil beneath the sump, as determined through analysis of soil samples - possible demolition and excavation of sump and soil, or return of structure to the IRP for further assessment of contamination (determination on a case-by-case basis by the Navy).

2.2.5 Clay-lined Pond Waste Removal

Waste removal within the clay-lined ponds will be performed using standard construction techniques. Initially, the surface of each pond will be scraped using non-sparking hand tools to remove any loose pond sludge that may be present. The sludge will be placed in

DOT-approved polyethylene drums, labelled, and transported to a drum storage area for eventual off-site transportation and disposal. Following the removal of the pond sludge, earth-moving equipment will be used to excavate the clay and soil layers of each pond to a depth of approximately 23 inches. The excavated soil will be loaded in dump trucks and transported to plastic-lined, bermed temporary (less than 90-day storage) soil stockpiles for characterization prior to off-site transportation and disposal. Soil screening samples will be collected from within each pond excavation and analyzed following the analytical methods discussed in Table 4. More detailed information regarding sampling and analysis of the pond excavations is provided in Section 2.3.

After receipt and comparison of the soil screening samples against industrial PRGs, a determination will be made whether contamination is present at the bottom of each pond excavation. Should the screening samples indicate that no contamination is present, confirmation samples will be collected from each excavation and the excavations backfilled with clean fill soil, and mounded to provide surface water runoff from the site. At pond locations where contamination is present, additional soil may be removed from these ponds, followed by additional screening sampling, or the ponds may be placed back into the IRP for further study. The final disposition of each pond will be made on a case-by-case basis after consultation with the Navy.

If the extent of the soils containing contaminants exceeds the spatial limits designated in the EE/CA, additional soil excavation may occur or the pond may be placed back in the IRP for further evaluation.

2.2.6 Synthetic-lined Pond Waste Removal

In accordance with the EE/CA, the top sludge layer will be scraped off and any residue will be washed down into the pond to form a slurry, collected by either vacuum truck or trash pump, and analyzed to evaluate how to dispose of the slurry. It is proposed at this time that the liquid slurry will be sent off site for disposal either through incineration, or stabilization/solidification followed by disposal at a Class I disposal facility. The most appropriate method for disposal will be determined following review of profile sample results.

Liners will be removed using standard construction techniques. Liners will be wipe tested after washing to determine whether the liners are contaminated and placed in roll-off bins for temporary storage. Liners determined to be uncontaminated will be sent either to a Class III landfill for disposal or to a recycler. Liner material determined to be contaminated will be disposed of off-site in a Class I disposal facility.

Soil and gravel excavated from the ponds will be placed in stockpiles, sampled, and covered for temporary storage until analytical results are received. Following the receipt of the analytical results the stockpiled material will be appropriately disposed of off site.

If the extent of the soils containing contaminants exceeds the spatial limits designated in the EE/CA, additional soil excavation may occur or the pond may be placed back in the IRP for further evaluation.

2.3 Soil Screening/Waste Disposal Phase

This phase of work is composed of two elements: (1) the collection and analysis of soil screening samples from excavation locations and (2) the collection and analysis of media samples for the purpose of waste profiling and disposal. Information regarding these elements is provided in the following sections.

2.3.1 Collection and Analysis of Screening Samples

The Scope of Work for this removal action requires that IT collect and analyze screening samples for the purpose of identifying soil contamination which may remain in excavations following the removal of waste to the spatial limits identified in the EE/CA. IT intends to use composite soil samples to accomplish the screening of each excavation at Site 49. The screening sampling and analysis to be performed by IT for this removal action is not designed to be comprehensive in nature; confirmation sampling within the excavation limits to assess the spatial extent, or absence, of soil contamination will be performed by PRC Environmental Management, Inc. (PRC). Therefore, composite samples are applicable to the screening of the excavations. The confirmation sampling by PRC will be conducted under a separate sampling and analysis plan developed by PRC for the Navy. PRC will coordinate with IT during the construction activities to gain access to the excavations for sample collection.

Screening samples collected by IT during this removal action will be analyzed following EPA methodologies and other standard analytical techniques. All samples will be shipped to the laboratory under a completed chain-of-custody/request for analysis form, in accordance with SOP 1.1 (Appendix B). All samples collected by IT will be properly packaged for shipment, following SOP 2.1, 49 CFR Part 173, HM-181, and the latest International Air Transport Association (IATA) regulations pertaining to dangerous goods shipment.

2.3.1.1 Pond Excavation Screening Samples

A total of ten composite soil samples will be collected from each freshly excavated pond for screening purposes. Two composite samples will be collected from each sidewall; one composite sample will be made from soil collected at the surface of three locations along the excavated sidewall; one composite sample will be made from soil collected at a depth of one foot at the same three locations along the excavated sidewall. Each pond bottom will be divided into quarters and soil will be collected from the center of each quarter at both the surface and at a depth of one foot. The surface soil from the four quarters will be composited into one sample, and the soil from the one-foot depth will be composited into a second sample. Therefore, ten samples, representing a one-foot-thick layer of soil remaining in each pond will be sampled and tested (four sidewalls x two samples + two bottom samples = ten samples). All of the composite soil samples will be submitted to the analytical laboratory for analysis. Initially, the five surface composite samples will be analyzed in accordance with Table 4. Should contamination be identified in the surface samples, the deeper (one foot) samples will also be analyzed by the laboratory. Based upon the soil analytical results, a decision will be made by the Navy to either remove additional soil or to have confirmation samples collected.

Sampling will be performed using a stainless steel hand auger to remove soil from each sample location. The soil will be placed in stainless steel mixing bowls, mixed using a stainless steel trowel, and the resulting composite sample placed in one or more glass sample jars, or other appropriate sample containers.

2.3.1.2 Soil Samples from Other Excavations

In addition to the pond excavations, excavations for removal of buried piping will be performed. Discrete soil samples will be collected from depths of two and five feet below

each sump. These samples will be collected using a precleaned stainless steel hand auger fitted with precleaned stainless steel sample sleeves. After each sample sleeve is filled, the ends of each sleeve will be covered with Teflon™ film, capped with plastic end caps, sealed, packaged and shipped to the laboratory for analysis.

Composite soil samples will be collected for each pipe trench excavated during the field activities to preliminarily assess whether contamination may have been introduced as a result of leaking pipes. The trench composite samples will be collected following the same method as composite samples from the ponds. Two composite samples will be collected for every fifty feet of trench at locations along the trench where pipe joints were located or visible staining is present; one composite sample from the bottom surface of the trench, and one composite from a depth of one foot. Both sets of composite soil samples will be submitted to the analytical laboratory for analysis. Initially, the surface composite samples will be analyzed in accordance with Table 4. Should contamination be identified in the surface samples, the deeper samples will also be analyzed by the laboratory. Based upon the soil analytical results, a decision will be made by the Navy to either remove additional soil or to have confirmation samples collected.

2.3.1.3 Concrete Chip Samples

Each concrete sump will be cored after decontamination for the purpose of collecting soil samples beneath the structure. A chip sample will be collected from the bottom of each sump before coring and submitted to the laboratory for analysis (refer to Table 4). Based upon the analytical results from the chip sample and soil samples from beneath the sump, a determination will be made to either close the sump in place, excavate the sump and dispose of the concrete off site, or return the sump to the IRP for further study.

One concrete chip sample will be collected from each concrete drainage channel after cleaning of the channel occurs. The chip sample from each concrete channel will be analyzed for the same analytes as the sump chip samples.

2.3.1.4 Wipe Samples

Wipe samples will be collected from each type of material that is not conducive to bulk sampling (e.g., metal piping, synthetic liner material). The wipe samples will be collected at a frequency shown in Table 3 and will follow standard wipe sampling techniques. The

analytical laboratory will provide the field staff with all necessary sampling materials, such as wipe pads, deionized water, and sample packaging materials.

Metal piping will be sampled at a frequency of one sample per 100 linear feet; metal fixtures will be visually inspected after decontamination and a representative sample will be collected at a frequency of one sample per item. One sample will be collected from each section of synthetic liner material removed after decontamination has been performed. Analytical methods to be used for the wipe samples are provided in Table 4.

2.3.2 Waste Profile Sampling and Disposal

The following sections provide more detailed information regarding waste profiling and disposal options for the wastes generated during the removal action.

2.3.2.1 Sludge Samples

Samples of the drummed sludges will be collected and analyzed to determine the appropriate method for disposal. One composite sludge sample will be collected from the drums associated with each sump/pond system. Discrete samples will be collected from each drum, mixed in a stainless steel mixing bowl, and the resulting composite sample will be placed in a glass sample jar, or other appropriate sample container. There is a potential for the sludge sample to present a hazard during shipping and receiving; therefore, all applicable regulations pertaining to shipping of explosive materials will be followed. After receiving the sample results, IT will coordinate with the base to dispose of the drummed sludge.

2.3.2.2 Stockpiled Soil/Gravel

After each pond is excavated and the soils stockpiled, discrete samples will be collected from each soil and gravel stockpile at a frequency of one sample per 50 cubic yards. Samples will be collected from each stockpile using a precleaned stainless steel hand auger. At each sample location, the sample will be collected by drilling into the stockpile approximately two feet, extracting soil at the two-foot depth, and placing the soil into glass sample jars or other appropriate sample containers. Samples will be packaged and shipped to the analytical laboratory under chain-of-custody and analyzed using the methods listed in Table 4. After receipt of the sample results, a determination will be made regarding the most appropriate method for disposal of the waste (refer to Table 3).

2.3.2.3 Clay Pipe Samples

Bulk samples of decontaminated clay pipe will be collected after the pipe has been removed from the pipe trench and stockpiled. It is estimated that less than 100 linear feet of clay pipe is present at each pond; therefore, one representative sample will be collected from each pond's stockpile, crushed into manageable pieces in the field, placed in a sample container, and shipped to the laboratory for analysis. The clay pipe is expected to be slightly permeable and may have absorbed organic compounds dissolved in the wastewater. The analytical testing of the pipe samples will focus on organic and explosive compounds only. Materials used in the manufacturing of low-grade clay products such as clay sewer pipe can include waste clay materials from other manufacturing processes. These waste clay materials often have high concentrations of metals; therefore, the samples from the clay pipe will not be analyzed for metals.

2.3.2.3 Wastewater Samples

Prior to sampling, wastewater generated during decontamination at each pond will be combined into one or more temporary water storage tanks. When each tank is full, or decontamination for a pond is complete, discrete samples will be collected from each wastewater tank used. These samples will be collected using either a stainless steel sampling bomb lowered into each tank, disposable bailers, or thieving rods if drums are used. All wastewater samples will be analyzed for the methods shown in Table 4 to determine the proper disposal method for the wastewater.

2.3.2.4 Disposal of Wastes

Table 3 lists the disposal options identified for each type of waste generated during the removal action (i.e., concrete, clay). Where possible, waste will be recycled or reused (e.g., gravel, synthetic liners); however, the majority of the waste is expected to require off-site disposal at either a Class I or Class III disposal facility.

3.0 Implementation Report

An Implementation Report will be prepared to present data, activities, and procedures performed during the removal actions. The report will contain copies of required permits, approvals, chain-of-custody forms, and sample analytical results. The report will be signed by a professional engineer or geologist licensed in the State of California.

4.0 Project Organization

The proposed project organization reflects the proposed management approach described in Section 5.0. IT will prepare purchase orders defining the scope and negotiated cost for the work. All project personnel will report directly to the IT project manager during the work activities. The key project personnel responsibilities are described below.

PERSON	POSITION	PROJECT AREAS OF RESPONSIBILITY	RESPONSIBILITIES/DUTIES
John Warren	Project Manager	All tasks, project execution, reporting and continuity.	•Serve as single point of contact for delivery order •Management and execution of all activities according to work plans •Coordinate CIH and SSHO to ensure safe site activities •Maintain close contact/ communication with WESTDIV, monthly progress and detailed cost reporting
Christopher Corey	Senior Project Scientist	Task management, project execution	•Serve as an alternate point of contact for delivery order •Daily management of field activities according to work plans •Coordinate with site superintendent, SSHO, and CQC manager
Dennis Alexander	Project Superintendent	Field implementation of work plans	•Manage field personnel •Manage and execute field activities in accordance with the work plans
James Truman	Site Safety and Health Officer	All tasks	•Ensure all elements of SHSP are implemented and enforced on site
Thomas Davis	Site CQC Manager	All tasks	•Single point of contact for compliance with CQCP requirements

5.0 Management Approach

IT will use construction and management personnel located in the Martinez, San Jose, and Wilmington offices. Project costs and schedule will be reviewed by the program's support management and controlled by the project manager.

Costs will be accrued daily and provided to the project manager on a weekly basis. Using these data, the project manager can evaluate the progress of the project and continually update the project schedule. In accordance with the contract, IT will provide these data to the Navy via monthly status reports (e.g., Construction Management System status reports). In addition, the project manager will be kept informed of the status of IT's minority and small business procurement plans relative to this project. Every effort will be made to assure compliance with our goals.

In order to best meet the Client's needs, the project manager will contact the Navy's remedial project manager on a weekly basis. If requests for changes to the scope of work or changes as a result of field conditions occur, the Contracting Officer will be notified in writing via Field Work Variances. Modifications to the contract will not be initiated without authorization from Navy contracts.

6.0 Project Schedule

The project schedule for the removal action at Site 49 is included on the Gantt chart in Figure 6. Approval of this plan by the other agencies will constitute their authorization to proceed. IT anticipates that personnel and equipment mobilization can begin within two weeks of receiving an authorization to proceed from EFA-WEST.

7.0 References

California Environmental Protection Agency, *California Code of Regulations.*

Dames and Moore, *Preliminary Site Assessment, Evaporation Ponds at Salt Wells and China Lake Propulsion Laboratories, Naval Weapons Center (NWC) China Lake, China Lake, California*, 1988.

International Air Transport Association, *Dangerous Goods Regulations*, IATA, 36th Edition, January 1995 through December 1995.

Naval Air Weapons Station China Lake, California, *Technical Memorandum 3 Remedial Investigation Phase I Report, Draft*, Department of the Navy, Western Division, Naval Facilities Engineering Command, March 1993 (Navy, 1993a).

Naval Air Weapons Station China Lake, California, *Sites 13, 31, and 32 Removal Action, Engineering Evaluation/Cost Analysis Report, Draft*, Department of the Navy, Western Division, Naval Facilities Engineering Command, September 1994 (Navy, 1994).

Naval Air Weapons Station China Lake, California, *Remedial Investigation/Feasibility Study, Waste Management Plan, Draft Final*, Department of the Navy, Western Division, Naval Facilities Engineering Command, October 1993 (Navy, 1993b).

Naval Air Weapons Station China Lake, California, *Engineering Evaluation/Cost Analysis, Site 49 Removal Action*, Department of the Navy, Western Division, Naval Facilities Engineering Command, August 1995 (Navy, 1995a).

U.S. Environmental Protection Agency, *Code of Federal Regulations.*

U.S. Environmental Protection Agency, Region IX, *Preliminary Remedial Goals, Second Half 1995*, August 1995.

TABLE 1
SUMMARY OF RELEVANT DATA FOR SITE 49 PONDS

Facility/Pond Number	Building(s) Serviced	Pond Type/Liner Type	Inside Edge of Crest[1,2] (ft)	Bottom Dimensions[1] (ft)	Pond Depth[1] (ft)	Appurtenances Associated with Pond	Leak Detection Pit
CLPL/10120	10120,10140	Evaporation/Clay[3]	54 x 56	20 x 20	5.3-5.7	Sediment traps with wood baffles; underground piping	YES
CLPL/10560	10560	Evaporation/Clay[3]	54 x 52	20 x 20	5.4-5.6	Concrete sediment trap; sump not operable; underground piping	YES
CLPL/10562	10562	Evaporation/Clay[3]	56 x 57	15 x 15	6.1-7.8	Abandoned concrete settling box - flow bypassed box when pond was built; underground piping	YES
CLPL/10570	10570	Evaporation/Synthetic[4]	53 x 52	15 x 15	5.8-7	Concrete influent channels; underground piping	YES
CLPL/10600	10600	Evaporation/Clay[3]	50 x 48	15 x 15	5.3-6.5	Underground piping	YES
CLPL/13060	13060,13100	Evaporation/Synthetic[4]	78 x 58	38 x 28	4.2-7.1	Underground piping	YES
SWPL/15510A	15510	Evaporation/Clay[3]	76 x 65	15 x 15	7.9-13.1	Underground piping	YES
SWPL/15510B	15510	Evaporation/Synthetic[4]	70 x 70	15 x 15	5.5-10.7	Concrete sediment trap; underground piping	YES
SWPL/15530	15530	Evaporation/Clay[3]	94 x 96	20 x 20	11.3-14.4	Concrete sediment trap; underground piping	YES

TABLE 1
SUMMARY OF RELEVANT DATA FOR SITE 49 PONDS

Facility/Pond Number	Building(s) Serviced	Pond Type/Liner Type	Inside Edge of Crest[1,2] (ft)	Bottom Dimensions[1] (ft)	Pond Depth[1] (ft)	Appurtenances Associated with Pond	Leak Detection Pit
SWPL/15540	15521,15522, 15523,15524, 15540	Evaporation/Synthetic[4]	94 x 63	25 x 25	10.5-13.5	Concrete sediment traps w/baffles; underground piping	YES
SWPL/15550	15550	Evaporation/Clay[3]	80 x 80	15 x 15	9.3-12.8	Explosives cone separator; sediment trap; underground piping	YES
SWPL/15564	15560,15564	Evaporation/Synthetic[4]	61 x 61	25 x 25	7-7.5	Air classifier; concrete explosives separator; concrete sediment trap	YES
SWPL/15590	15590	Evaporation/Clay[3]	90 x 61	18 x 36	9-9.7	Cone separator; concrete sediment trap; underground piping	YES
SWPL/15600	15600	Evaporation/Clay[3]	75 x 75	15 x 15	10.1-10.5	Explosives separator; concrete sediment trap; underground piping	YES
SWPL/15700	15700	Evaporation/Synthetic[4]	59 x 48	12 x 12	7.1-8.4	Concrete sediment trap; flow-through sumps; underground piping	YES

TABLE 1
SUMMARY OF RELEVANT DATA FOR SITE 49 PONDS

Facility/Pond Number	Building(s) Serviced	Pond Type/Liner Type	Inside Edge of Crest[1,2] (ft)	Bottom Dimensions[1] (ft)	Pond Depth[1] (ft)	Appurtenances Associated with Pond	Leak Detection Pit
SWPL/15730	15730	Evaporation/Clay[3]	59 x 59	15 x 15	7.3-8	Concrete clarifier; aluminum clarifier; aluminum secondary containment tank; concrete influent channels	YES
SWPL/15740	15743,15744	Evaporation/Clay[3]	53 x 46	15 x 15	5.3-8	Concrete sediment trap; underground piping	YES
SWPL/15754[5]	15754	Evaporation/Clay[3]	75 x 75	20 x 20	6	Concrete sediment trap; concrete influent channels	YES
SWPL/15760	15741,15742, 15760	Evaporation/Clay[3]	63 x 62	20 x 20	6.3-8.4	Concrete sediment traps; concrete influent channels; underground piping	YES
SWPL/15813	15813, bunker bldgs B,C,D	Evaporation/Synthetic[4]	62 x 44	20 x 20	6.4-8	Aluminum sump; concrete influent channels	YES
SWPL/15980	15980	Evaporation/Clay[3]	56 x 48	12 x 12	6.5-8.2	Concrete influent channels; piping	YES
CLPL/10181[6]	**10181**	**Percolation/None**	**175 x 169**	**125 x 125**	**5.2-9.2**	**Underground piping**	**NO**

Source: Naval Air Weapons Station, Environmental Project Office, *"Environmental Evaluation/Cost Analysis, Site 49 Removal Action, China Lake/Salt Wells Propulsion Laboratories, Surface Impoundments and Settling Sumps,"* 1995.

TABLE 1
SUMMARY OF RELEVANT DATA FOR SITE 49 PONDS

Notes

[1] Dimensions taken from original construction drawings (Lowry and Associates, 1979).

[2] Dimensions are at the inside edge of the crest. The crest width on all ponds is five feet. The side slopes are at an inclination of 3:1 (horizontal:vertical).

[3] A typical clay liner system is shown in Figure 4.

[4] A typical synthetic liner system is shown in Figure 5.

[5] Dimensions assumed from "Pond Data Sheets" (Dames & Moore, 1988).

[6] Pond No. 10181 is not a part of this removal action.

TABLE 2
SUMMARY OF ANALYTICAL RESULTS FROM POND AND SUMP SLUDGE

Compound	Ranges of Concentrations[1]	
	Weston (mg/kg)	NAWS (mg/kg)
1) Volatile Organics		
Acetone	0.0117-0.18	10-1040
Benzene	NA	3360
Chlorobenzene	NA	10-71.7
Chloroform	0.0066	60.6
Cyclohexane	NA	240
Dichlorobenzene	NA	55.9
1,2-Dichloroethane	4.2	NA
Dichloromethane	NA	674
Ethylbenzene	NA	5.5-11.6
Hexane	NA	35.9-190
2-Hexanone	0.018	NA
Methyl Ethyl Ketone	0.08-6.0	NA
Methylcyclohexane	NA	6400
Methylene Chloride	0.003-3.7	9-10.3
Naphthalene	NA	79
Tetrachloroethylene	NA	13.2-20
Toluene	0.026-2.2	220
1,2,4-Trimethylbenzene	0.0056	86.5-17,000
Trichloroethene	0.054-2.9	242
Trichlorofluoromethane	0.0064-0.0023	1130-63,800
Trimethycyclohexane	NA	5300

TABLE 2
SUMMARY OF ANALYTICAL RESULTS FROM POND AND SUMP SLUDGE

Compound	Ranges of Concentrations[1]	
	Weston (mg/kg)	NAWS (mg/kg)
2) Semi-Volatile Organics		
Nitro Aromatics/Explosives		
4,6-Dinitro-o-toluidine	21	NA
Dinitrobenzene	NA	5-49,000
2,4-Dinitrotoluene	0.43	NA
2,6-Dinitrotoluene	0.61	NA
HMX	0.75-3300	5.33-341,000
Hexahydrotrinitriazine	NA	1.5-155
Nitrobenzene	NA	1.76-523
Nitroglycerin	NA	<7-1610
PETN	NA	<7-5,800
RDX	1.3-6,100	<7-253,000
Trinitrotoluene	23	3.6-62,900
2,4,6-Trinitrotoluene	0.39-275	441
Phthalate Esters		
bis(2-ethylhexyl) phthalate	0.38-18.0	NA
di-n-butyl phthalate	470	NA
diethylphthalate	1.4	NA
3) Metals		
Arsenic	2-15.1	NA
Antimony	53.4	NA
Barium	34.4-307	3.87-1060
Beryllium	0.91	0.03-8.15

TABLE 2
SUMMARY OF ANALYTICAL RESULTS FROM POND AND SUMP SLUDGE

Compound	Ranges of Concentrations[1]	
	Weston (mg/kg)	NAWS (mg/kg)
Cadmium	0.91-2.9	<0.01-28.3
Chromium	5.5-58.3	0.3-165
Cobalt	10.7	NA
Copper	6.7-397	5.76-1060
Lead	4.4-287	1-8460
Mercury	0.05-25.6	NA
Nickel	6.1-31.4	0.04-36.6
Silver	8.0-385	0.02-18.8
Vanadium	12.6-55.2	2.24-29.6
Zinc	21-713	1-2330
4) Other Compounds (mg/L)		
Carbon Disulfide	0.0072	NA
Cyanide	7.6-8.5	NA
Phenols	0.0012	NA

[1] Range of concentrations taken directly from source listed below. These concentrations are a summary of analytical data presented in Tables 2.4 and 2.5 of the source below.

NA = Chemical either not analyzed for or not detected at the detection limit specified.

Source: Naval Air Weapons Station, Environmental Project Office, *"Environmental Evaluation/Cost Analysis, Site 49 Removal Action, China Lake/Salt Wells Propulsion Laboratories, Surface Impoundments and Settling Sumps,"* 1995.

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
10120 (Bldgs 10120 & 10140)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Sump (2)	Concrete	Scrape/Pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Traps (2)	Wood/Metal	None	Exhume and remove by hand	None - assumed to be contaminated	Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal
10560 (Bldg 10560)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Sump	Concrete	Scrape/Pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
10562 (Bldg 10562)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Trap	Wood/Metal	None	Exhume and remove by hand	None - assumed to be contaminated	Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal
10600 (Bldg 10600)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Channels	Concrete	Scrape/Pressure wash	Break w/backhoe and stockpile	Chip/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Grating	Metal	Pressure wash	Remove with backhoe	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15510A (Bldg 15510)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Sump	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal
15530 (Bldg 15530)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Sump	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Trap Baffles	Wood	None	Remove by hand	None - assumed to be contaminated	Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15550 (Bldg 15550)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
		Stainless steel	Pressure wash	Cut w/non-sparking saw and remove	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Sump	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Cone Separator	Stainless steel	Scrape/pressure wash	Remove with backhoe	Wipe/one per cone separator	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal
15590 (Bldg 15590)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Sump	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Cone Separator	Stainless steel	Scrape/pressure wash	Remove with backhoe	Wipe/one per cone separator	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
10570 (Bldg 10570)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Channel	Concrete	Scrape/pressure wash	Break w/backhoe and stockpile	Chip/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Grating	Metal	Pressure wash	Remove with backhoe	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Synthetic	Scrape/pressure wash	Excavate/Stockpile	Wipe/one per side	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Gravel	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
13060 (Bldgs 13060, 13080, 13100)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
		Ductile Iron	Pressure wash	Cut w/non-sparking saw and remove	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Sump	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Synthetic	Scrape/pressure wash	Excavate/Stockpile	Wipe/one per side	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Gravel	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15510B (Bldg 15510)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
		Ductile Iron	Pressure wash	Cut w/non-sparking saw and remove	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Sump (same as 15510A)	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Synthetic	Scrape/pressure wash	Excavate/Stockpile	Wipe/one per side	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Gravel	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15540 (Bldgs 15521, 15522, 15523, 15524, 15540)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
		Ductile Iron	Pressure wash	Cut w/non-sparking saw and remove	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Sump (3)	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Synthetic	Scrape/pressure wash	Excavate/Stockpile	Wipe/one per side	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Gravel	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15564 (Bldgs 15560, 15564)	Pipe	Copper	Pressure wash	Cut w/non-sparking saw and remove	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
		Galvanized	Pressure wash	Cut w/non-sparking saw and remove	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
		Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
		Ductile Iron	Pressure wash	Cut w/non-sparking saw and remove	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Cone Separator	Stainless steel	Scrape/pressure wash	Remove with backhoe	Wipe/one per cone separator	Clean: salvage/recycle Hazardous: Class I disposal
	Sump	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Synthetic	Scrape/pressure wash	Excavate/Stockpile	Wipe/one per side	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Gravel	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15600 (Bldg 15600)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
		Steel	Pressure wash	Cut w/non-sparking saw and remove	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Cone Separator	Stainless steel	Scrape/pressure wash	Remove with backhoe	Wipe/one per cone separator	Clean: salvage/recycle Hazardous: Class I disposal
	Sump	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal
15700 (Bldg 15700)	Pipe	Vitrified Clay	Pressure Wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Sump (flow-thru boxes)	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Synthetic	Scrape/pressure wash	Excavate/Stockpile	Wipe/one per side	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Gravel	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15730 (Bldg 15730)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Clarifier	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per unit	Clean: salvage/recycle Hazardous: Class I disposal
		Aluminum	Scrape/pressure wash	Remove with backhoe	Wipe/one per unit	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal
15740 (Bldgs 15743, 15744)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Sump	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Trap Baffles	Wood	None	Remove by hand	None - assumed to be contaminated	Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15754 (Bldg 15754)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Channel	Concrete	Scrape/pressure wash	Break w/backhoe and stockpile	Chip/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Grating	Metal	Pressure wash	Remove by hand	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Sump	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15760 (Bldgs 15741, 15742, 15760)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Channel	Concrete	Scrape/pressure wash	Break w/backhoe and stockpile	Chip/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Grating	Metal	Pressure wash	Remove by hand	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Sump (2)	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal
15813 (Bldgs 15812, 15813, 15814)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Liner	Synthetic	Scrape/pressure wash	Excavate/Stockpile	Wipe/one per side	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Gravel	None	Excavate/Stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal

TABLE 3
SUMMARY OF REMOVAL ACTIVITIES
BY POND LOCATION

Pond No.	Material	Composition	Cleaning Method	Removal Method	Sampling Method and Frequency	Disposal Options
15980 (Bldg 15980)	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Grab/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Channel	Concrete	Scrape/pressure wash	Break w/backhoe and stockpile	Chip/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Grating	Metal	Pressure wash	Remove by hand	Wipe/one per 100 linear feet	Clean: salvage/recycle Hazardous: Class I disposal
	Liner	Clay	None	Excavate/stockpile	Grab/one per 50 cubic yards	Clean: Class III disposal Hazardous: treatment/disposal
Bldg 13470	Pipe	Unknown - 3" diam.	Pressure wash	Remove from excavation and stockpile	Chip/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
Bldg 15510	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Chip/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
Bldgs 15630, 15640, 15750	Pipe	Vitrified Clay	Pressure wash	Remove from excavation and stockpile	Chip/one per 100 linear feet	Clean: Class III disposal Hazardous: Class I disposal
	Sump (2)	Concrete	Scrape/pressure wash	Close in place or remove	Chip/one per sump	Clean: salvage/recycle Hazardous: Class I disposal

TABLE 4
SUMMARY OF ANALYTICAL METHODS
FOR MEDIA SAMPLING

Material	Sample Type	Analytical Methods[1]						
		8240	8270	CCR Metals	8330	Cyanide	R/C/I	TCLP
Sludge								
Ponds (Dry)	Grab	X	X	X	X	X	X	D
Sumps (Wet)	Grab	X	X	X	X	X	X	D
Soil								
Earth	Grab	X	X	X	X	X	X	D
Liners (Clay)	Grab	X	X	X	X	X	X	D
Gravel	Grab	X	X	X	X	X	N/A	D
Concrete Sumps	Chip	X	X	A	X	A	N/A	D
Piping								
Metal	Wipe	X	X	X	X	X	N/A	N/A
Clay	Chip	X	X	B	X	B	N/A	D
Synthetic Liner	Wipe	X	X	X	X	X	N/A	N/A
Decon Water	Grab	X	X	X	X	X	C	N/A

TABLE 4
SUMMARY OF ANALYTICAL METHODS
FOR MEDIA SAMPLING

Notes

[1] Analytical methods to be performed are standard EPA methodologies (e.g., SW-846) with standard laboratory analytical reporting packages (i.e., laboratory control sample [LCS], matrix spike results, etc.). All analyses will be performed by a State-certified, NFESC-approved laboratory.

CCR - California Code of Regulations
R/C/I - Reactivity, Corrosivity, Ignitability
TCLP - Toxic Characteristic Leaching Procedure
STLC - Soluble Threshold Limit Concentration
N/A - Not applicable

A: Test for metals and cyanide if sludges have metals that are anomalous.

B: No test of metals on clay pipe because of the materials used in the manufacturing process.

C: Measure pH first. If pH is less than 3 or greater than 10, perform reactivity, corrosivity, and ignitability tests.

D: If total concentration is greater than 10 times the STLC or 20 times the TCLP, then the TCLP will be performed.

DRAWN BY	MBM 02/09/95	CHECKED BY	CC 6-27-95	DRAWING NUMBER	761123-A25
		APPROVED BY	6-27-95		

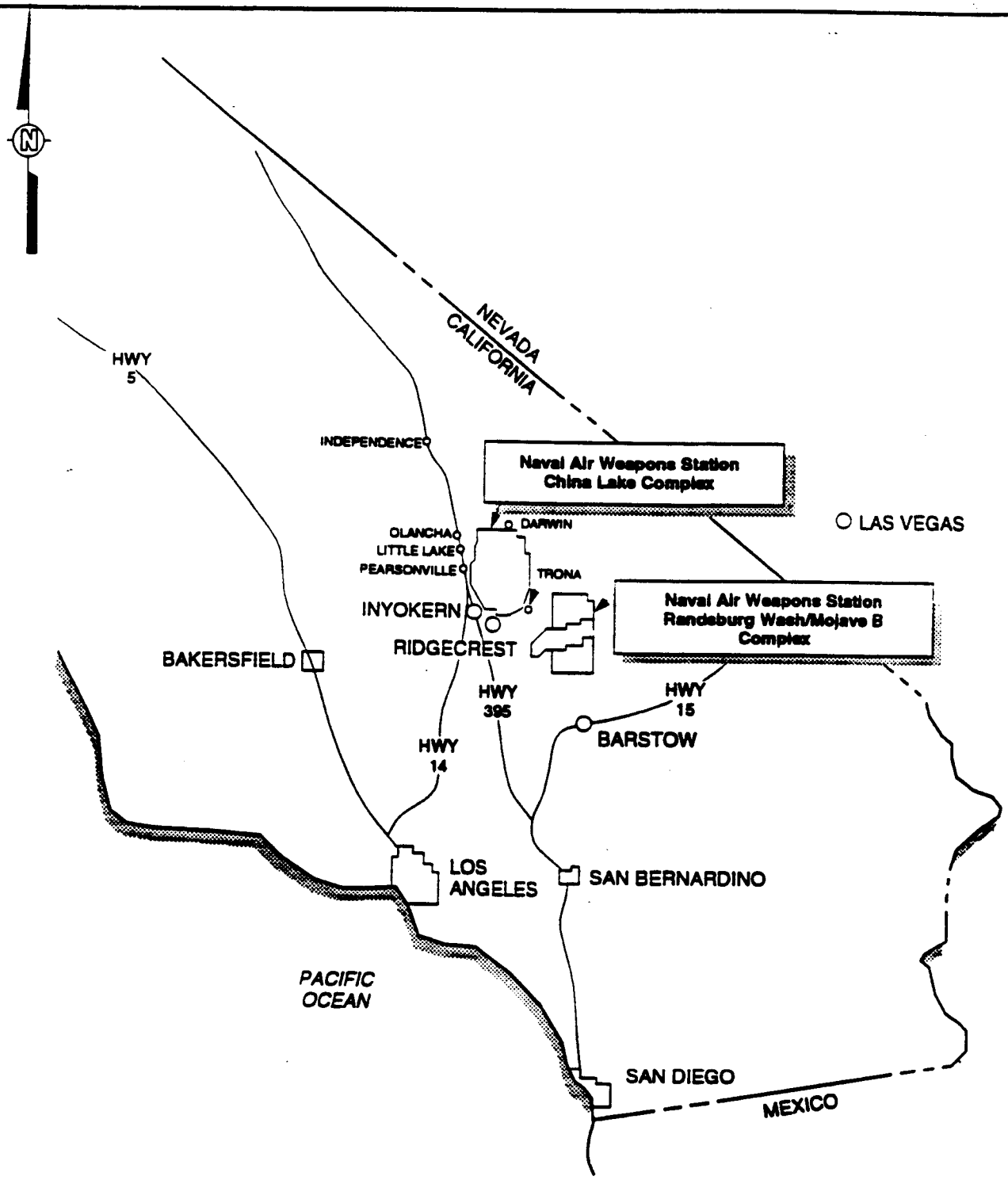


FIGURE 1

VICINITY MAP
NAWS, CHINA LAKE, CALIFORNIA

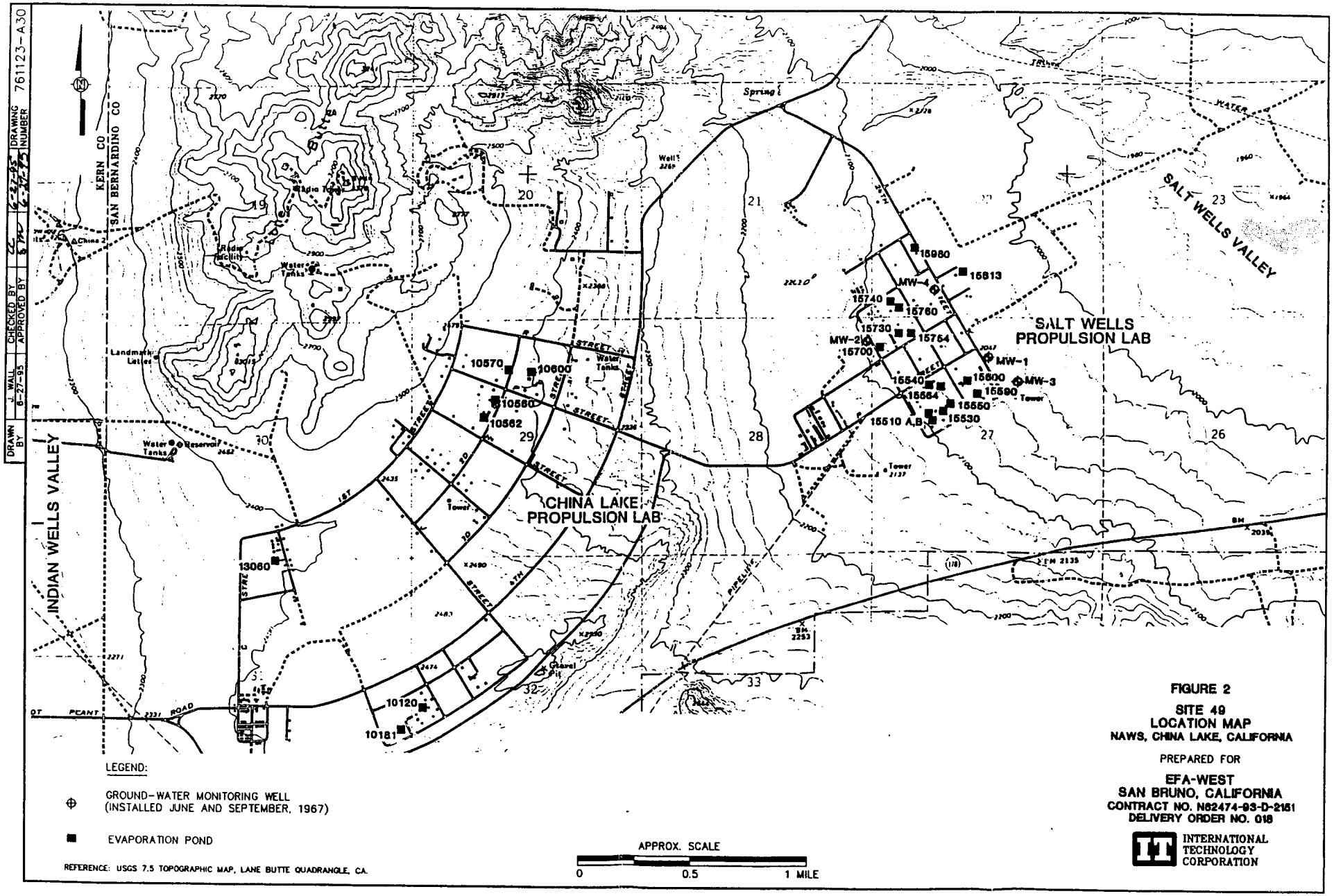
PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

-NOT TO SCALE-

REFERENCE: NAWS, CHINA LAKE, CA. TECH. MEMORAMDUM 3
RI PHASE I REPORT, W.DIV. NAVFACENCOM, 1993

INTERNATIONAL TECHNOLOGY CORPORATION



LEGEND:

⊕ GROUND-WATER MONITORING WELL (INSTALLED JUNE AND SEPTEMBER, 1967)

■ EVAPORATION POND

REFERENCE: USGS 7.5 TOPOGRAPHIC MAP, LANE BUTTE QUADRANGLE, CA.

APPROX. SCALE

0 0.5 1 MILE

FIGURE 2

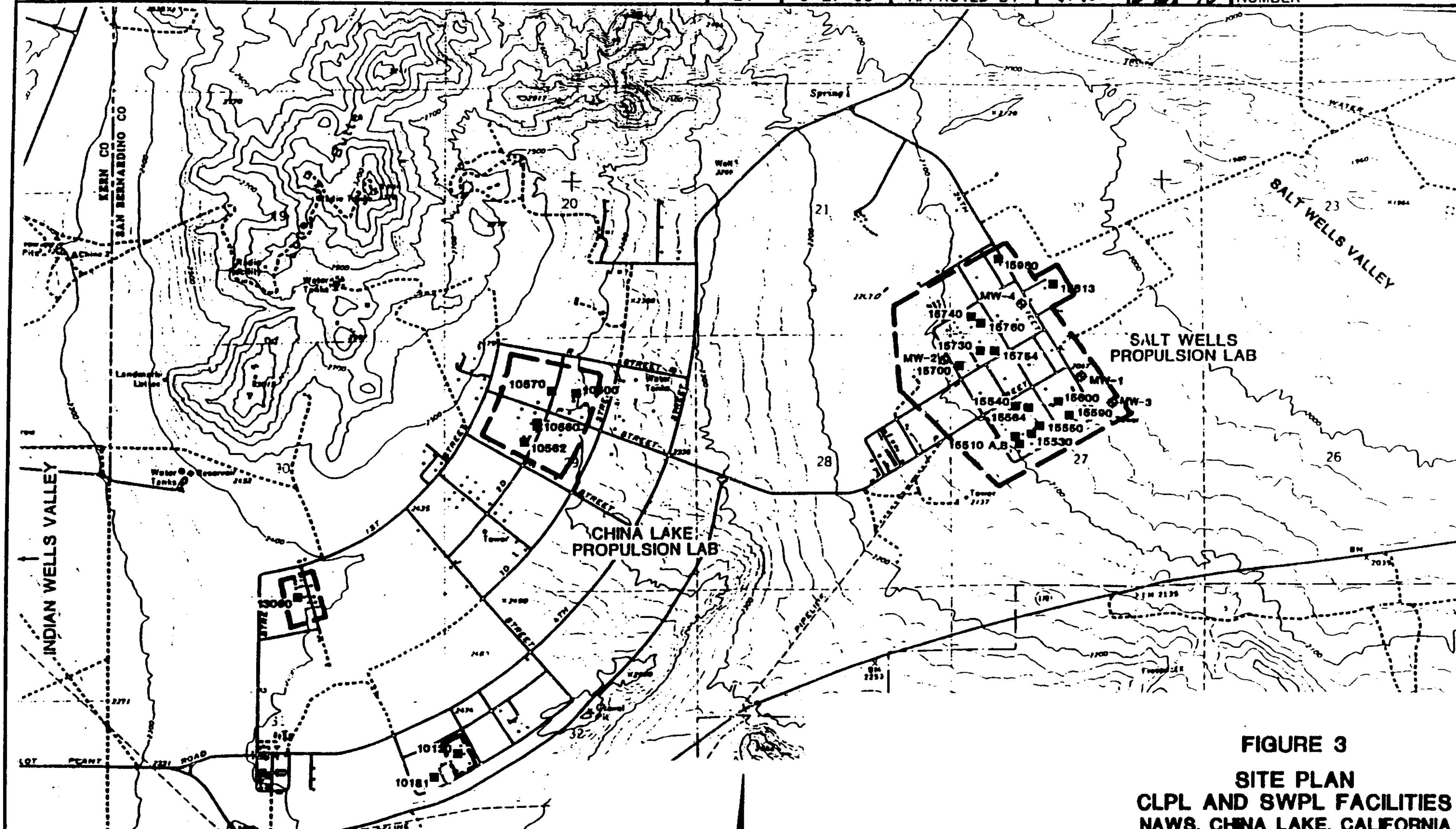
SITE 49
LOCATION MAP
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

J. WALL	CHECKED BY	CC	6-27-95	DRAWING
6-27-95	APPROVED BY	JMW	6-27-95	NUMBER 3-A24



LEGEND:

APPROXIMATE BOUNDARY OF AREA OF CONCERN

GROUND-WATER MONITORING WELL (INSTALLED JUNE AND SEPTEMBER, 1967)

EVAPORATION POND

APPROX. SCALE

0 0.5 1 MILE

REFERENCE: USGS 7.5 TOPOGRAPHIC MAP, LANE RUTTE QUADRANGLE, CA.

FIGURE 3

SITE PLAN
CLPL AND SWPL FACILITIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

J. WALL	CHECKED BY	CC	6-27-95	DRAWING NUMBER	3-A26
6-27-95	APPROVED BY	JMW	6-27-95		

Total Volumes (All Clay-Lined Ponds)

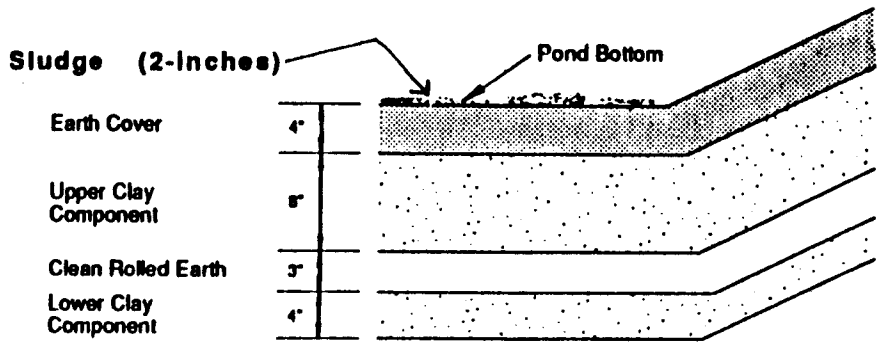


FIGURE 4

TYPICAL LINER SYSTEM FOR CLAY-LINED POND
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

Reference: Lowry and Associates, Industrial Domestic Sewer System Improvements, Navy Construction Contract No. N62474-78-C-0335, Sheet C-79 Lowry and Associates, San Diego, California, 10 September 1979.

DRAWN BY	J. WALL 6-27-95	CHECKED BY / APPROVED BY	CC / JMW	6-27-95 / 6-27-95	DRAWING NUMBER	70,123-A27

Total Volumes
(All Synthetic-Lined Ponds)

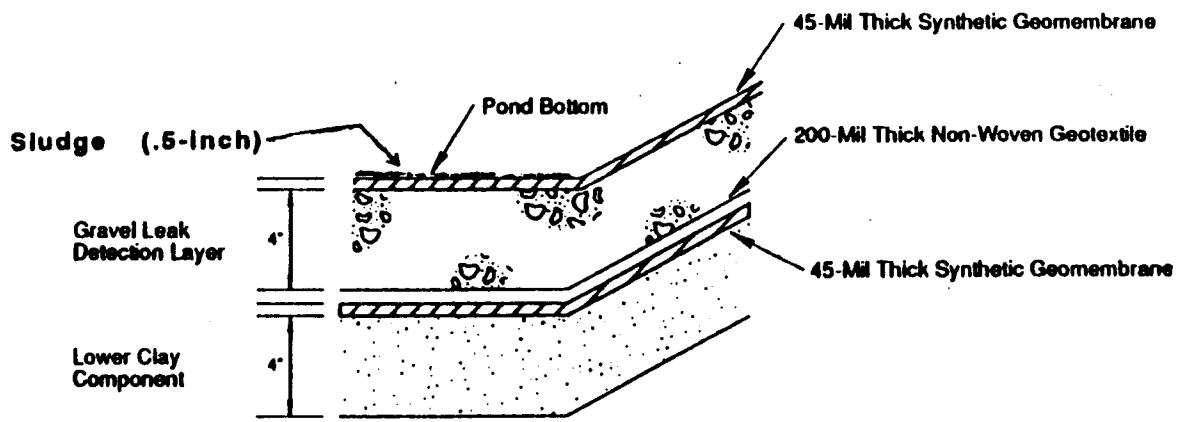


FIGURE 5

TYPICAL LINER SYSTEM FOR SYNTHETIC-LINED POND
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

Reference: Levine-Fricke, Industrial Waste Ponds Rehabilitation Plans, Construction Contract No. N62474-88-C6540, Sheet C-6, Levine-Fricke, Emeryville, California, March 1989.

DRAWN BY	J. WALL 6-27-95	CHECKED BY	CC	6-27-95	DRAWING NUMBER	70123-A28
		APPROVED BY	JMW	6-27-95		

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	REM DUR
Site-49 Pre-Construction/EOD Trainin	24JUL95	24JUL95	1
Site-49 Mobilizaton of Personnel	1AUG95	2AUG95	2
Site-49 Sample Pond/Sump/Berms/Rinsa	1AUG95	19SEP95	35
Site-49 Soil/Sludge/Rinsate Analysis	1AUG95	10NOV95	73
Site-49 On-Site Supervision/Manageme	1AUG95	10NOV95	73
Site-49 Temporary Construction Facil	1AUG95	10NOV95	73
Site-49 Vehicles for Personnel	1AUG95	10NOV95	73
Site-49 Emergency Equipment	1AUG95	10NOV95	73
Site-49 Lodging & Per Diem	1AUG95	10NOV95	73
Site-49 Mobilization of Construction	3AUG95	9AUG95	5
Site-49 Set-up Decon Facility for Eq	3AUG95	3AUG95	1
Site-49 Set-up Temporary Constructio	3AUG95	9AUG95	5
Site-49 Remove/Store Fencing	7AUG95	18AUG95	10
Site-49 Pre-Construction Meeting	8AUG95	8AUG95	1
Site-49 Excavate Sludges/Concrete Fr	10AUG95	19JUN96	220
Site-49 Evaporation Pond 15590	10AUG95	28AUG95	13
Site-49 Remove Cone Settlers/Piping/	11AUG95	13MAY96	192
Site-49 Decon Sump Area/Piping and C	14AUG95	27MAY96	201
Site-49 Evaporation Pond 15600	18AUG95	5SEP95	12
Site-49 Remove Liner From Ponds	18AUG95	10JUN96	207
Site-49 Evaporation Ponds 15510A & 1	23AUG95	14SEP95	16
Site-49 Transportation and Disposal	23AUG95	24JUN96	214
Site-49 Loading of Soils and Sludges	23AUG95	24JUN96	214
Site-49 Backfill Sumps and Ponds	23AUG95	25JUN96	215
Site-49 Evaporation Pond 15530	7SEP95	26SEP95	14
Site-49 Evaporation Pond 15540	19SEP95	7NOV95	36
Site-49 Evaporation Pond 15550	31OCT95	16NOV95	13
Site-49 Evaporation Pond 15564	9NOV95	7DEC95	19

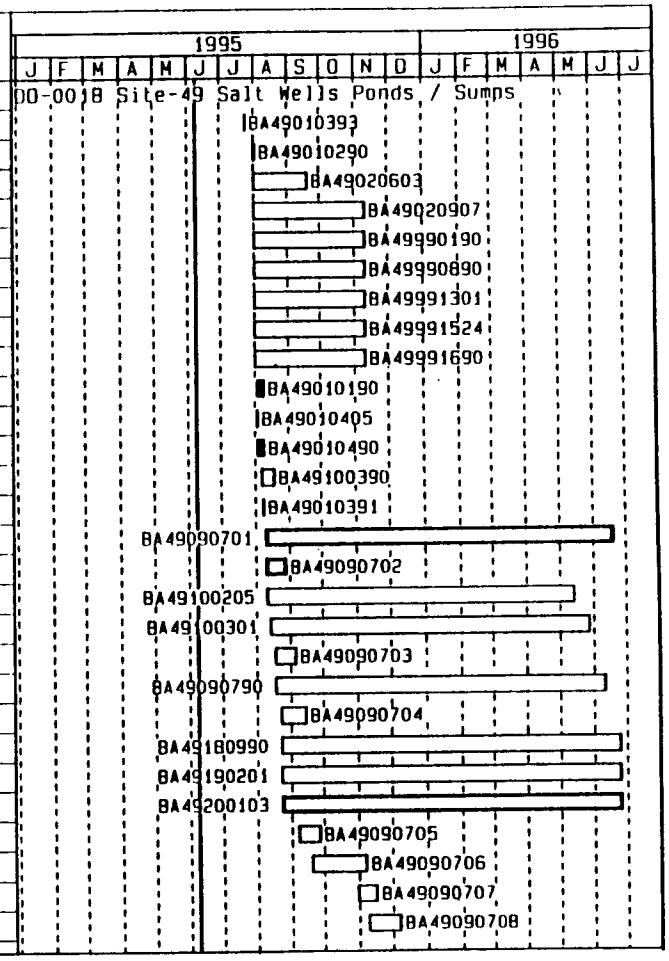


FIGURE 6

SITE 49
PROJECT SCHEDULE
PHASE I AND II
NAWS, CHINA LAKE, CALIFORNIA

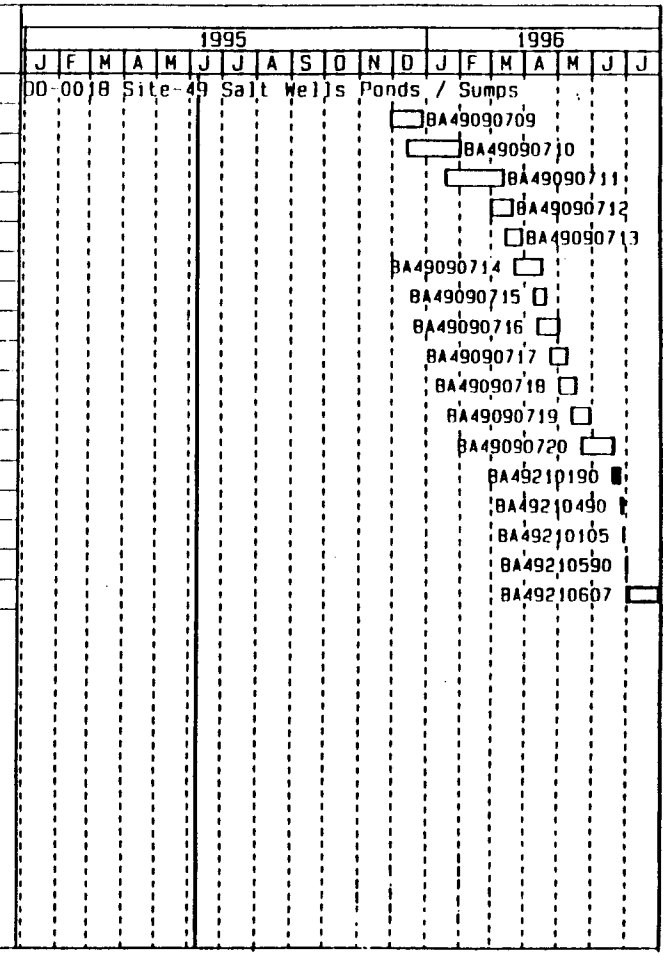
PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

J. WALL	CHECKED BY	CC	6-27-95	DRAWING	3-A29
6-27-95	APPROVED BY	JMW	6-27-95	NUMBER	

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	REM DUR
Site-49 Evaporation Pond 15700	30NOV95	28DEC95	19
Site-49 Evaporation Ponds 15730 & 15	15DEC95	1FEB96	33
Site-49 Evaporation Ponds 15740 & 15	19JAN96	12MAR96	38
Site-49 Evaporation Pond 15813	1MAR96	20MAR96	14
Site-49 Evaporation Pond 15980	14MAR96	29MAR96	12
Site-49 Evaporation Pond 10120	22MAR96	16APR96	18
Site-49 Evaporation Pond 10181	9APR96	19APR96	9
Site-49 Evaporation Pond 10560	12APR96	1MAY96	14
Site-49 Evaporation Pond 10562	24APR96	9MAY96	12
Site-49 Evaporation Pond 10570	2MAY96	17MAY96	12
Site-49 Evaporation Pond 10600	13MAY96	29MAY96	13
Site-49 Evaporation Pond 13060	22MAY96	19JUN96	21
Site-49 Remove Temporary Site Facili	19JUN96	25JUN96	5
Site-49 Demob of Construction Equipm	26JUN96	27JUN96	2
Site-49 Remove Decon Facility for Eq	28JUN96	28JUN96	1
Site-49 Demobilization of Personnel	1JUL96	1JUL96	1
Site-49 Implementation Report	1JUL96	30JUL96	22



SITE 49
PROJECT SCHEDULE
PHASE I AND II (CONTINUED)
NAWS, CHINA LAKE, CALIFORNIA

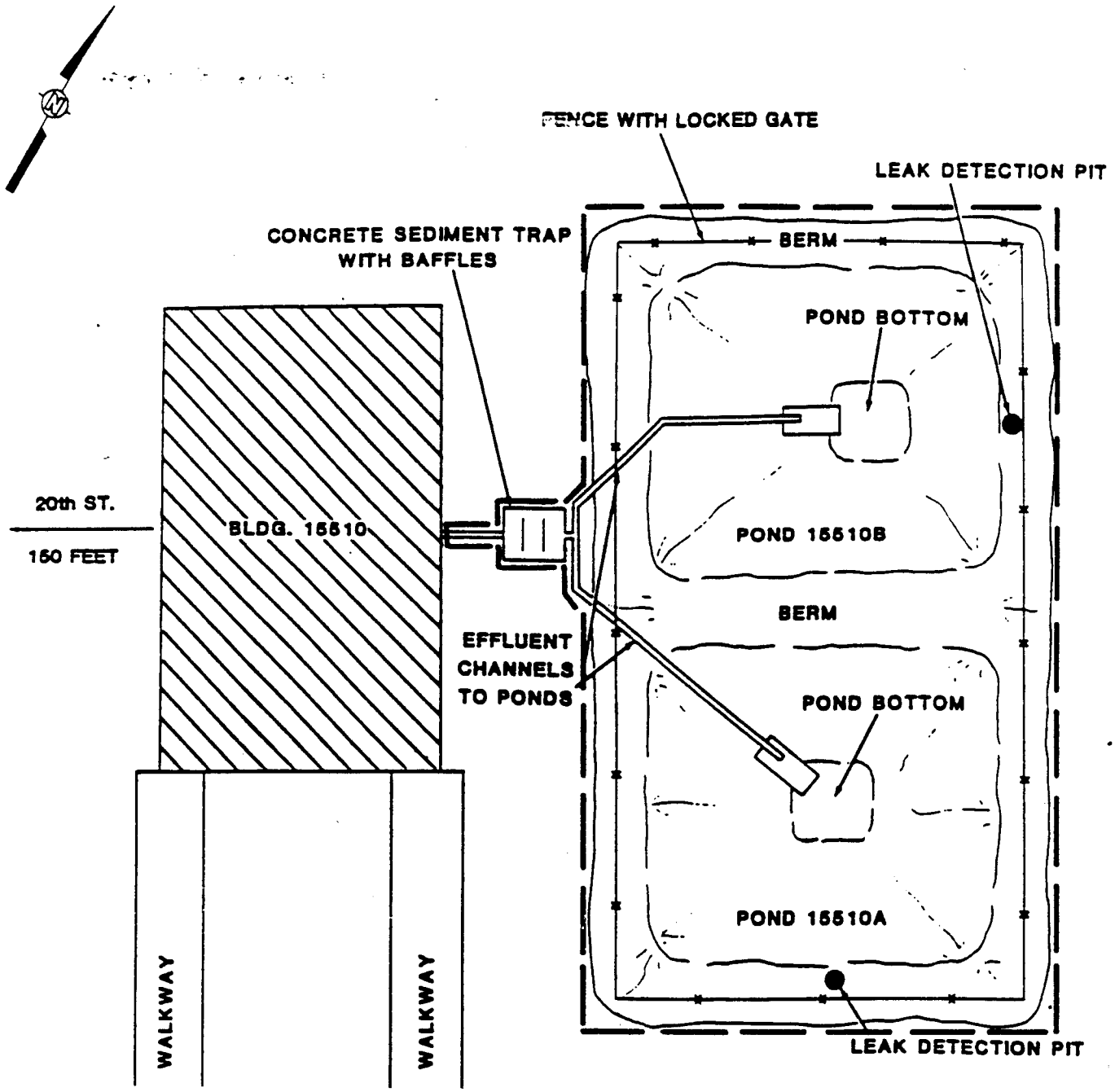
PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

Appendix A

Site 49 Evaporation Ponds Site Plans and Utility Drawings



SCALE

0 25 SCALE

LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-1

SITE PLAN
EVAPORATION POND 15510b
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

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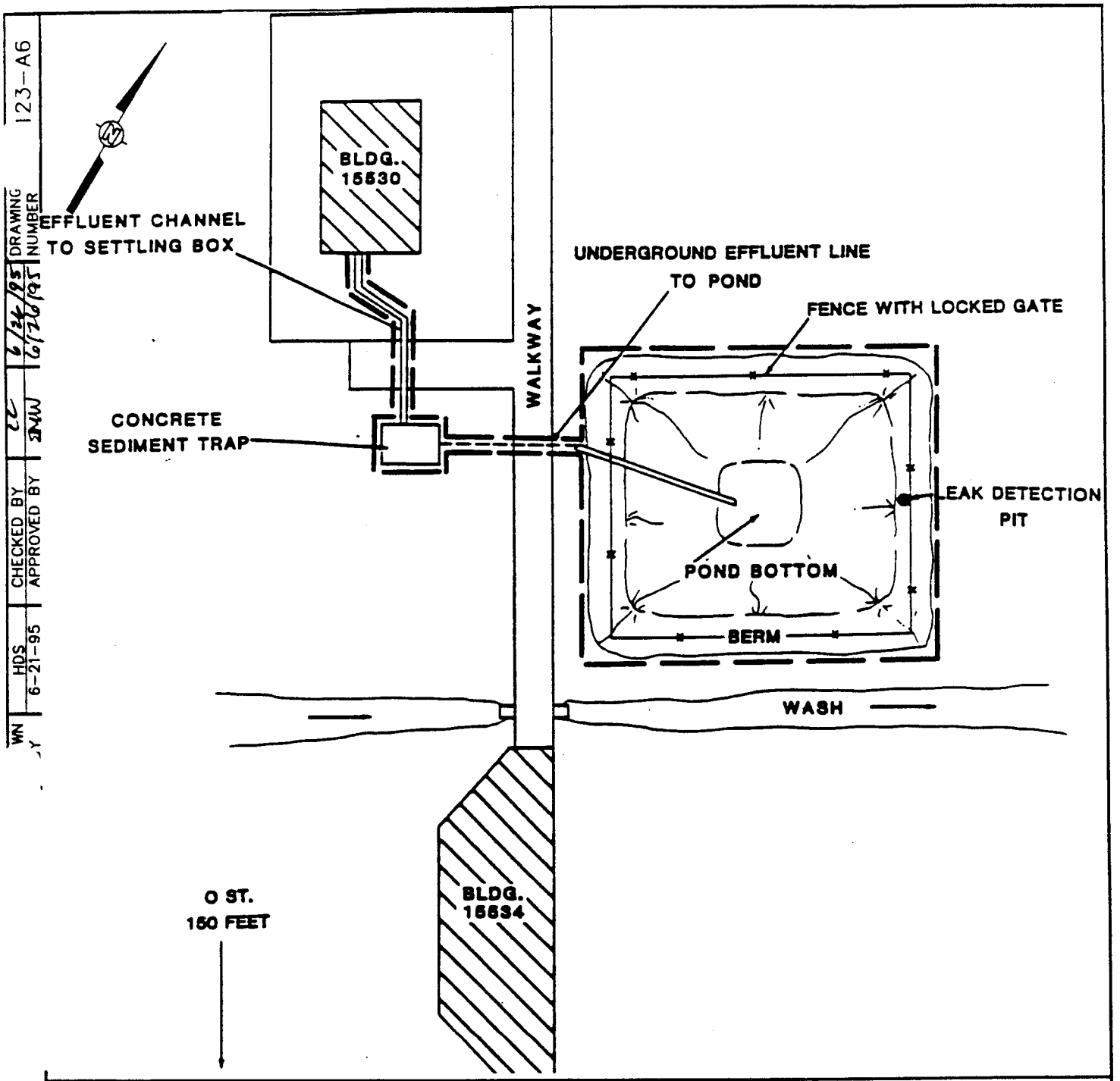
	6-21-95	APPROVED BY	6/26/95	123-A5



SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

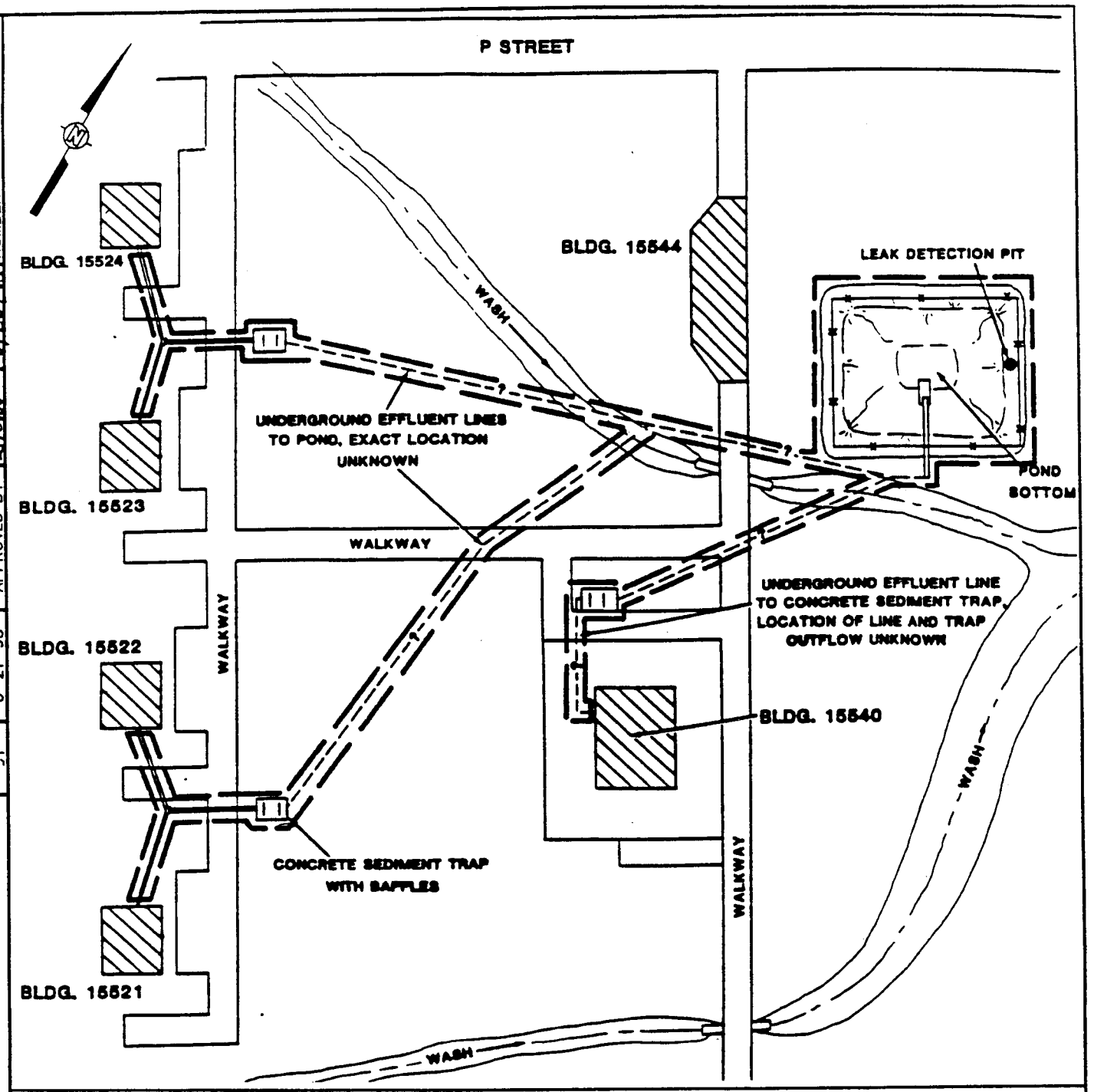
FIGURE A-2

SITE PLAN
EVAPORATION POND 15530
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION



SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-3

SITE PLAN
EVAPORATION POND 15540
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

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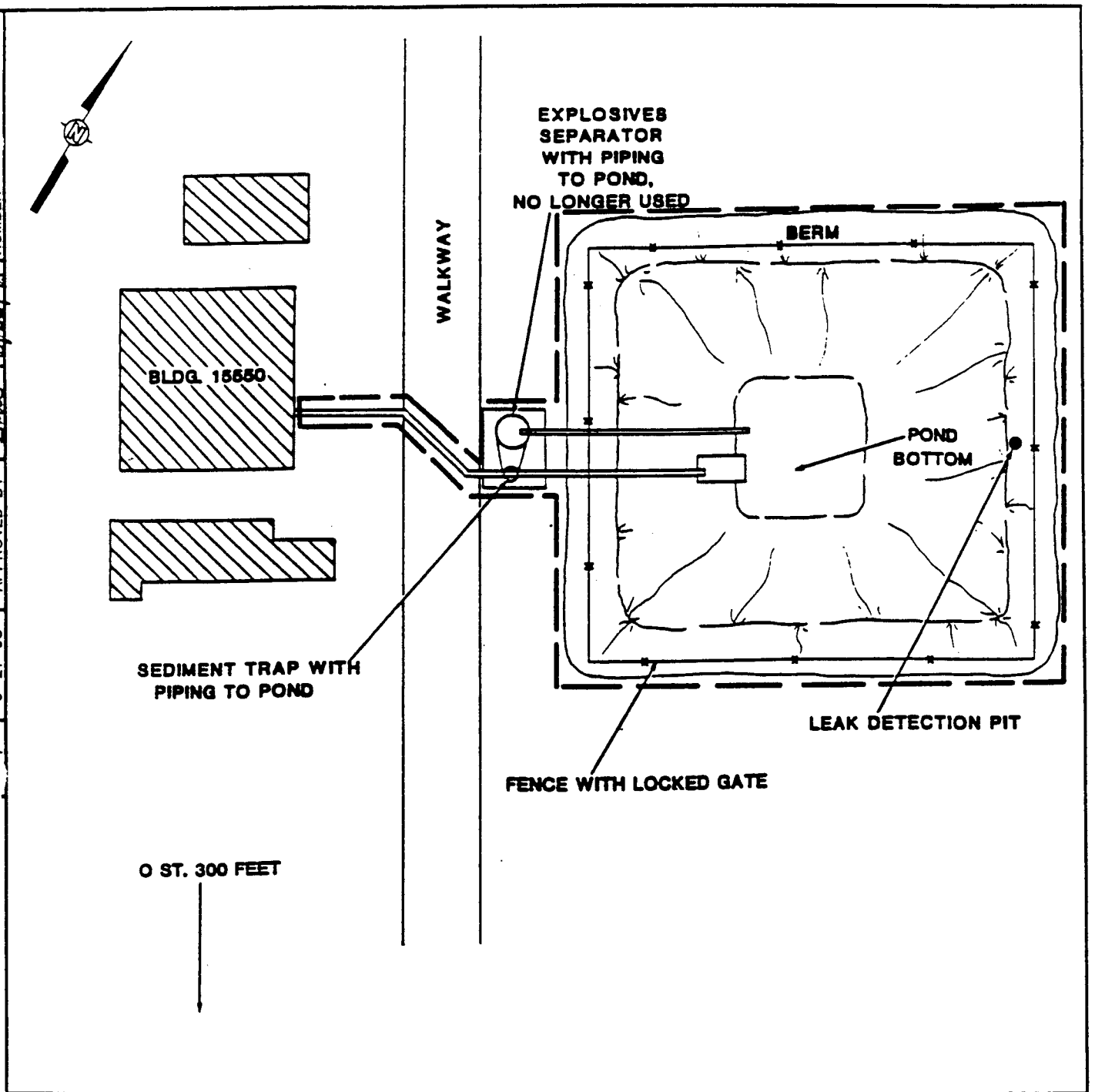
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION



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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-4

SITE PLAN
EVAPORATION POND 15550
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

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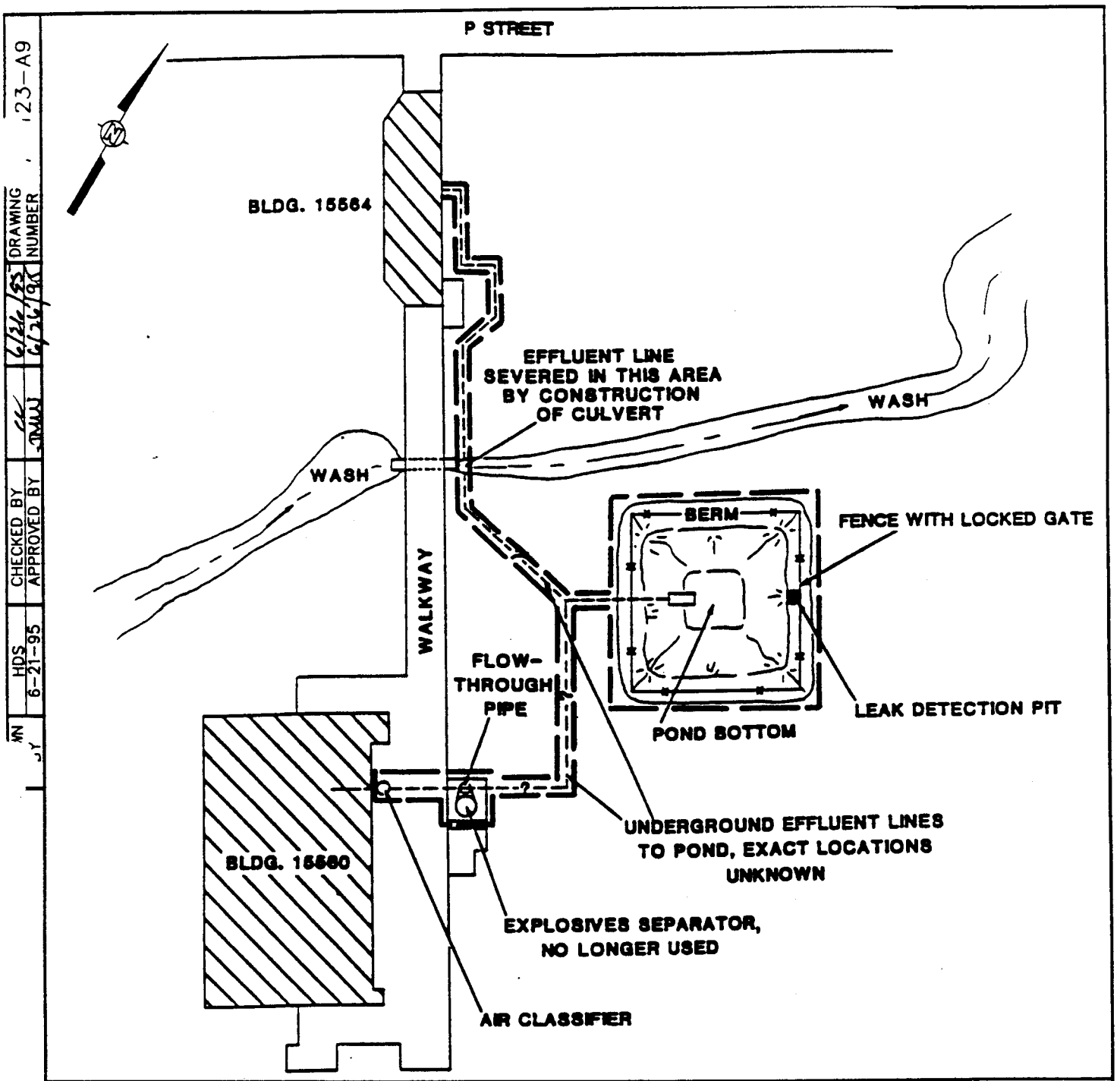

SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-5

SITE PLAN
EVAPORATION POND 15564
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

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DRAWING NUMBER 123-A9
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APPROVED BY
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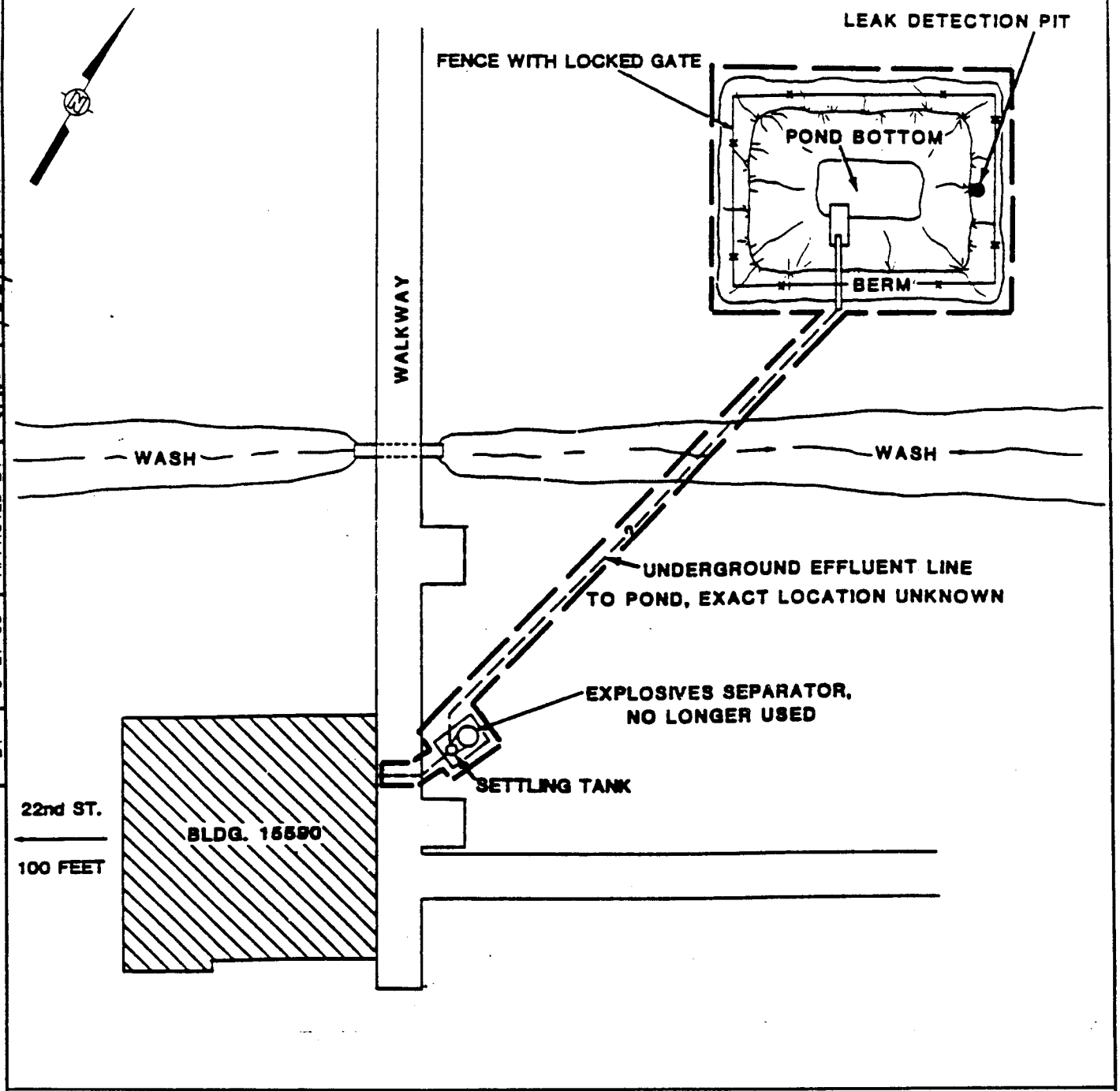

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-6

SITE PLAN
EVAPORATION POND 15590
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

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CONTRACT NO. N62474-93-D-2151
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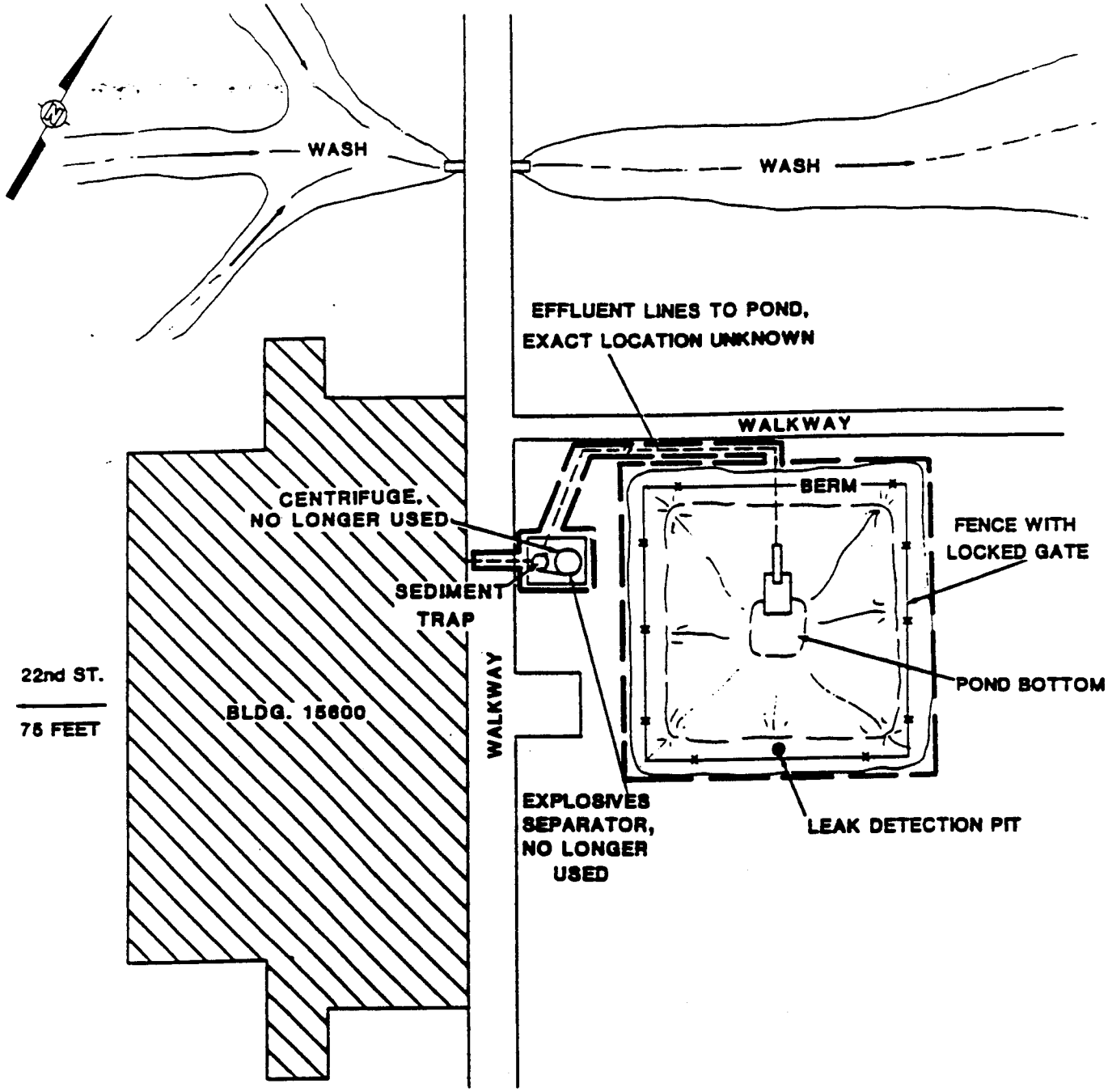

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-7

SITE PLAN
EVAPORATION POND 15600
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

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DRAWING NUMBER	123-A12
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APPROVED BY	JMW
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6-21-95	
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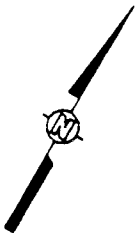

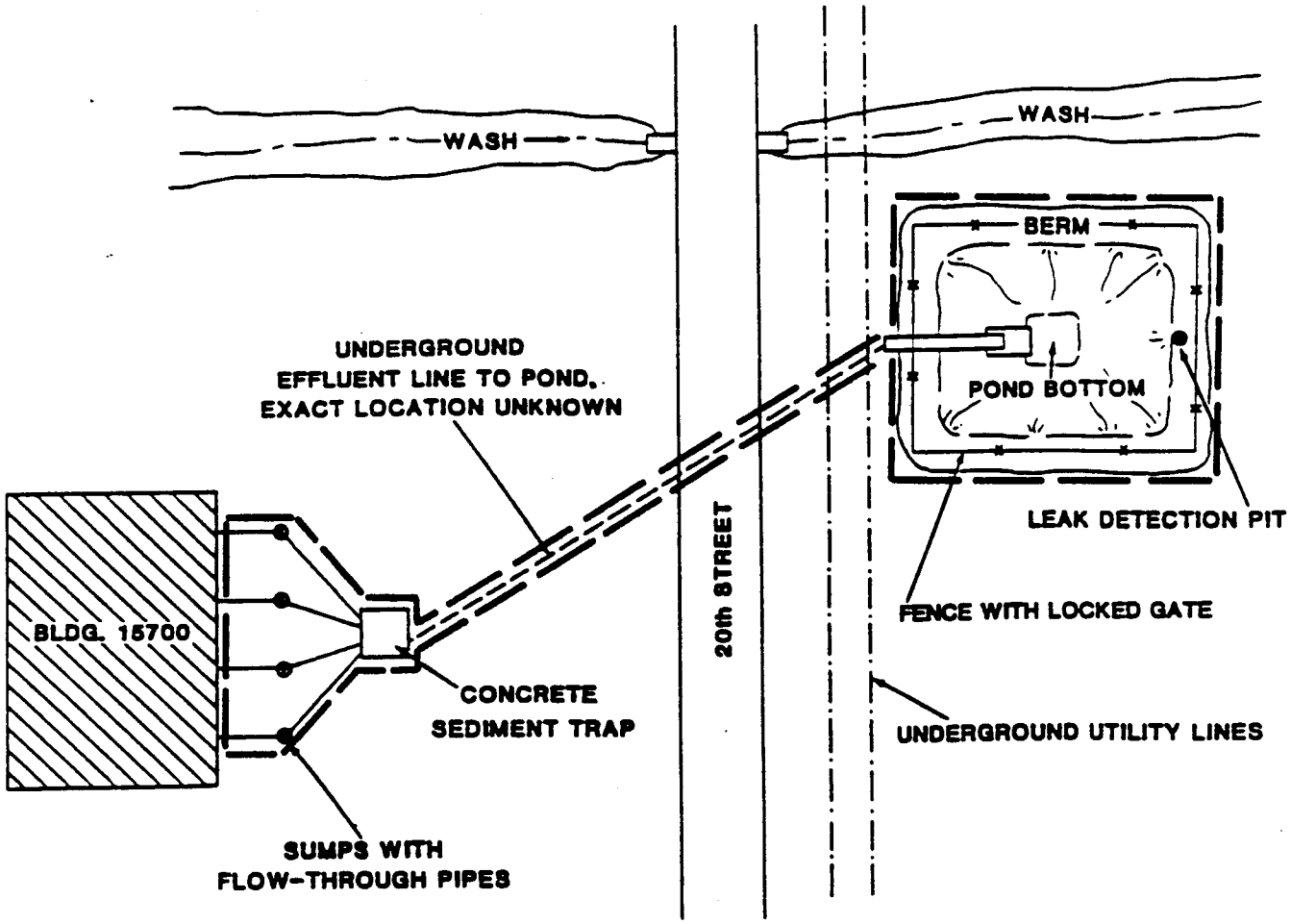

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-8

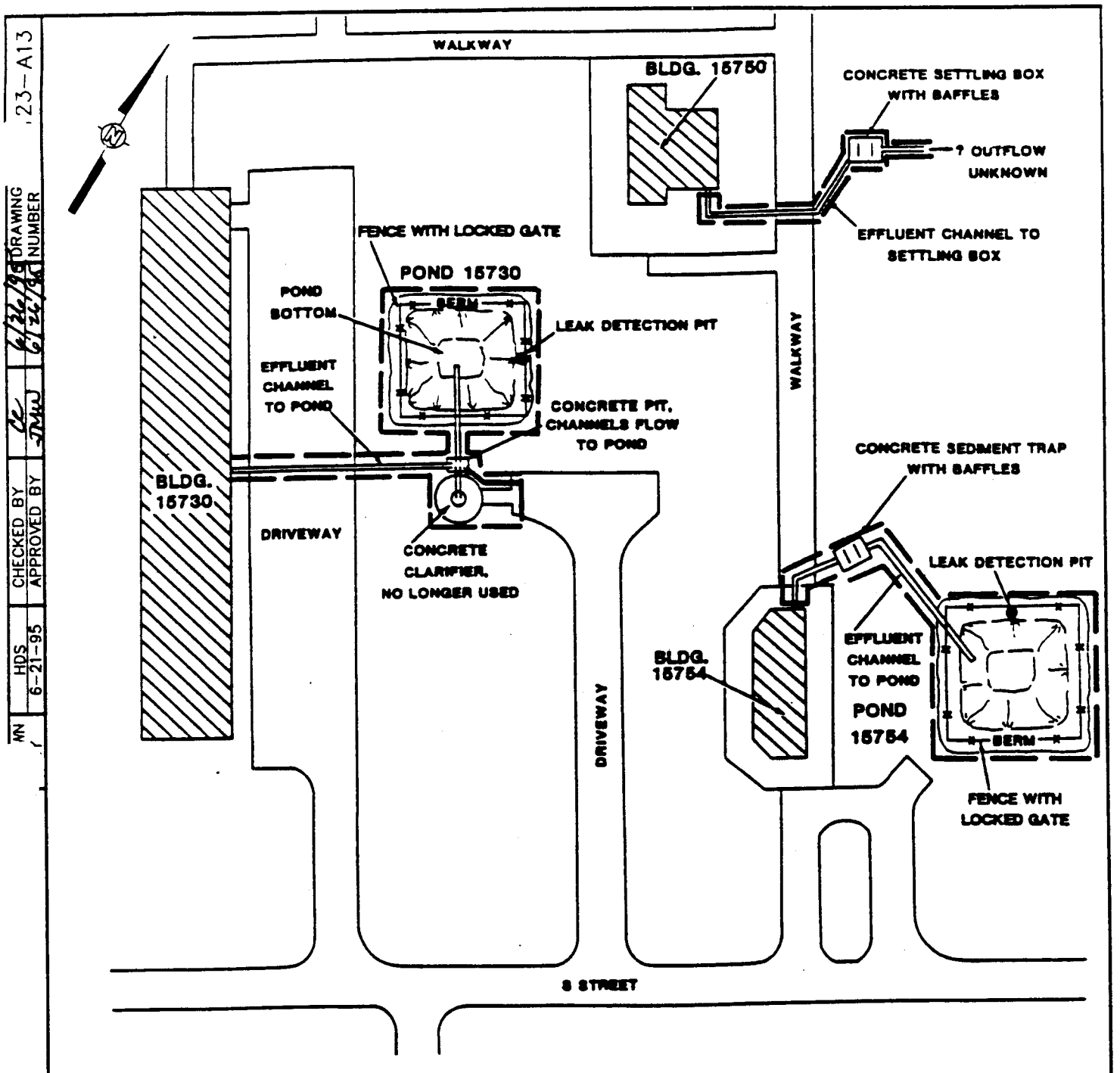
SITE PLAN
EVAPORATION POND 15700

SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION



SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-9

SITE PLAN
EVAPORATION POND 15754
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

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CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

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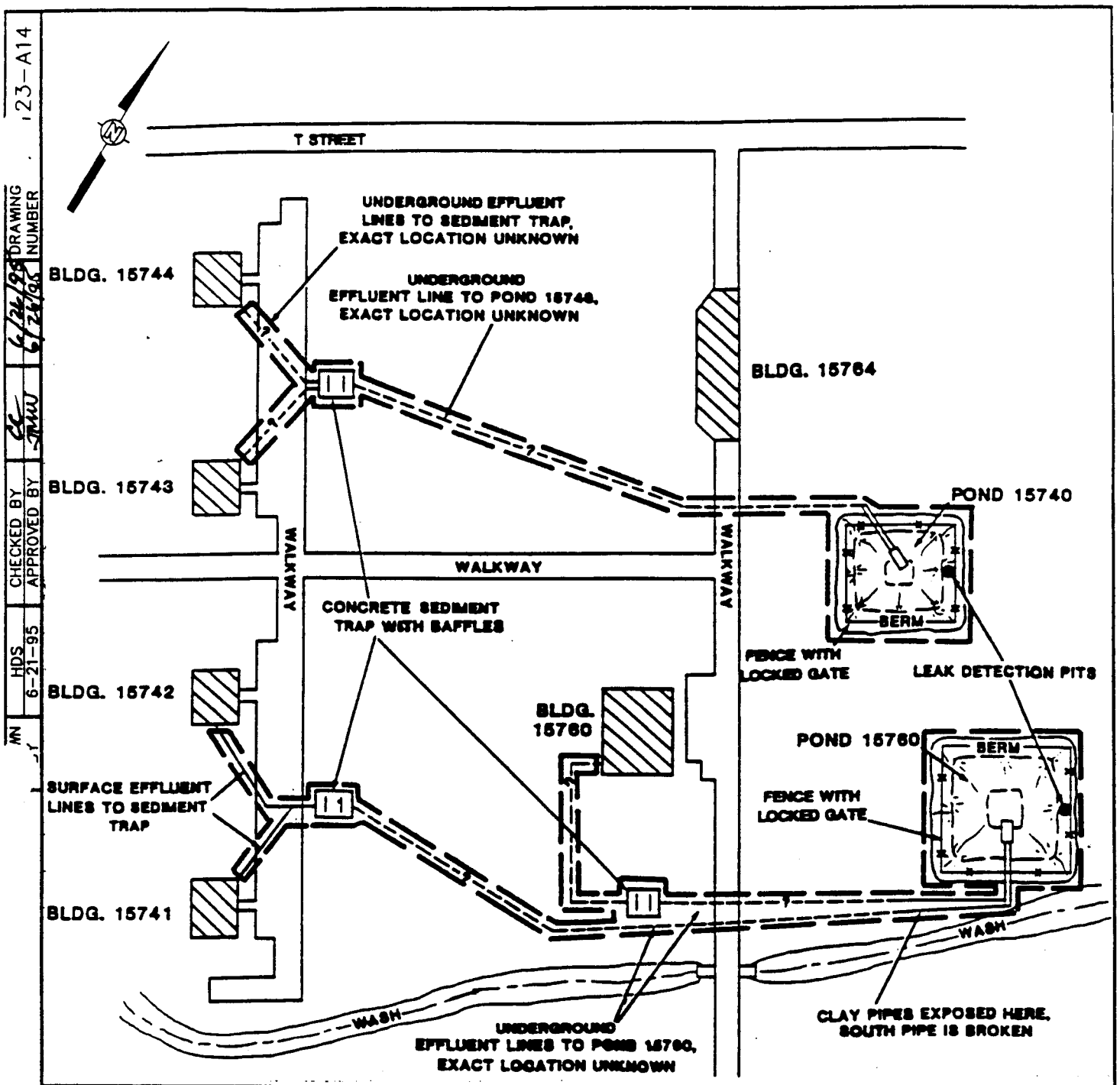

SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-10

SITE PLAN
EVAPORATION POND 15760
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

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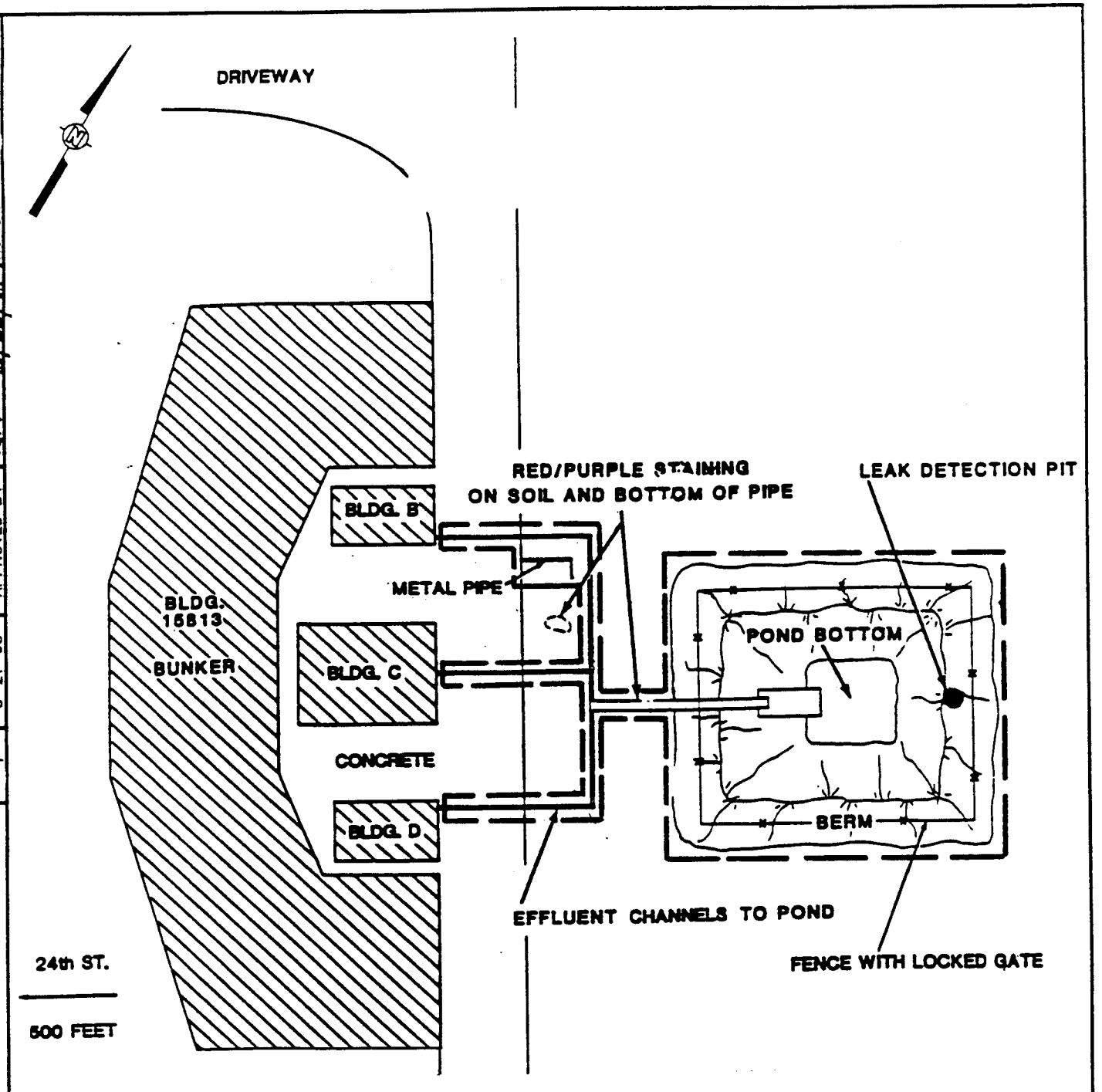
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION



SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-11

SITE PLAN
EVAPORATION POND 15813
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

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CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

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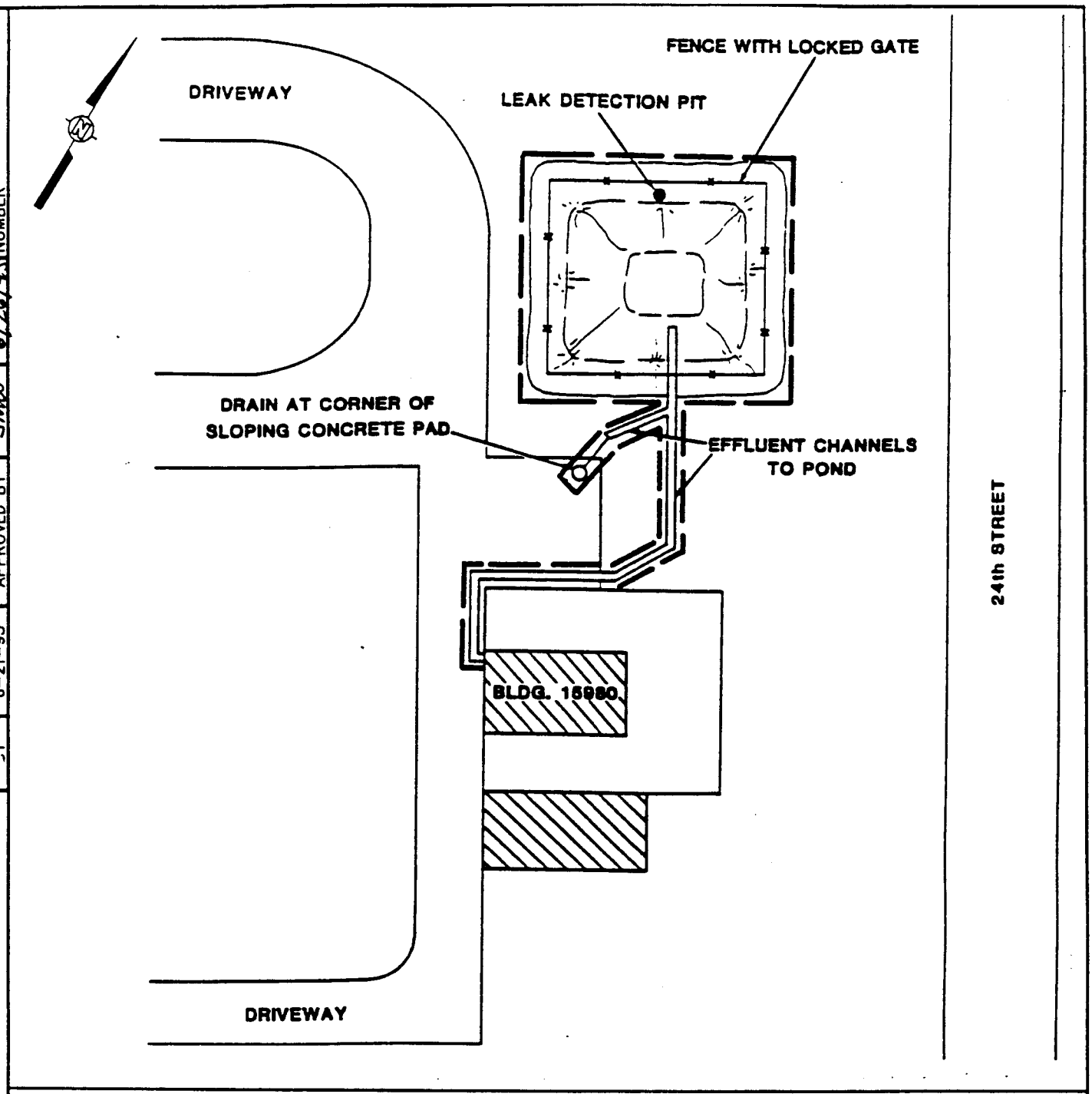

SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-12

SITE PLAN
EVAPORATION POND 15980
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

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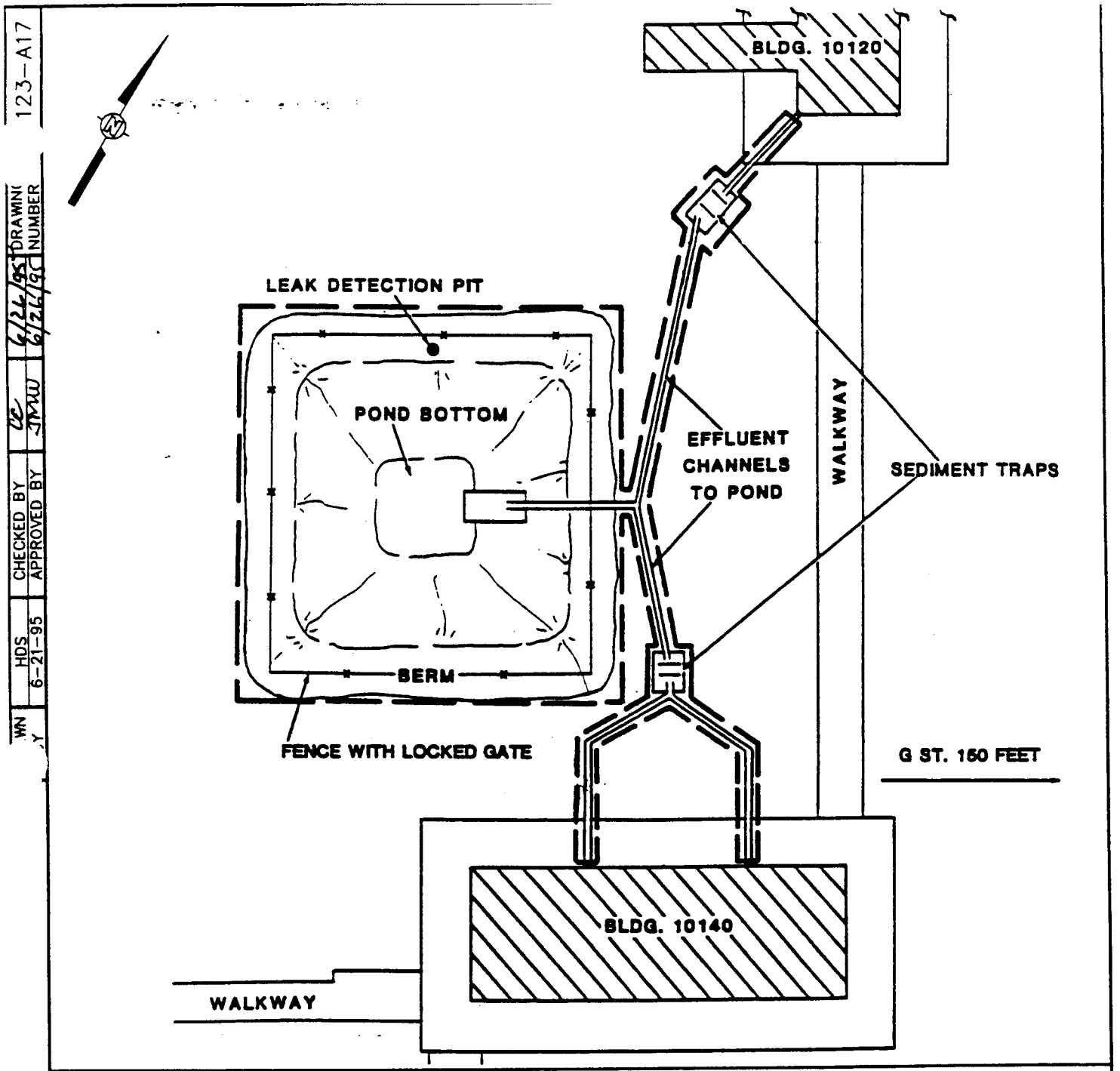
123-A16



SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

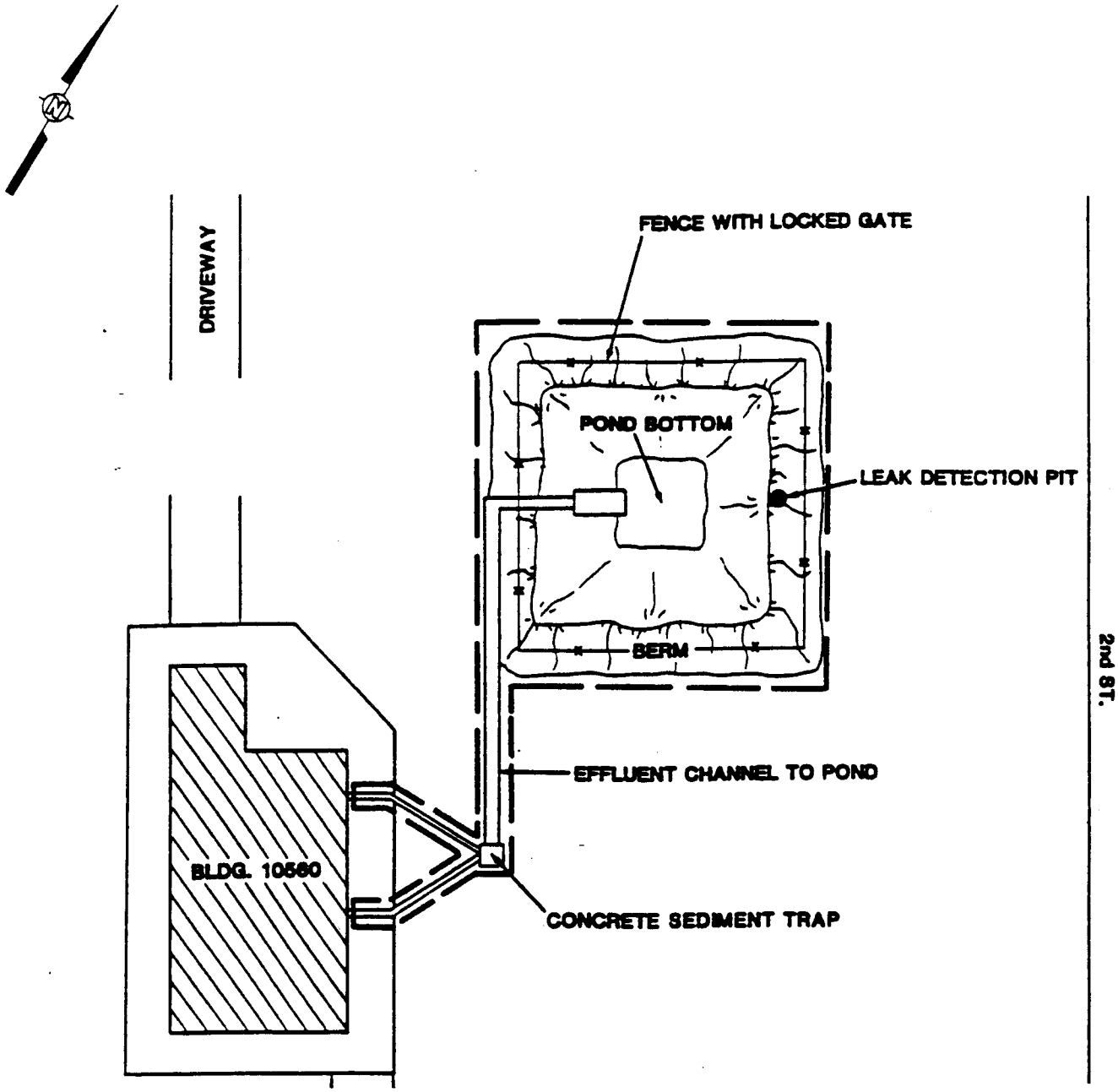
FIGURE A-13

SITE PLAN
EVAPORATION POND 10120
SALT WELLS PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION



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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-14

SITE PLAN
EVAPORATION POND 13060
CHINA LAKE PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

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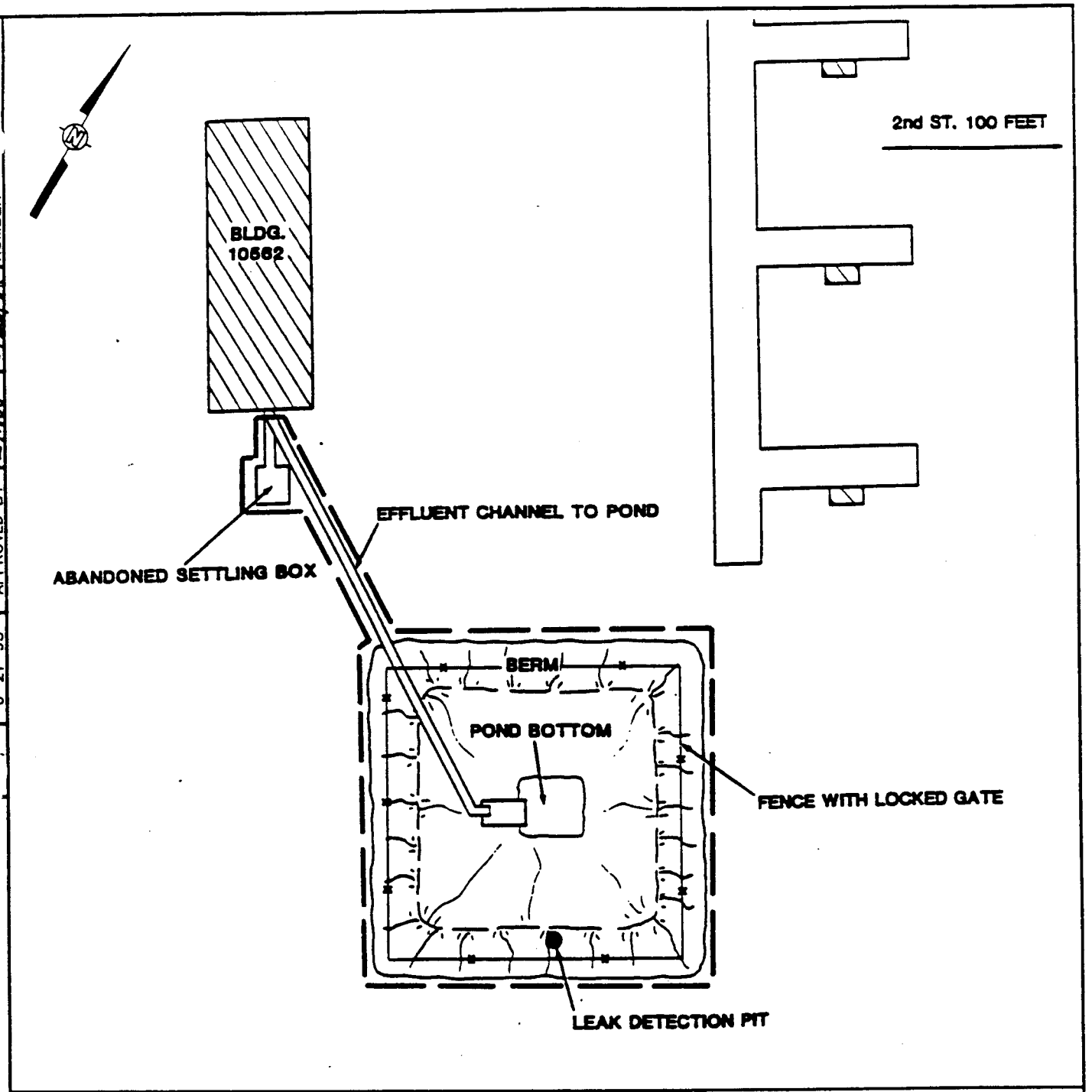

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-15

SITE PLAN
EVAPORATION POND 10562
CHINA LAKE PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

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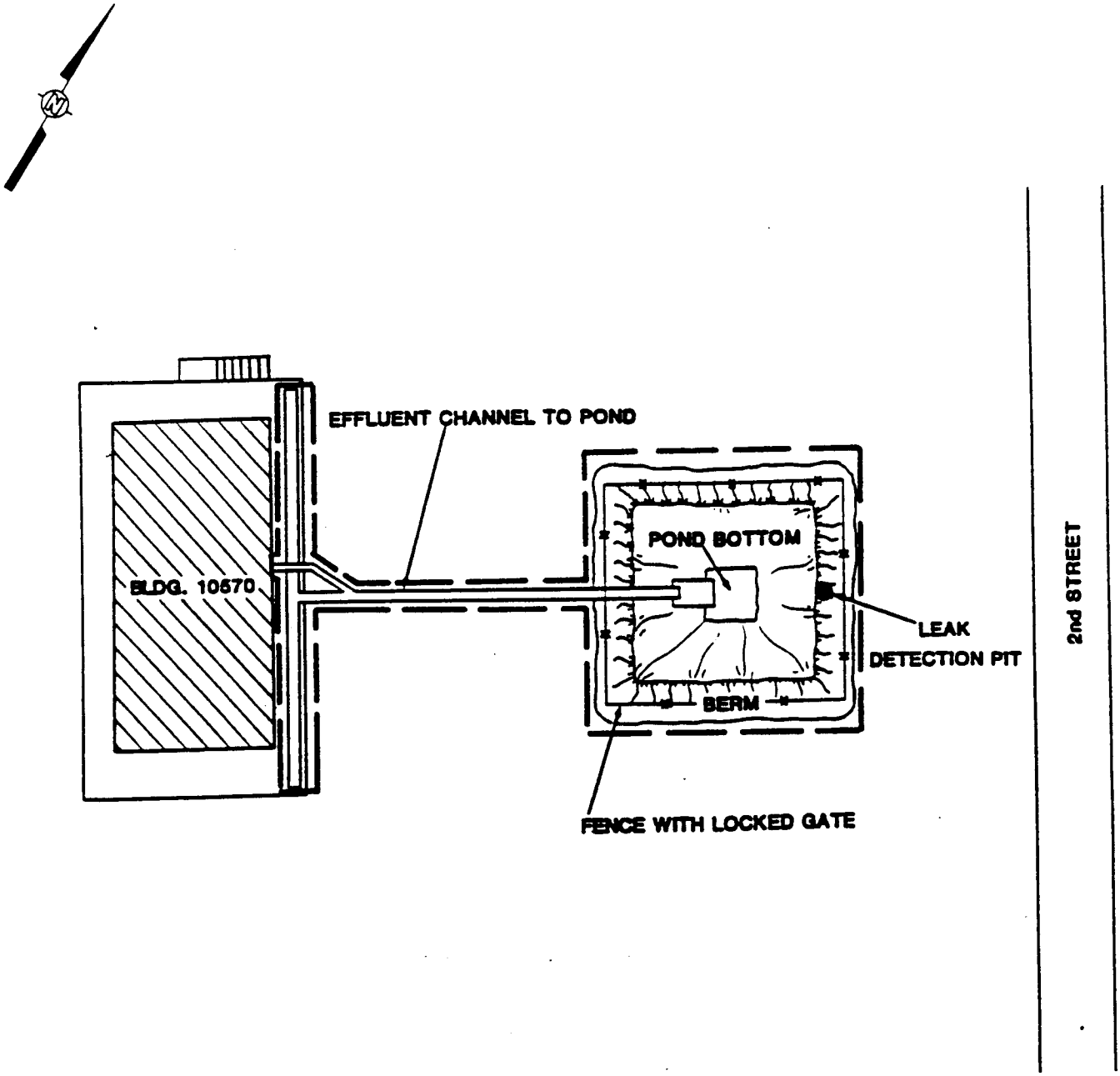

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-16

SITE PLAN
EVAPORATION POND 10570
CHINA LAKE PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

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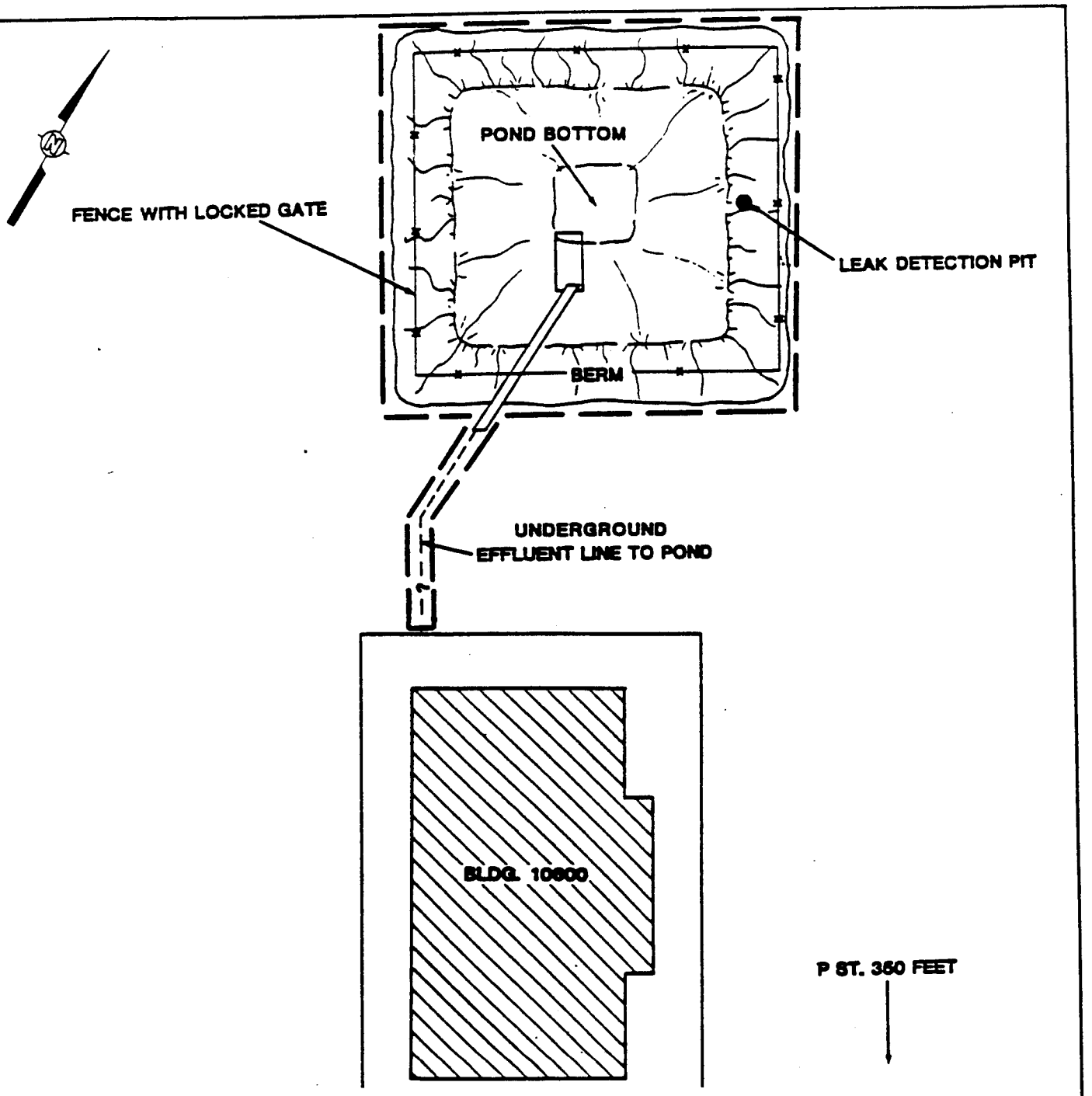

SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-17

SITE PLAN
EVAPORATION POND 10600
CHINA LAKE PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

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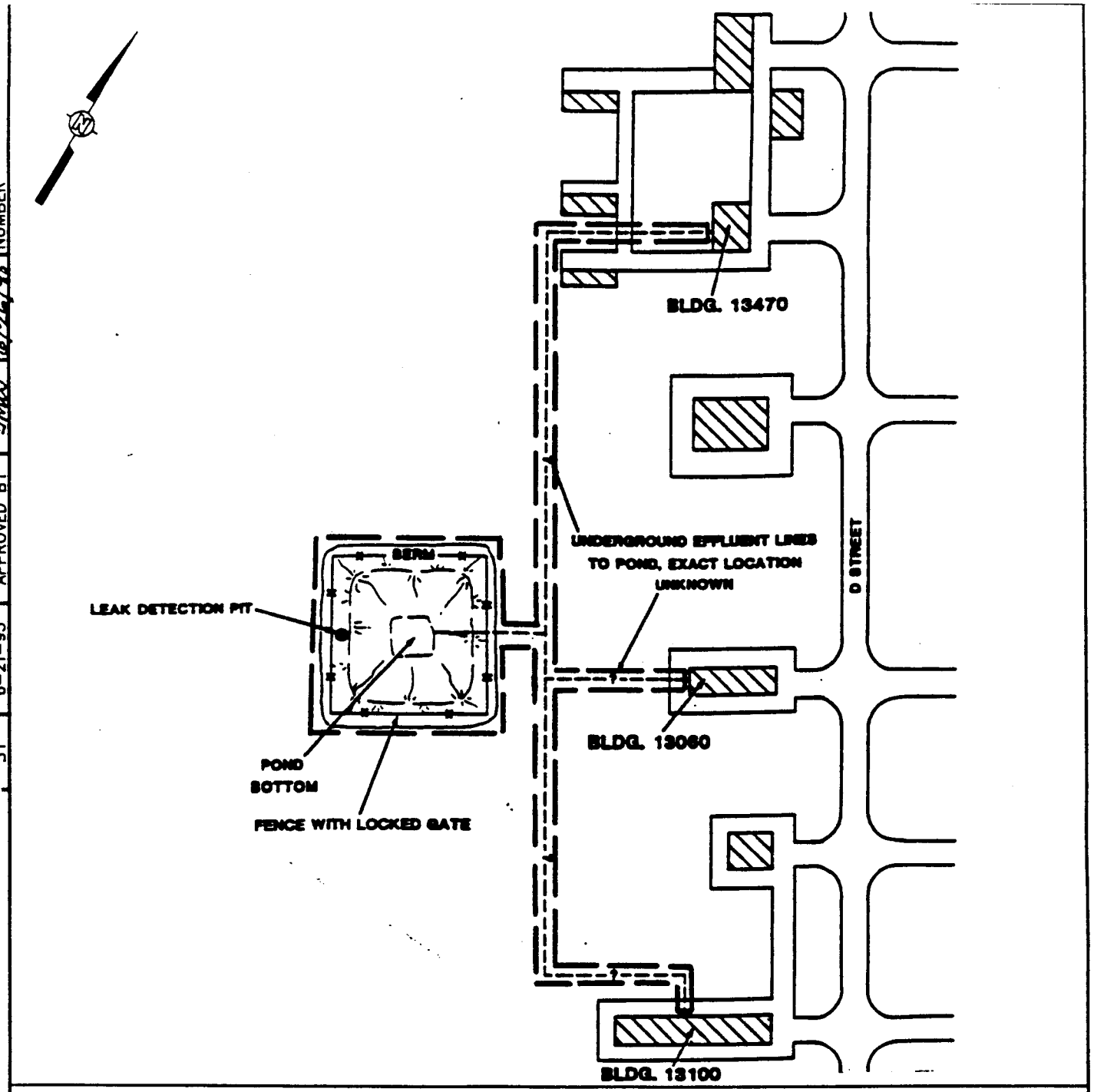

SCALE

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LEGEND:

APPROXIMATE LIMIT OF REMOVAL

SOURCE: DAMES & MOORE, "PRELIMINARY SITE ASSESSMENT, EVAPORATION PONDS AT SALT WELLS AND CHINA LAKE PROPULSION LABORATORIES, NAVAL WEAPONS CENTER, CHINA LAKE, CA.," 1988

FIGURE A-18

SITE PLAN
EVAPORATION POND 13060
CHINA LAKE PROPULSION LABORATORIES
NAWS, CHINA LAKE, CALIFORNIA

PREPARED FOR

EFA-WEST
SAN BRUNO, CALIFORNIA
CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NO. 018

INTERNATIONAL TECHNOLOGY CORPORATION

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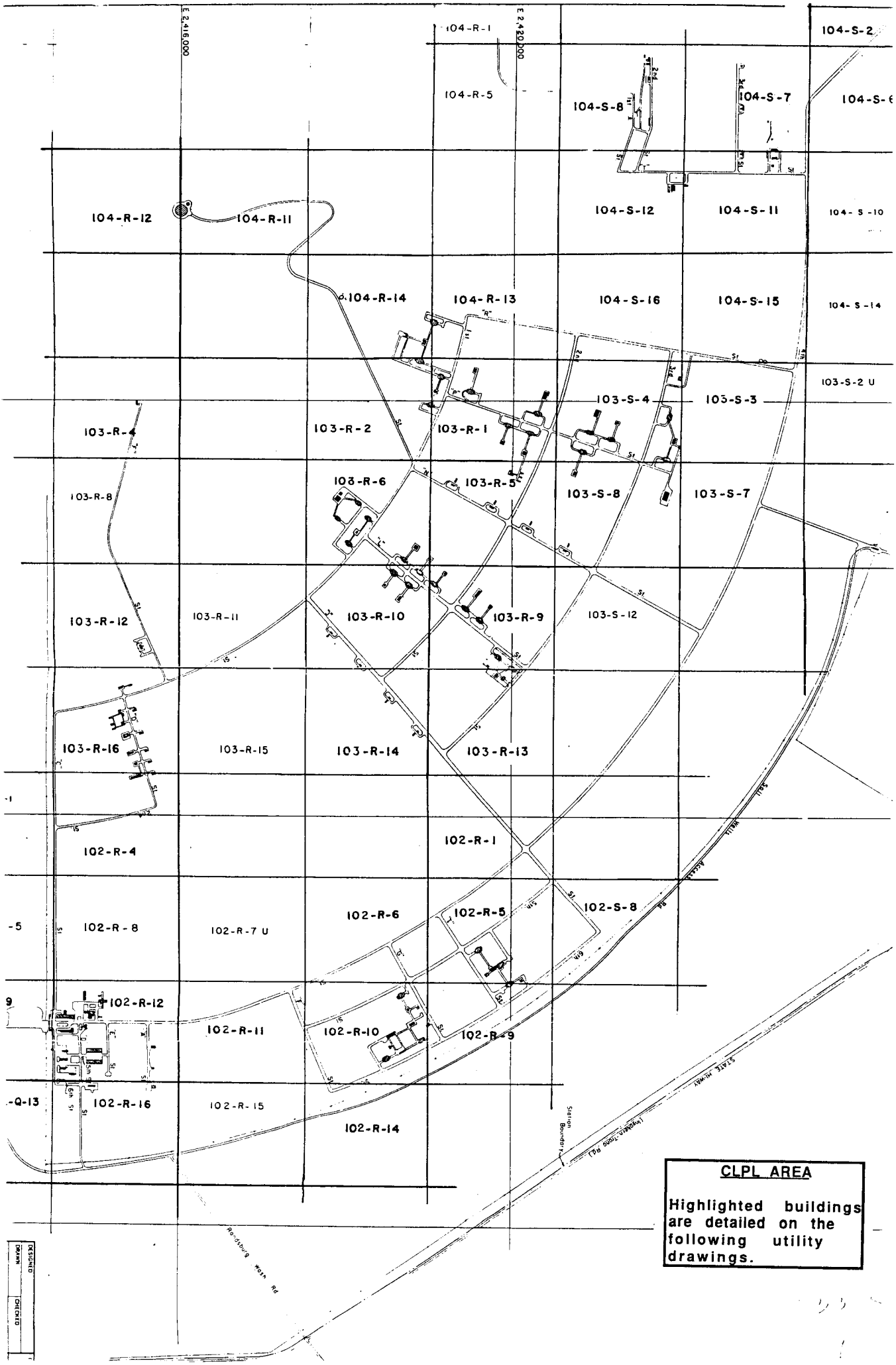
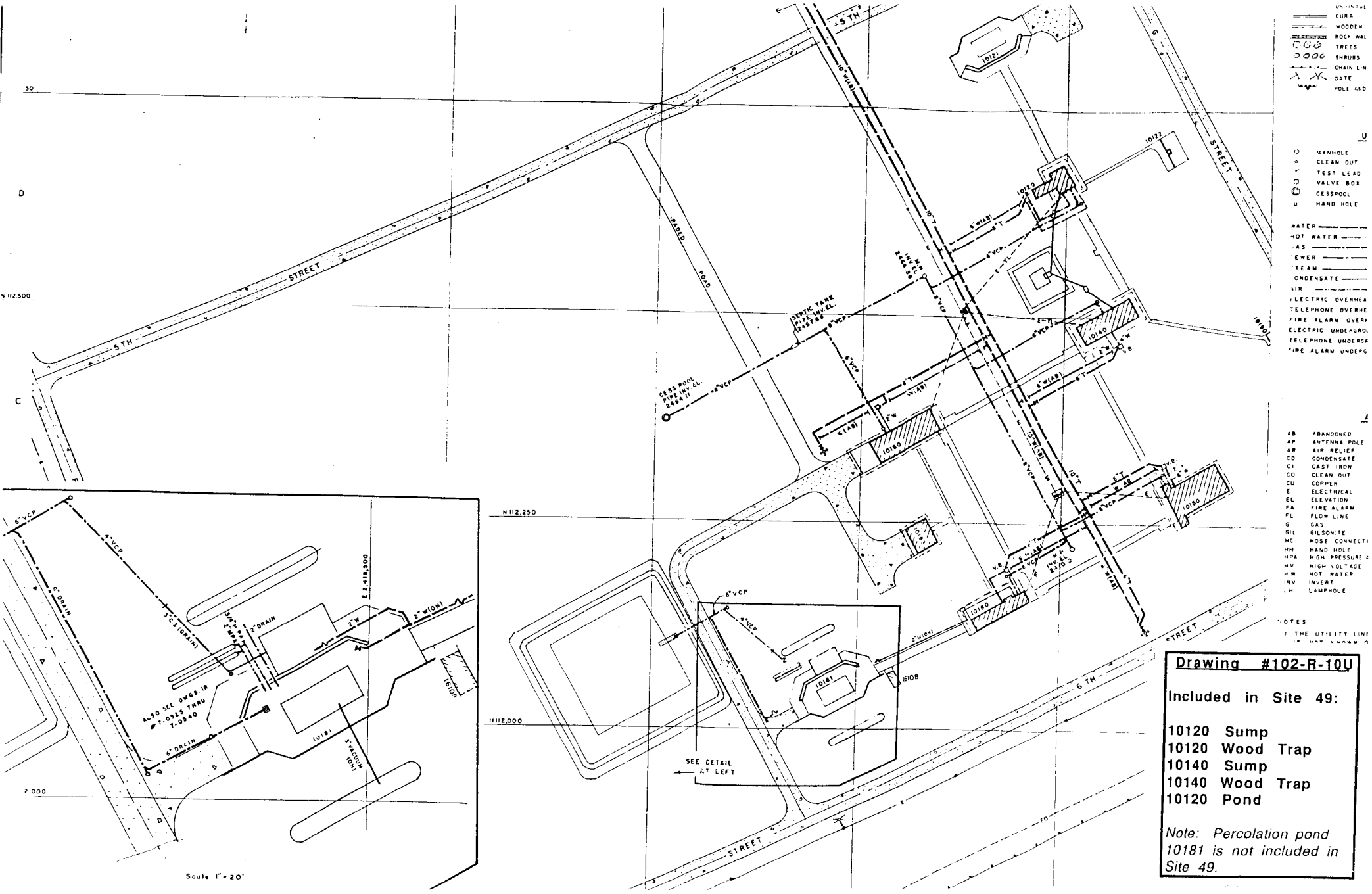


CLPL AREA

Highlighted buildings are detailed on the following utility drawings.

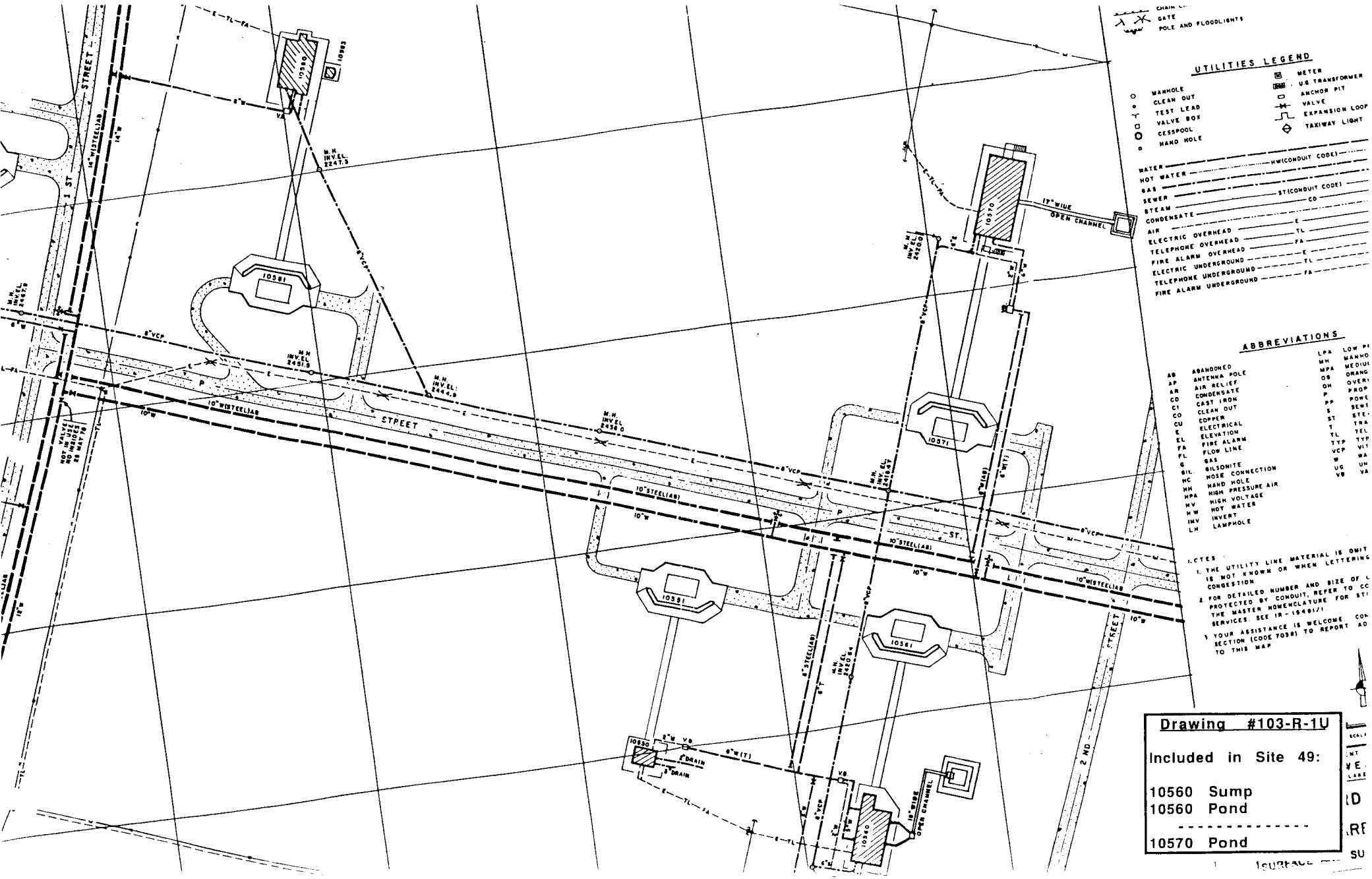


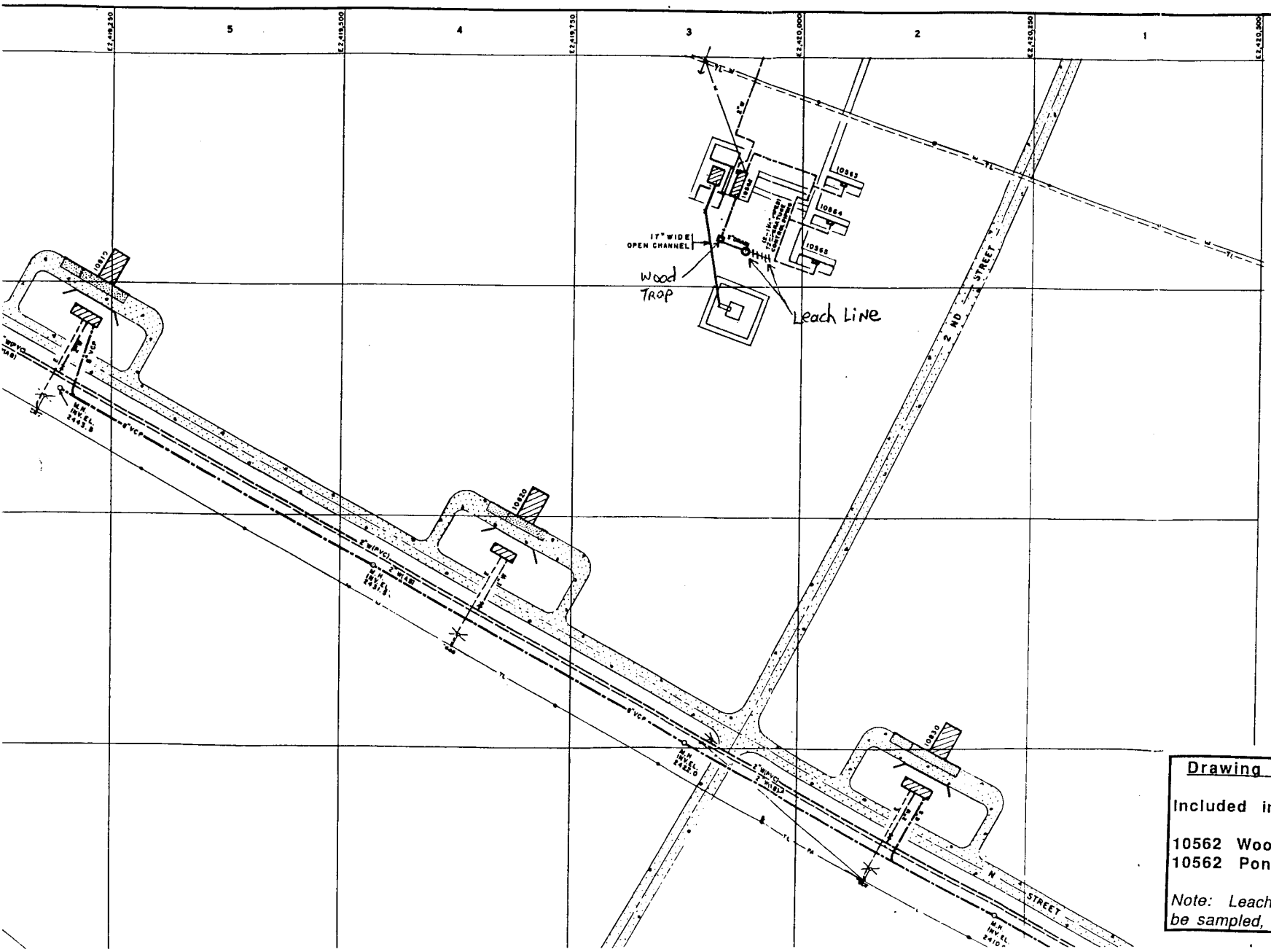
Drawing #102-R-10U

Included in Site 49:

10120 Sump
10120 Wood Trap
10140 Sump
10140 Wood Trap
10120 Pond

Note: Percolation pond 10181 is not included in Site 49.


UTILITIES LEGEND
MANHOLE
CLEAN OUT
TEST LEAD
VALVE BOX
CESSPOOL
HAND HOLE
METER
U.G. TRANSFORMER
ANCHOR PIT
VALVE
EXPANSION LOOP
TAXIWAY LIGHT
GATE
POLE AND FLOODLIGHTS
WATER
HOT WATER
GAS
SEWER
STEAM
CONDENSATE
AIR
ELECTRIC OVERHEAD
TELEPHONE OVERHEAD
FIRE ALARM OVERHEAD
ELECTRIC UNDERGROUND
TELEPHONE UNDERGROUND
FIRE ALARM UNDERGROUND
ABBREVIATIONS
AB ABANDONED
AP ANTENNA POLE
AR AIR RELIEF
CD CONDENSATE
CI CAST IRON
CO CLEAN OUT
CU COPPER
E ELECTRICAL
EL ELEVATION
FA FIRE ALARM
FL FLOW LINE
G GAS
BIL BILSONITE
HC HOSE CONNECTION
HH HAND HOLE
HPA HIGH PRESSURE AIR
HV HIGH VOLTAGE
HW HOT WATER
INV INVERT
LH LAMPHOLE
NOTES
1. THE UTILITY LINE MATERIAL IS OMIT
IS NOT KNOWN OR WHEN LETTERING
CONGESTION
2. FOR DETAILED NUMBER AND SIZE OF L
PROTECTED BY CONDUIT, REFER TO CO
THE MASTER NOMENCLATURE FOR ST
SERVICES. SEE IR-15481/1
3. YOUR ASSISTANCE IS WELCOME CON
SECTION (CODE 7038) TO REPORT AD
TO THIS MAP
STREET
1 ST
2 ND
10581
10583
10570
10371
10561
10530
M.H. INV.EL. 2247.3
M.H. INV.EL. 2451.9
M.H. INV.EL. 2444.9
M.H. INV.EL. 2458.0
M.H. INV.EL. 2450.00
M.H. INV.EL. 2450.84
8"VCP
10"W(STEEL)AB
10"STEEL(AB)
8"STEEL(AB)
8"W(T)
19" WIDE OPEN CHANNEL
Drawing #103-R-1U
Included in Site 49:
10560 Sump
10560 Pond
10570 Pond



LEGEND

ROADS AND GROUNDS

CONSTRUCTION FLOOR PLAN
FOUNDATION LINE
ROOF LINE
HOUSE ADDRI
PLANT ACCO

CONCRETE SURFACE
ASPHALTIC SURFACE
GRASS
DIRT ROAD
RAILROAD
DRAINAGE DITCH
CURB
WOODEN OR RAIL CURB
ROCK WALL
TREES
SHRUBS
CHAIN LINK FENCE
GATE
POLE AND FLOODLIGHTS

POLE
POLE ANCHO
TRANSFORMI
STREET LIG
FIRE ALARM
FA PEDESTA
FIRE HYDRA
TRIANGULAT
BENCH MARK
DRINKING FO

UTILITIES LEGEND

MANHOLE
CLEAN OUT
TEST LEAD
VALVE BOX
CESSPOOL
HAND HOLE

METER
U.G. TRANSFO
ANCHOR PIT
VALVE
EXPANSION

WATER
HOT WATER — HW(CONDUIT CODE)
GAS
SEWER
STEAM — ST(CONDUIT CODE)
CONDENSATE — CD
AIR
ELECTRIC OVERHEAD — E
TELEPHONE OVERHEAD — TL
FIRE ALARM OVERHEAD — FA
ELECTRIC UNDERGROUND — E
TELEPHONE UNDERGROUND — TL
FIRE ALARM UNDERGROUND — FA

ABBREVIATIONS

AB	ABANDONED	LPA	LOW PRESSI
AP	ANTENNA POLE	MH	MANHOLE
AR	AIR RELIEF	MPA	MEDIUM PRE
CD	CONDENSATE	OB	ORANGEBURG
CI	CAST IRON	OH	OVERHEAD
CO	CLEAN OUT	P	PROPANE
CU	COPPER	PP	POWER POL
E	ELECTRICAL	S	SEWER
EL	ELEVATION	ST	STEAM
FA	FIRE ALARM	T	TRANSITE
FL	FLOW LINE	TL	TELEPHONE
G	GAS	TYP	TYPICAL
		VCP	VITRIFIED
		W	WATER
		UG	UNDERGROUN
		VB	VALVE BOX

RIAL IS OMITTED WHEN
N LETTERING WOULD C

B SIZE OF UTILITY LINI
EFER TO CODE LETTERS
RE FOR STEAM AND HO
I

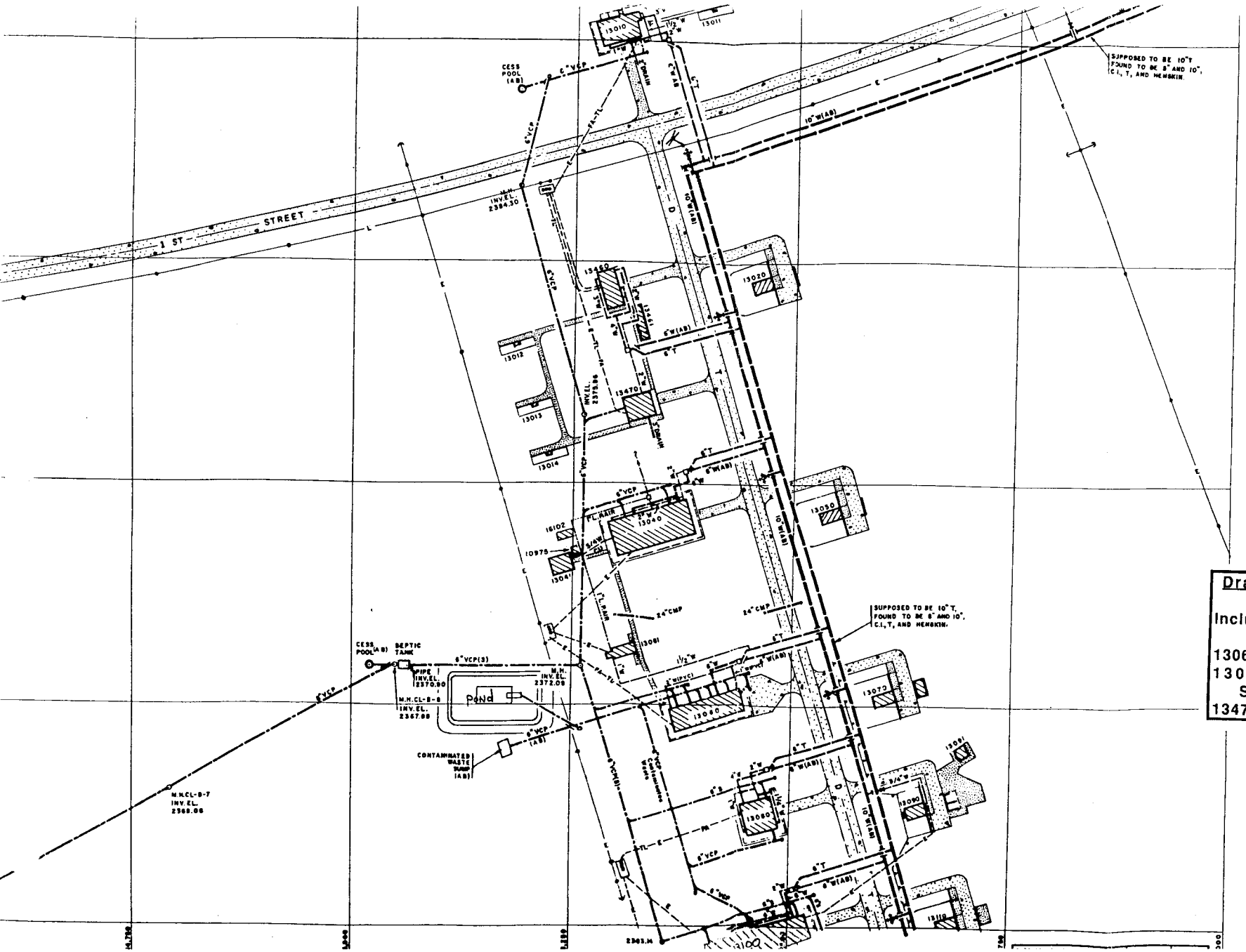
COME. CONTACT MAPPIN

Drawing #103-R-5U

Included in Site 49:

10562 Wood Trap
10562 Pond

Note: Leach Line will only be sampled, not removed.



GATE
POLE AND FLOODLIGHTS

UTILITIES LEGEND

- MANHOLE
- CLEAN OUT
- TEST LEAD
- VALVE BOX
- CESSPOOL
- HAND HOLE
- MET
- U.G.
- ANC
- VAL
- EXP

WATER
HOT WATER — HW(CONDUIT CO
GAS
SEWER
STEAM — ST(CONDUIT CO
CONDENSATE — CD
AIR
ELECTRIC OVERHEAD — E
TELEPHONE OVERHEAD — TL
FIRE ALARM OVERHEAD — FA
ELECTRIC UNDERGROUND — E
TELEPHONE UNDERGROUND — TL
FIRE ALARM UNDERGROUND — FA

ABBREVIATIONS

AB	ABANDONED	LPA	LOW
AP	ANTENNA POLE	MH	MAN
AR	AIR RELIEF	MPA	MEDI
CD	CONDENSATE	OB	ORAN
CI	CAST IRON	OH	OVE
CO	CLEAN OUT	P	PRO
CU	COPPER	PP	POW
E	ELECTRICAL	S	SEW
EL	ELEVATION	ST	STE
FA	FIRE ALARM	T	TRA
FL	FLOW LINE	TL	TELE
G	GAS	TYP	TYP
GIL.	GILSONITE	VCP	VITR
HC	HOSE CONNECTION	W	WAT
HH	HAND HOLE	UG	UNDE
HPA	HIGH PRESSURE AIR	VB	VALVE
HV	HIGH VOLTAGE		
HW	HOT WATER		
INV	INVERT		
LH	LAMPHOLE		

Drawing #103-R-16U

Included in Site 49:

13060 Pond
13060/13080/13100 Sump
13470 Drain

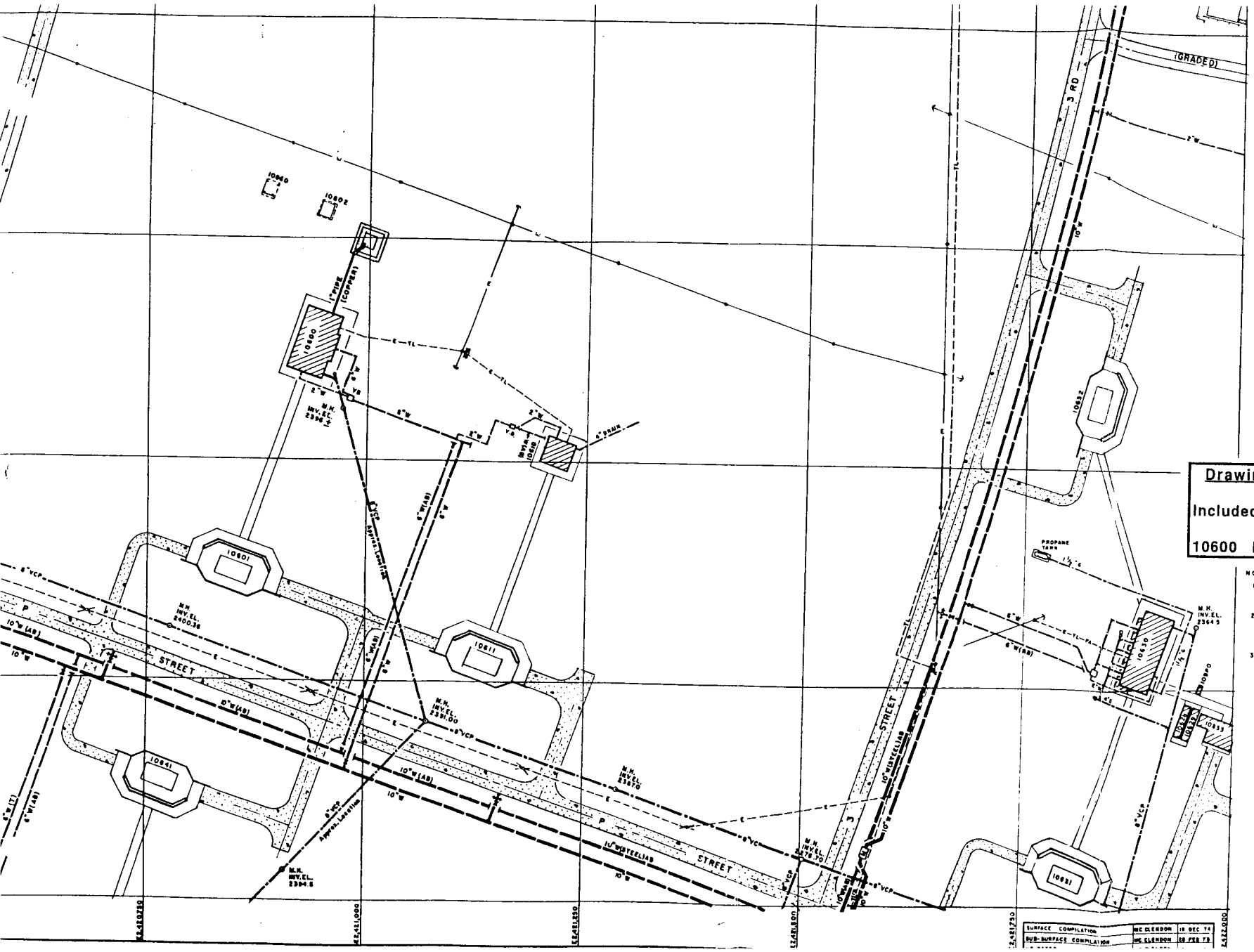
SCALE IN FEET

DEPARTMENT OF THE NA
US NAVAL WEAPONS
CHINA LAKE, CALIFORNIA

RECORD DRAW

AREA S

SURFACE AND SUBSURFACE



UTILITIES LEGEN

- MANHOLE
- CLEAN OUT
- TEST LEAD
- VALVE BOX
- CESSPOOL
- HAND HOLE

WATER
HOT WATER — HW(CONDUIT C
GAS
SEWER
STEAM — ST(CONDUIT C
CONDENSATE — CD
AIR
ELECTRIC OVERHEAD — E
TELEPHONE OVERHEAD — TL
FIRE ALARM OVERHEAD — FA
ELECTRIC UNDERGROUND — E
TELEPHONE UNDERGROUND — TL
FIRE ALARM UNDERGROUND — FA

ABBREVIATIONS

AB	ABANDONED	LPA	LO
AP	ANTENNA POLE	MH	MA
AR	AIR RELIEF	MPA	ME
CD	CONDENSATE	OB	OR
CI	CAST IRON	OH	OV
CO	CLEAN OUT	P	PR
CU	COPPER	PP	PO
E	ELECTRICAL	S	SE
EL	ELEVATION	ST	ST
FA	FIRE ALARM	T	TR
		TL	TE
		TYP	TY
		VCP	VIT
		W	WA
		US	UND
		VB	VAL

Drawing #103-S-4U

Included in Site 49:

10600 Pond

NOTES:

1. THE UTILITY LINE MATERIAL IS OMITTED IS NOT KNOWN OR WHEN LETTERING W CONGESTION
2. FOR DETAILED NUMBER AND SIZE OF UTILI PROTECTED BY CONDUIT, REFER TO CODE L THE MASTER NOMENCLATURE FOR STEAM A SERVICES. SEE IR-15491/1
3. YOUR ASSISTANCE IS WELCOME. CONTACT SECTION (CODE 7038) TO REPORT ADDITIONS TO THIS MAP.

SCALE IN FEET

DEPARTMENT OF THE N
US NAVAL WEAPONS
CHINA LAKE, CALIFORNIA

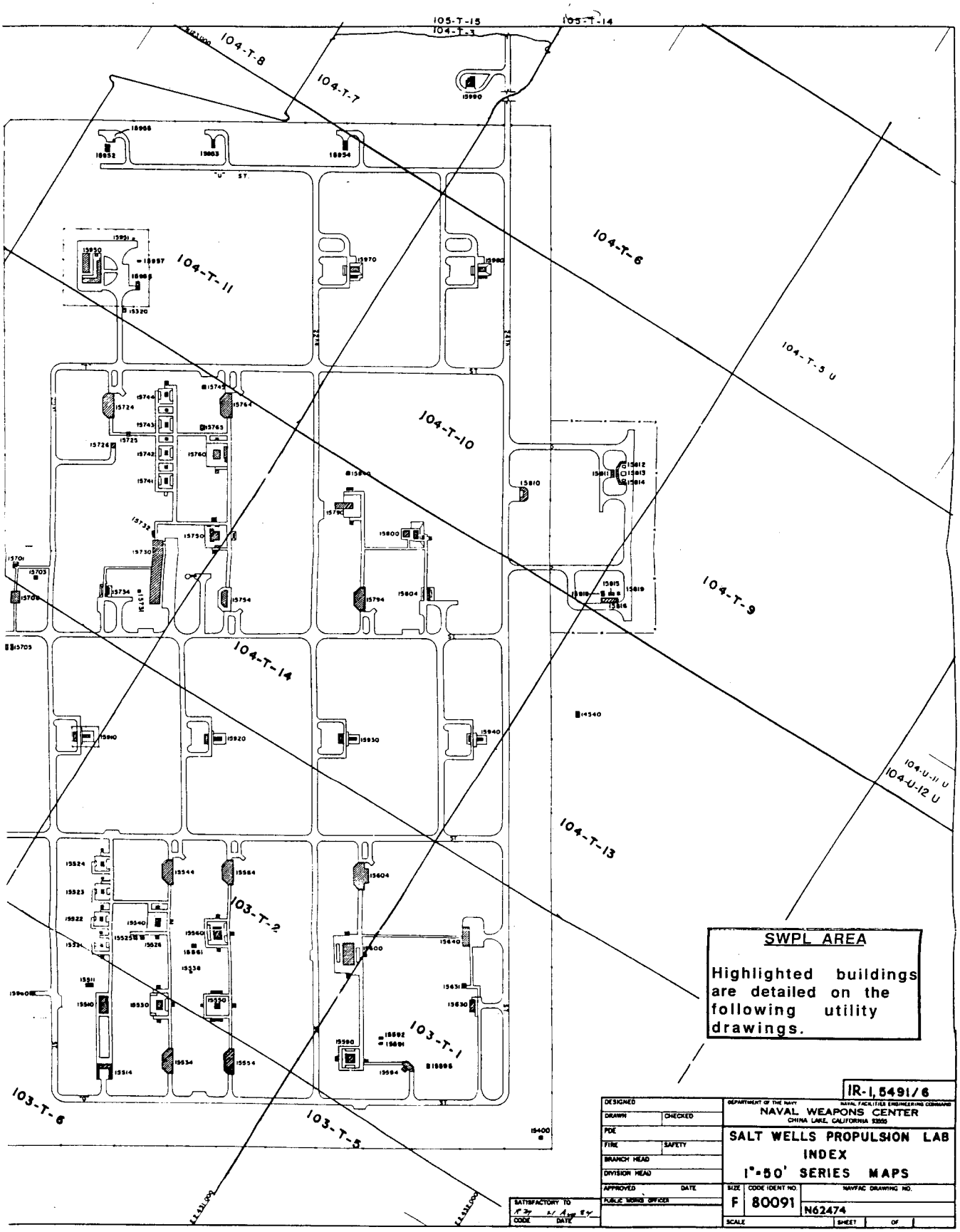
RECORD DRAW

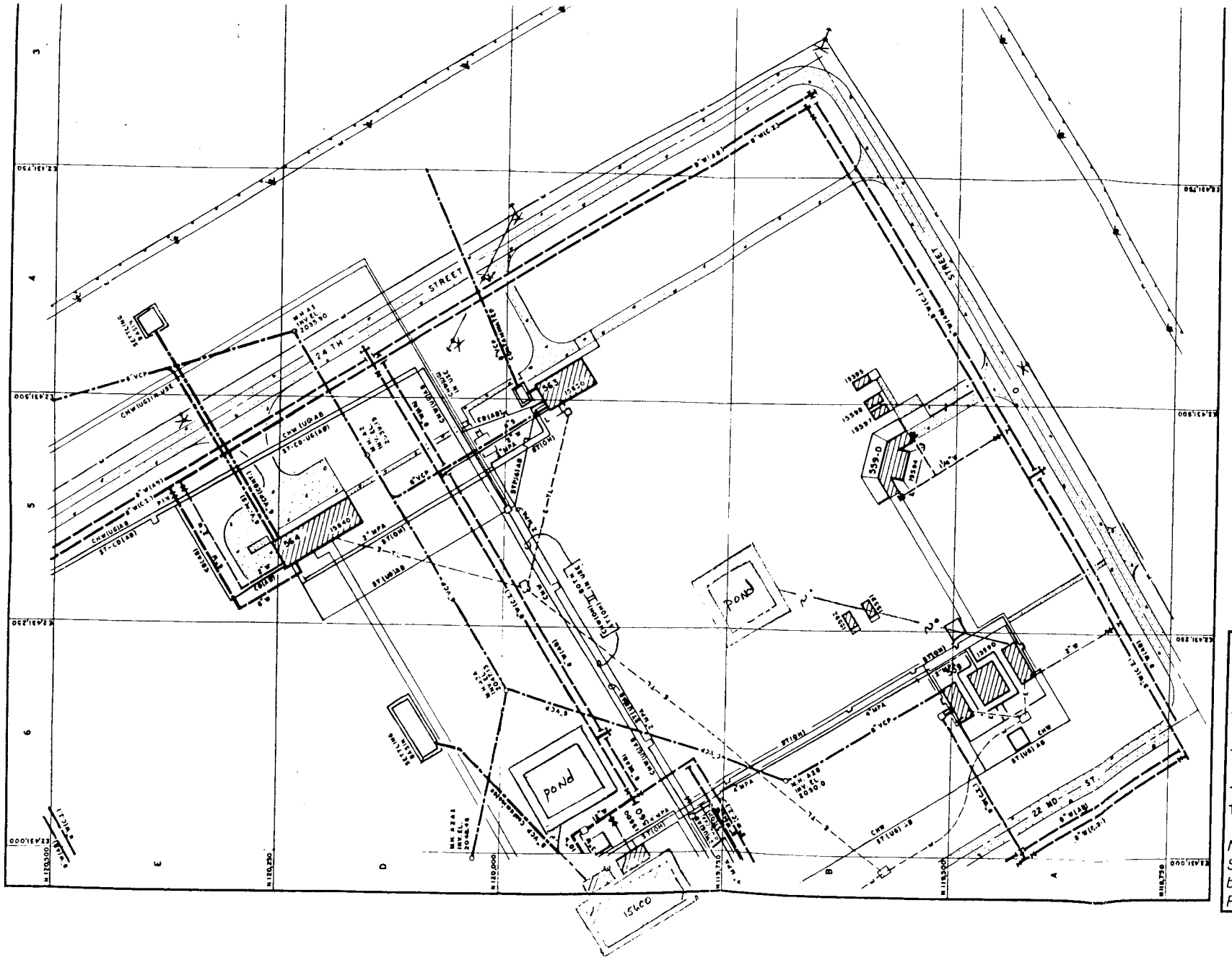
AREA S

SURFACE AND SUBSURFACE

SURFACE COMPILATION	WC CLENDON	16 DEC 74
SUB-SURFACE COMPILATION	WC CLENDON	08 FEB 75

103-S-4 U | IR 15


105-T-15
104-T-3
105-T-14
104-T-8
104-T-7
104-T-6
104-T-11
104-T-10
104-T-5 U
104-T-9
104-T-14
104-T-13
104-U-11 U
104-U-12 U
103-T-2
103-T-1
103-T-6
103-T-5
"U" ST.
SWPL AREA
Highlighted buildings are detailed on the following utility drawings.
IR-1, 5491/6
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL WEAPONS CENTER
CHINA LAKE, CALIFORNIA 93555
SALT WELLS PROPULSION LAB
INDEX
1"=50' SERIES MAPS
DESIGNED
DRAWN
CHECKED
PDE
FIRE
SAFETY
BRANCH HEAD
DIVISION HEAD
APPROVED
DATE
PUBLIC WORKS OFFICER
SATISFACTORY TO
CODE
DATE
SIZE
F
CODE IDENT NO.
80091
NAVFAC DRAWING NO.
N62474
SCALE
SHEET
OF



Drawing #103-T-1U

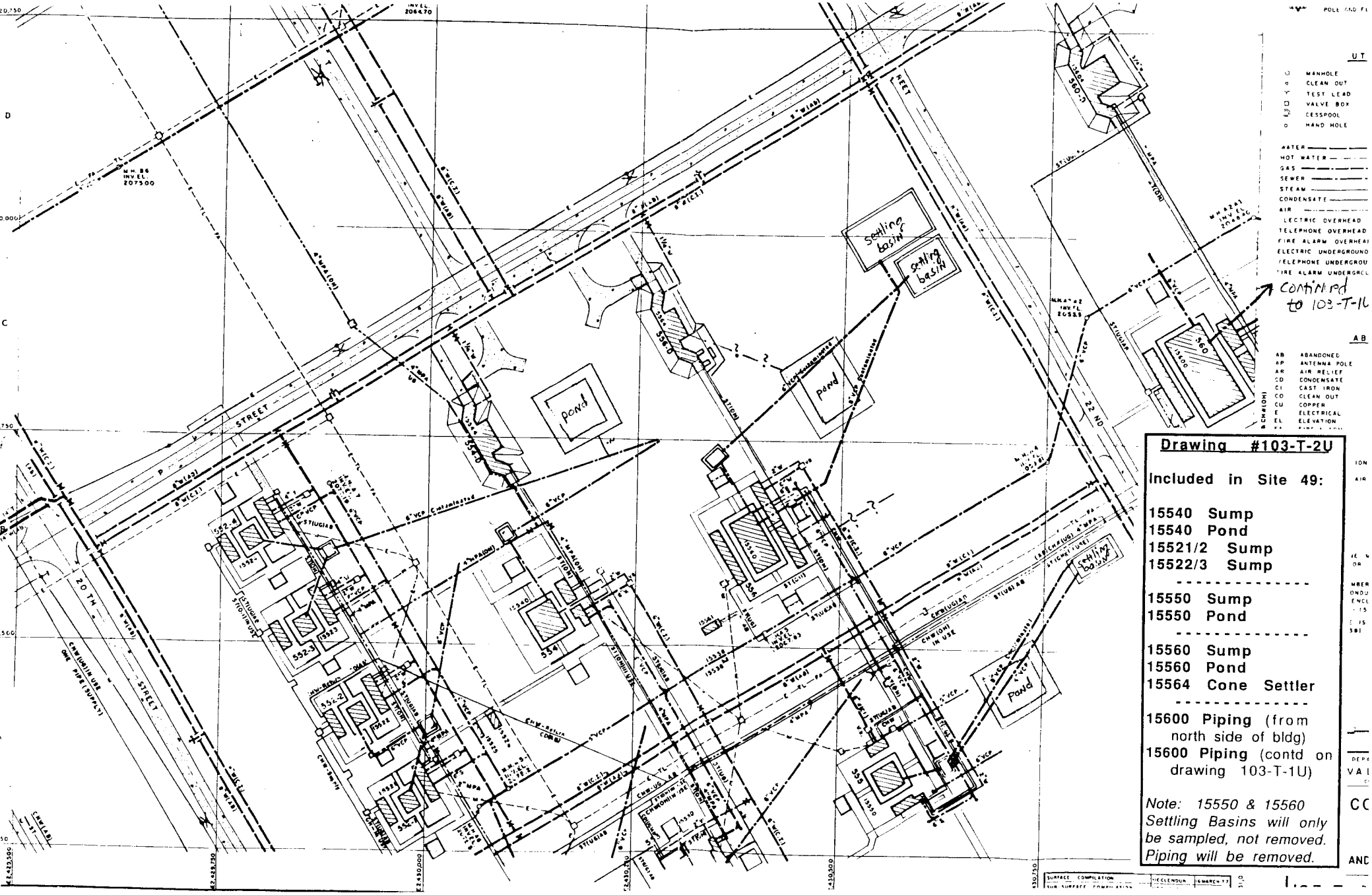
Included in Site 49:

15600 Pond

15630 Sump

15590 Pond
15590 Cone Settler

Note: 15600 & 15640 Settling Basins will only be sampled, not removed. Piping will be removed.



Drawing #103-T-2U

Included in Site 49:

15540 Sump
15540 Pond
15521/2 Sump
15522/3 Sump

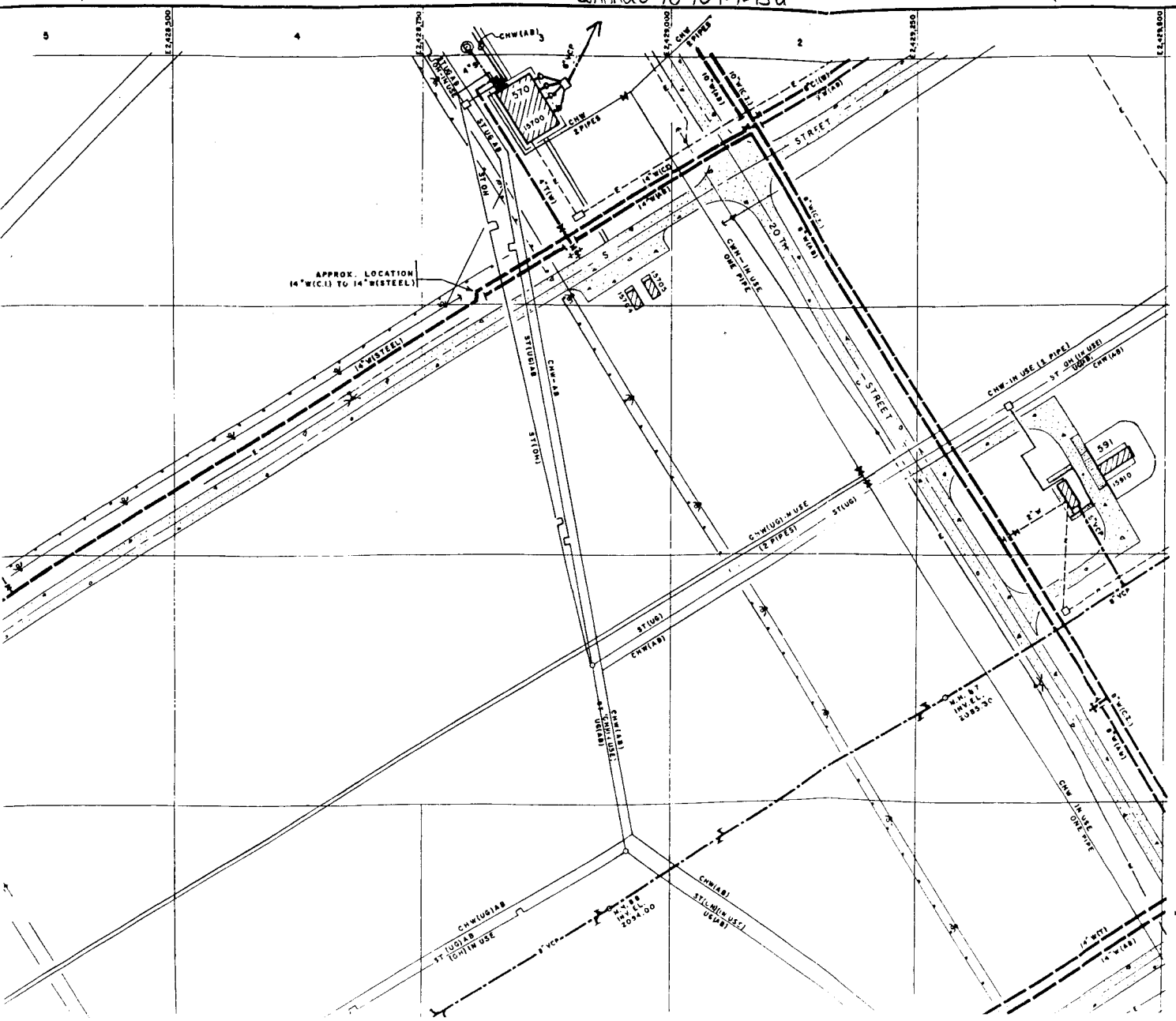
15550 Sump
15550 Pond

15560 Sump
15560 Pond
15564 Cone Settler

15600 Piping (from north side of bldg)
15600 Piping (contd on drawing 103-T-1U)

Note: 15550 & 15560 Settling Basins will only be sampled, not removed. Piping will be removed.

continued to 104-T-15U



LEGEND

ROADS AND GROUNDS

CONSTRUCTION FLOOR PLAN — ROOF LINE
FOUNDATION LINE — HOUSE ADDRESS
PLANT ACCOUNT NO.

- CONCRETE SURFACE
- ASPHALTIC SURFACE
- GRASS
- DIRT ROAD
- RAILROAD
- DRAINAGE DITCH
- CURB
- WOODEN OR RAIL CURB
- ROCK WALL
- TREES
- SHRUBS
- CHAIN LINK FENCE
- GATE
- POLE AND FLOODLIGHTS
- POLE
- POLE ANCHOR
- TRANSFORMER
- STREET LIGHT
- FIRE ALARM BOX
- FA. PEDESAL TYPE
- FIRE HYDRANT
- TRIANGULATION STATION
- BENCH MARK
- DRINKING FOUNTAIN

UTILITIES LEGEND

- MANHOLE
- CLEAN OUT
- TEST LEAD
- VALVE BOX
- CESSPOOL
- HAND HOLE
- METER
- U.G. TRANSFORMER VAULT
- ANCHOR PIT
- VALVE
- EXPANSION LOOP

WATER
HOT WATER — HW (CONDUIT CODE)
GAS
SEWER
STEAM — ST (CONDUIT CODE)
CONDENSATE — CD
AIR
ELECTRIC OVERHEAD — E
TELEPHONE OVERHEAD — TL
FIRE ALARM OVERHEAD — FA
ELECTRIC UNDERGROUND — E
TELEPHONE UNDERGROUND — TL
FIRE ALARM UNDERGROUND — FA

Drawing #103-T-3U

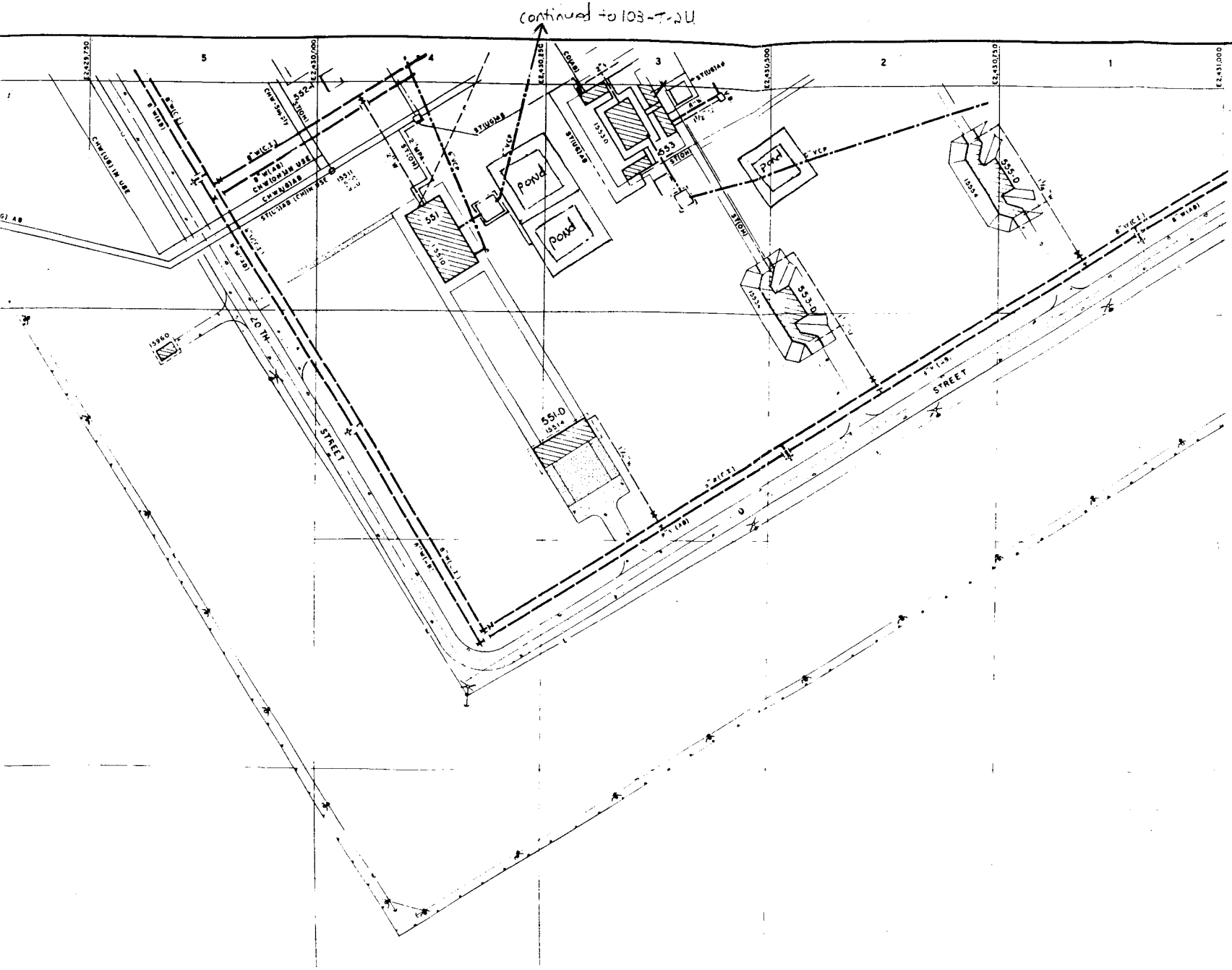
Included in Site 49:

15700 Sump
15700 Flow Boxes
15700 Piping (contd on drawing 103-T-1U)

AB	AI
AP	AI
AR	AI
CD	CC
CI	CA
CO	CL
CU	CC
E	EL
EL	EL
FA	FI
FL	FL
G	GA
GIL	GILSONITE
HC	HOSE CONNECTION
HH	HAND HOLE
HPA	HIGH PRESSURE AIR
HV	HIGH VOLTAGE
HW	HOT WATER
INV	INVERT
LH	LAMPHOLE
VCP	VITRIFIED CLAY PIPE
W	WATER
UG	UNDERGROUND
VB	VALVE BOX
FO	FIBRE OPTIC CABLE

NOTES

1. THE UTILITY LINE MATERIAL IS OMITTED WHEN IT IS NOT KNOWN OR WHEN LETTERING WOULD CAUSE CONGESTION.
2. FOR DETAILED NUMBER AND SIZE OF UTILITY LINES PROTECTED BY CONDUIT, REFER TO CODE LETTERS IN THE MASTER NOMENCLATURE FOR STEAM AND HOT WATER SERVICES. SEE IR - 15491/1
3. YOUR ASSISTANCE IS WELCOME. CONTACT MAPPING



LEGEND

ROADS AND GROUNDS

CONSTRUCTION FLOOR PLAN — ROAD LINE
FOUNDATION LINE — HOUSE ADDRESS
PLANT ACCOUNT N

CONCRETE SURFACE
ASPHALTIC SURFACE
GRASS
DIRT ROAD
RAILROAD
DRAINAGE DITCH
CURB
WOODEN OR RAIL CURB
ROCK WALL
TREES
SHRUBS
CHAIN LINK FENCE
LTE
POLE AND FLOODLIGHTS

POLE
POLE ANCHOR
TRANSFORMER
STREET LIGHT
FIRE ALARM BOX
FZ FEDESAL TYP
FIRE HYDRANT
TRIANGULATION
BENCH MARK
DRINKING FOUNTA

UTILITIES LEGEND

MANHOLE
CLEAN OUT
TEST LEAD
VALVE BOX
CESSPOOL
HAND HOLE

METER
UG TRANSFORMER
ANCHOR PIT
VALVE
EXPANSION LOOP

WATER
HOT WATER — HWT(CONDUIT CODE)
GAS
SEWER
STEAM — STC(CONDUIT CODE)
CONDENSATE — CD
AIR
ELECTRIC OVERHEAD — E
TELEPHONE OVERHEAD — TL
FIRE ALARM OVERHEAD — FA
ELECTRIC UNDERGROUND — E
TELEPHONE UNDERGROUND — T
FIRE ALARM UNDERGROUND — FA

ABBREVIATIONS

AB ABANDONED
EP EXTERNAL POLE
AR AIR RELIEF
CD CONDENSATE
CI CAST IRON
CO CLEAN OUT
LP LOW PRESSURE
MH MANHOLE
MPA MEDIUM PRESSUR
OB ORANGEBURG PIPE
OH OVERHEAD
P PROPANE

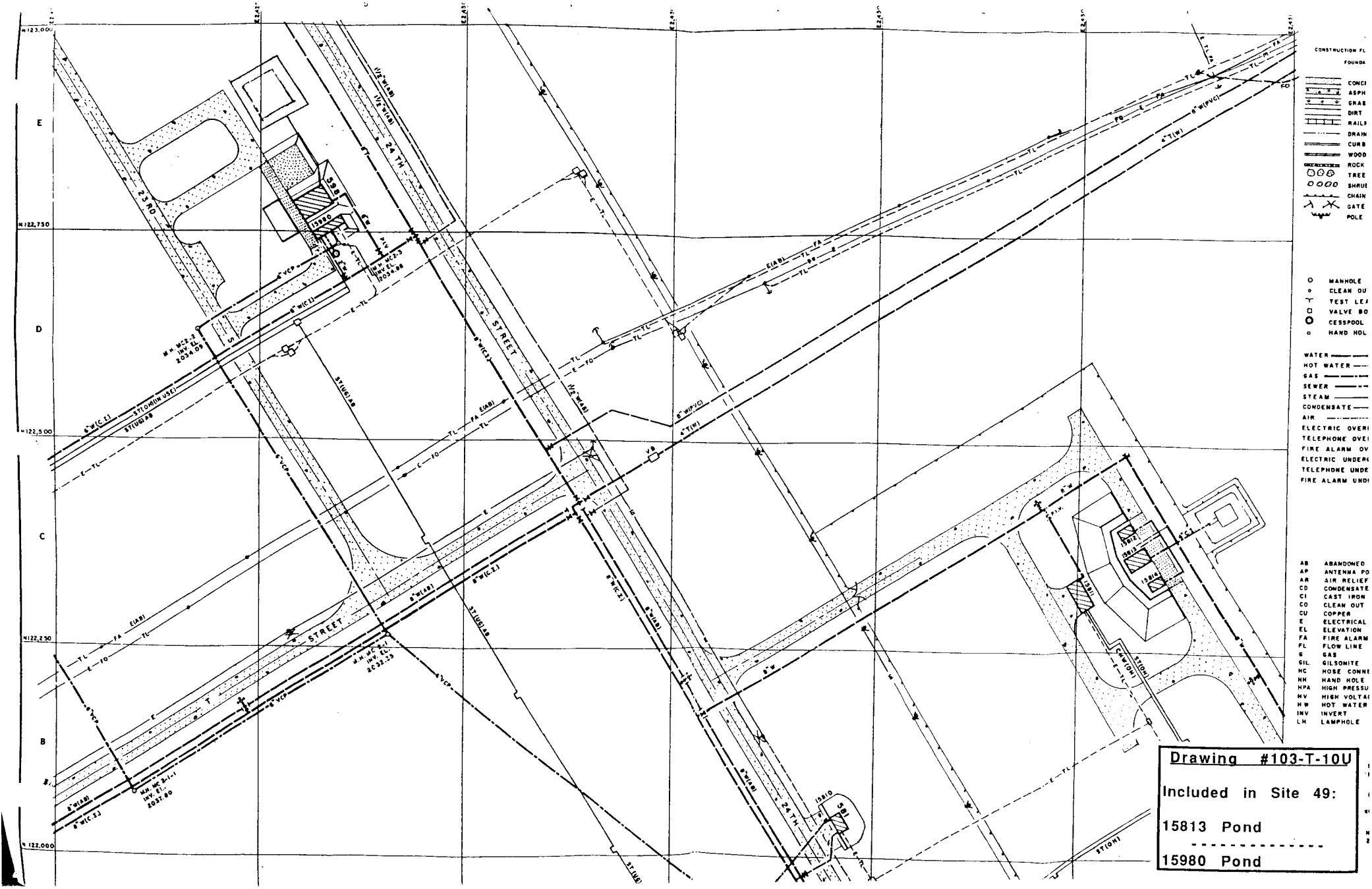
Drawing #103-T-6U

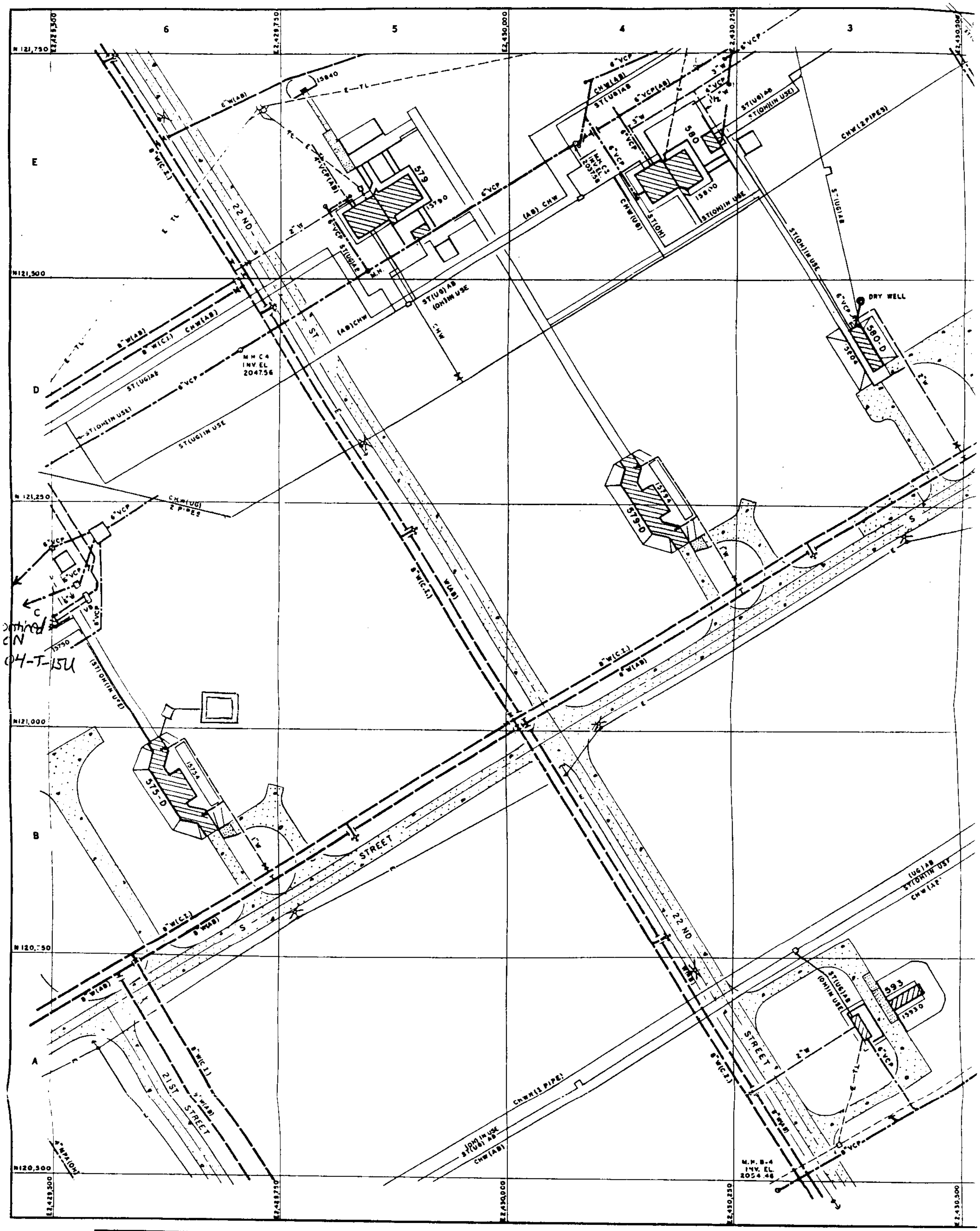
Included in Site 49:

15510A Pond (clay)
15510B Pond (syn.)
15510 Sump

15530 Sump
15530 Pond

THE MASTER NOMENCLATURE FOR STEAM AND HOT WA
SERVICES SEE IR-15491/1


Drawing #103-T-10U
Included in Site 49:
15813 Pond
15980 Pond
STREET
24 TH
23 RD
CONSTRUCTION FL
FOUNDA
CONCI
ASPH
GRAS
DIRT
RAILS
DRAIN
CURB
WOOD
ROCK
TREE
SHRUB
CHAIN
GATE
POLE
MANHOLE
CLEAN OU
TEST LE
VALVE BO
CESSPOOL
HAND HOL
WATER
HOT WATER
GAS
SEWER
STEAM
CONDENSATE
AIR
ELECTRIC OVER
TELEPHONE OVE
FIRE ALARM OV
ELECTRIC UNDER
TELEPHONE UNDE
FIRE ALARM UND
AB ABANDONED
AP ANTENNA PO
AR AIR RELIEF
CD CONDENSATE
CI CAST IRON
CO CLEAN OUT
CU COPPER
E ELECTRICAL
EL ELEVATION
FA FIRE ALARM
FL FLOW LINE
G GAS
GIL GILSONITE
HC HOSE CONNE
HH HAND HOLE
HPA HIGH PRESSU
HV HIGH VOLTA
HW HOT WATER
INV INVERT
LH LAMPHOLE



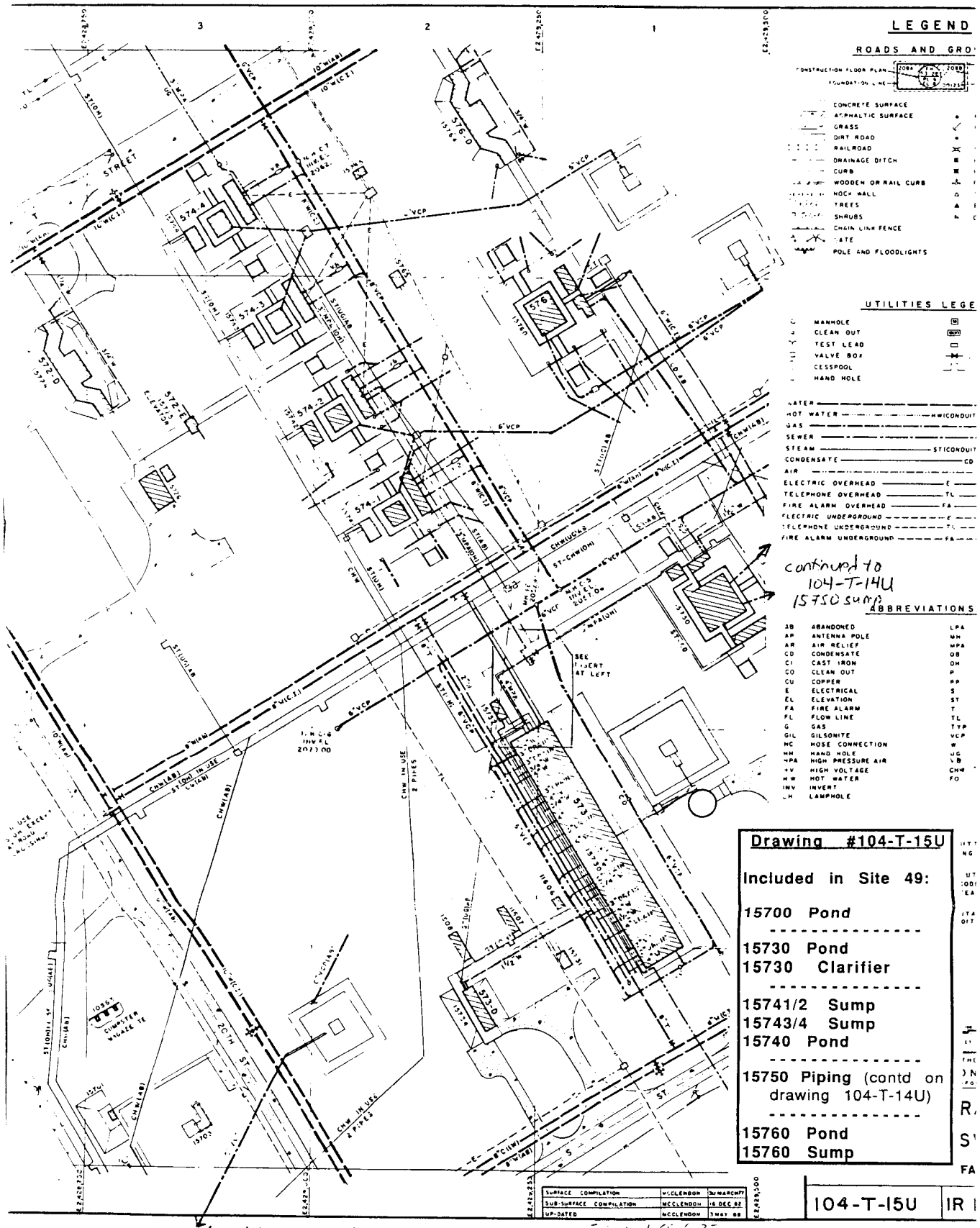
Drawing #104-T-14U

Included in Site 49:

15750 Sump

15754 Sump

15754 Pond


LEGEND
ROADS AND GRO
CONSTRUCTION FLOOR PLAN
FOUNDATION LINE
CONCRETE SURFACE
ASPHALTIC SURFACE
GRASS
DIRT ROAD
RAILROAD
DRAINAGE DITCH
CURB
WOODEN OR RAIL CURB
ROCK WALL
TREES
SHRUBS
CHAIN LINK FENCE
GATE
POLE AND FLOODLIGHTS
UTILITIES LEGE
MANHOLE
CLEAN OUT
TEST LEAD
VALVE BOX
CESSPOOL
HAND HOLE
WATER
HOT WATER
GAS
SEWER
STEAM
CONDENSATE
AIR
ELECTRIC OVERHEAD
TELEPHONE OVERHEAD
FIRE ALARM OVERHEAD
ELECTRIC UNDERGROUND
TELEPHONE UNDERGROUND
FIRE ALARM UNDERGROUND
ABBREVIATIONS
AB ABANDONED
AP ANTENNA POLE
AR AIR RELIEF
CD CONDENSATE
CI CAST IRON
CO CLEAN OUT
CU COPPER
E ELECTRICAL
EL ELEVATION
FA FIRE ALARM
FL FLOW LINE
G GAS
GIL GILSONITE
HC HOSE CONNECTION
HH HAND HOLE
HPA HIGH PRESSURE AIR
HV HIGH VOLTAGE
HW HOT WATER
INV INVERT
LH LAMPHOLE
LPA
MH
MPA
OB
OH
P
PP
S
ST
T
TL
TYP
VCP
W
UG
CHW
FO
continued to 104-T-14U 15750 sump
SEE INSERT AT LEFT
Drawing #104-T-15U
Included in Site 49:
15700 Pond
15730 Pond
15730 Clarifier
15741/2 Sump
15743/4 Sump
15740 Pond
15750 Piping (contd on drawing 104-T-14U)
15760 Pond
15760 Sump
SURFACE COMPILATION
SUB-SURFACE COMPILATION
UP-DATED
104-T-15U
continued to 103-T-3U 15700 Bldg

Appendix B

Standard Operating Procedures
Sample Chain-Of-Custody
Sample Packaging and Shipment

CHAIN OF CUSTODY

STANDARD OPERATING PROCEDURE

1.0 Purpose

This Standard Operating Procedure (SOP) establishes the method and responsibilities associated with the maintenance and custody of samples which are to be used to provide data which form a basis for making project related decisions. It outlines the general procedures for maintaining and documenting sample chain of custody from the time of sample collection through sample disposition.

2.0 References

2.1 IT Contractor Quality Control Program Plan

2.2 IT SQP 4.2 Records Management

3.0 Definitions

3.1 Chain of Custody

The Chain of Custody (COC) document is the written record that traces the sample possession from the time each sample is collected until its final disposition, sometimes called the "cradle to grave" record. Chain of Custody is maintained by compliance with one of the following criteria:

- The sample is in the individual's physical possession
- The sample is maintained in the individual's physical view after being in his/her possession
- The sample is transferred to a designated secure area restricted to authorized personnel
- The sample is sealed and maintained under lock and key to prevent tampering, after having been in physical possession.

3.2 Waybill

A document that contains a list of the goods and shipping instructions relative to a shipment.

3.3 Common Carrier

For the purpose of this procedure, the common carrier is any commercial carrier utilized for the transportation of the sample(s) from the field to the laboratory.

4.0 Procedure

4.1 Responsibilities

4.1.1 The Project Manager is responsible for assuring proper COC is initiated at the time the sample(s) are collected and maintained throughout the handling and subsequent transportation of the sample(s) to the designated laboratory. Additionally, he/she is the project authority for determining the disposition and fate of sample(s) which have identified deficiencies (e.g., missed holding times, elevated temperature at receipt, etc.).

4.1.2 The sample team member(s) are responsible for properly documenting and maintaining the COC from the time of sample collection until the sample is delivered to the lab.

4.1.3 Laboratory personnel are responsible for receipt and entry of samples into the laboratory which have been submitted under a COC document. Additionally, samples received will be entered into the laboratory COC procedures by properly documenting and maintaining COC from the moment that they take custody of the sample at the laboratory until the sample is disposed of or returned to the client.

4.2 General

4.2.1 An overriding consideration for data resulting from laboratory analyses is the ability to demonstrate that the samples were obtained from the locations stated and that they reached the laboratory without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal must be documented to accomplish this. Documentation will be accomplished through a COC Record that lists each sample and the individuals performing the sample collection, shipment, and receipt.

4.2.2 The COC document is a preprinted form with a unique six-digit control number in the upper right-hand corner. The white copy will accompany the samples while the yellow field copy will be retained in the project file.

4.3 Field Sample Custody

4.3.1 Sampling personnel, upon collection of samples for analysis, will properly complete a COC Record form (Attachment 6.1). The COC document will be the controlling document to assure that sample maintenance and custody are maintained thereby assuring the sample(s) are representative of the environment from which they were collected. At a minimum, the following information will be recorded on the COC document:

- The unique identification number assigned to each sample.
- A brief description of the sampling location and a physical description of the sample type.
- The date and time of the sample collection.
- Container type (e.g., glass, poly, brass sleeve, etc.).
- Sample volume and number of containers (e.g., 2 x 40 ml, 3 x 1 liter).
- Sample preservation (e.g., HNO_3, H_2SO_4, 4°C).
- Requested analyses.
- Special instructions to the laboratory including handling requirements, quality assurance/quality control, health and safety, and sample disposition.
- The project name and number.
- The date the analytical report is due.
- The names of all sampling personnel.
- The name and phone number of the project contact.
- The name and phone number of the laboratory contact.

- The name of the courier and the waybill number (if applicable).
- A unique document reference number.

4.3.2 The COC document will be initiated in the field by the person collecting the sample and signed by each individual who has the samples in their possession. Each time that sample custody is transferred, the former custodian must sign over the COC as Relinquished By, and the new custodian must sign on to the COC as Received By. Each signature must be accompanied by the date, time, and the name of their project or company affiliation.

4.3.3 Transferring of COC from sampling personnel to the analytical laboratory will be performed in accordance with the requirements stated below.

4.3.3.1 If the sampling personnel deliver the samples to the laboratory, transfer of COC occurs as follows:

- The sample collector delivers the samples to the laboratory and relinquishes the sample directly to a laboratory representative.
- The collector signs the COC listing his/her name, affiliation, the date, and time. Any person involved in the collection of the sample may act as the sample custodian.
- The laboratory representative must receive the samples by signing his/her name, affiliation, the date, and time on the COC. The laboratory representative may decline to take receipt of the samples if the COC is not properly completed or if the samples are not properly packaged. All designated laboratory personnel may act as the sample custodian.
- One copy of the COC is given to the sample collector to be returned to the project files and one copy is maintained with the samples at the laboratory.

4.3.3.2 If the sampling personnel transfer sample(s) to the laboratory utilizing a common carrier, sampling personnel will retain COC responsibility and the common carrier is not responsible for maintaining sample custody. The sample collectors are responsible for packaging the samples in a manner that meets the COC definition criteria, that is, the samples

are sealed to prevent tampering. When transferring samples to the courier for transport, COC procedures are maintained as follows:

- The sample collector lists the courier affiliation and waybill number on the COC.
- The sample collector relinquishes custody by signing his name, affiliation, date, and time. The collector keeps a copy of the relinquished COC for the project file.
- The relinquished original COC is sealed in a watertight plastic bag and taped to the inside of the lid of the container used for transportation.
- The transportation container is sealed to prevent tampering and given to the courier for delivery to the laboratory.
- The sample collector obtains a copy of the waybill from the courier for the project file.
- The laboratory representative must receive the samples by signing his/her name, affiliation, the date, and time on the COC. This copy is maintained with the samples at the laboratory.
- The laboratory representative obtains a copy of the waybill from the courier for the project file.

4.4 Analytical Laboratory Custody

4.4.1 Upon receipt at the analytical laboratory, the field generated COC document will be signed, dated, time marked, temperature marked, and laboratory identification will be provided in the appropriate spaces.

4.4.2 Laboratory receipt personnel will enter the samples into the laboratory by implementing the sample custody procedures addressed within their IT approved QA Program.

4.4.3 After completion of analytical testing, sample remnants not consumed during testing may be kept for six months beyond the completion of analysis, unless otherwise specified by a notation on the COC that samples are to be returned to the project site for disposal. Once

this time period has elapsed, the samples will be disposed of and the disposal record number will be recorded on the laboratory record copy of the COC.

5.0 Records

5.1 Records generated as a result of implementation of this SOP will be controlled and maintained in the project record files in accordance with SQP 4.2.

6.0 Attachment

6.1 Chain of Custody Record Form

ATTACHMENT 6.1

CHAIN OF CUSTODY RECORD FORM

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

Reference Document No 368244
Page 1 of ___

Project Name/No. [1]
Sample Team Members [2]
Profit Center No. [3]
Project Manager [4]
Purchase Order No. [6]
Required Report Date [11]

Samples Shipment Date [7]
Lab Destination [8]
Lab Contact [9]
Project Contact/Phone [12]
Carrier/Waybill No. [13]

Bill to. [5]
Report to. [10]

ONE CONTAINER PER LINE

Sample Number [14]	Sample Description/Type [15]	Date/Time Collected [16]	Container Type [17]	Sample Volume [18]	Pre-servative [19]	Requested Testing Program [20]	Condition on Receipt [21]	Disposal Record No. [22]

Special Instructions: [23]

Possible Hazard Identification: [24]
Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal: [25]
Return to Client ☐ Disposal by Lab ☐ Archive (mos.)

Turnaround Time Required: [26]
Normal ☐ Rush ☐

QC Level: [27]
I ☐ II ☐ III ☐ Project Specific (specify)

1. Relinquished by [28] (Signature/Affiliation)	Date: Time:	1. Received by [28] (Signature/Affiliation)	Date: Time:
2. Relinquished by (Signature/Affiliation)	Date: Time:	2. Received by (Signature/Affiliation)	Date: Time:
3. Relinquished by (Signature/Affiliation)	Date: Time:	3. Received by (Signature/Affiliation)	Date: Time:

Comments: [29]

White: To accompany samples — Yellow: Field copy — *See back of form for special instructions

SAMPLE HANDLING, PACKAGING AND SHIPPING

STANDARD OPERATING PROCEDURE

1.0 Purpose

This Standard Operating Procedure (SOP) outlines the methods and responsibilities for field personnel to use in the packaging and shipping of environmental samples for chemical and physical analysis. This SOP only applies to the packaging and shipping of limited quantity, low concentration environmental samples. This procedure does not apply to those samples considered hazardous materials, hazardous waste, mixed waste, radioactive waste, and/or dangerous goods. Those requirements are specified in the Department of Transportation (DOT) 49 CFR 114-327 and the International Air Transport Association (IATA) procedures. The details within this SOP are only applicable to the general requirements for sample packaging and shipping and should only be used as a guide for developing more job-specific work plans.

2.0 References

2.1 EPA, September 1987, Compendium of Superfund Field Operations Methods, EPA 540/P-87/001a, OSWER 9355.0-14.

2.2 EPA, August 1988, EPA Guidelines for Conducting Remedial Investigation and Feasibility Studies under CERCLA, Interim Final OSWER Directive 9355.3-01.

2.3 Code of Federal Regulations, DOT 49 CFR parts 100 to 177, Revised October 1, 1992.

2.4 Dangerous Goods Regulations, IATA, January 1, 1994.

2.5 SQP 4.2 Records Management.

3.0 Definitions

3.1 Environmental Sample

A limited quantity, low concentration sample that does not require DOT or IATA hazardous waste labelling as a hazardous waste or material.

3.2 Hazardous Waste Sample

Medium or high concentration sample requiring either DOT or IATA labelling as a hazardous waste or material.

3.3 Hazardous Waste

Any substance listed in 40 CFR Subpart D (260.30 et seq.) or otherwise characterized as ignitable, corrosive, reactive, or toxic as specified in Subpart C (261.20 et seq.) that would be subject to manifest and packaging requirements specified in 40 CFR 262. Hazardous waste is defined and regulated by the U.S. Environmental Protection Agency (USEPA).

3.4 Hazardous Material

A substance or material in a quantity or form which may pose an unreasonable risk to health, safety, and/or property when transported in commerce. Hazardous material is defined and regulated by DOT (49 CFR 173.2 and 172.101) and IATA (Section 4.2).

3.5 Sample

Physical evidence collected from a facility or the environment which is representative of conditions at the point and time at which the sample is collected.

4.0 Procedure

4.1 Responsibilities

4.1.1 Compliance with this procedure is the responsibility of project management, site management, health and safety, and field personnel.

4.1.2 Project Manager - is responsible for the development and review of site-specific work plans which address the specific sample handling, packaging, and shipping requirements for the project. Review the project specific documentation forms to ensure they are appropriate

for the field activities. The Project Manager is also responsible for seeing that field personnel receive proper training and maintain quality assurance/quality control (QA/QC).

4.1.3 Contractor Quality Control (CQC) - is responsible for the periodic review of documentation generated during sample handling, packaging, and shipping and the periodic review and audit of field personnel as they perform the work.

If problems arise, the CQC is also responsible for swift implementation of corrective action (i.e., retraining personnel, additional review of work plans and SOPs, variances to requirements, issuing nonconformances).

4.2 Sample Handling

4.2.1 Inspect the sampling containers (obtained from the analytical laboratory prior to the sampling event) to ensure that they are appropriate for the samples being collected, correctly preserved, and undamaged.

4.2.2 When collecting a sample always use approved/site specific personal protective equipment (e.g., gloves, etc.) to prevent cross-contamination from sample to sample but also as a health and safety requirement.

4.3 Field Packaging

4.3.1 Collect the samples in accordance with the site-specific work plans and applicable SOPs.

4.3.2 As soon as possible after sample collection, tightly seal the container, and place a piece of custody tape over or around the cap. The custody tape should be placed over the cap so that any attempt to remove the cap will cause the tape to be broken. Do not place custody tape over a volatile organic analysis (VOA) vial septum.

4.3.3 Place all containers in separate, appropriately sized, airtight, seam sealing polyethylene bags (e.g., Ziploc™). Seal the bag, removing any excess air.

4.3.4 Place the bagged container inside an insulating shipping container, "cooler." This cooler should have frozen blue ice inside to assure samples remain cool, "4°," during transit from field to the packaging location.

4.3.5 Because blue ice does not maintain the 4°C standard required for sample shipping, it should only be used while in the field collecting samples.

4.3.6 Maintain the samples under chain of custody (COC) (Attachment 6.1) in accordance with the site-specific work plans and appropriate SOPs.

4.4 Sample Packaging

4.4.1 Inspect the integrity of the shipping container. The container is generally a "cooler" constructed of heavy plastic or metal with appropriate insulating properties so that variations in temperature during shipping are minimized. Also make sure that the drain plug has been sealed with nylon reinforced strapping tape or mailing tape.

4.4.2 Place two to four inches of absorbent packaging material (e.g., Vermiculite™) in the bottom of the shipping container.

4.4.3 Carefully check the COC record against the collected sample labels and containers to ensure that the sample numbers, sample description, date and time of collection, container type and volume, preservative, and the required analytical methods are correct and in agreement.

4.4.4 Place the samples in the shipping container, allowing sufficient room between the samples to place ice and/or packing material.

4.4.5 Double bag and seal crushed or cubed ice in heavy-duty polyethylene bags. Place these bags of ice on top of and between samples. Blue ice should not be used for sample shipping; it does not maintain the 4°C temperature necessary for regulatory compliance. Include a VOA vial of tap water clearly labeled "temperature check" so that the laboratory

can verify the temperature of the samples upon receipt. The remaining space will be filled with packing material.

4.4.6 All samples requiring temperature preservation stated at 4°C will be acceptable "as in" within the range of 4°C 2 °C. The laboratory should record the temperature of receipt upon the COC. For all samples received from 6°C to 10°C, the sample(s) and temperature (in 1°C increments) will be noted on the COC and then analyzed. For samples with temperatures greater than 10°C, the samples will be rejected by the laboratory for analysis and immediately reported to the Project Manager. For VOA samples below 0°C, the samples will be rejected and also reported.

4.5 Sample Shipping

4.5.1 The person in charge of sample custody will time, date, and sign over relinquishment of custody on the COC. When a common carrier is to be used for sample shipment, also record the air/waybill number (tracking number) and the name of the carrier on the COC record. Place the original copy of the COC record in a sealed, clear plastic envelop or bag and tape the COC record envelope to the inside lid of the shipping container. Retain a copy of the COC record for tracking purposes.

4.5.2 Using nylon reinforced strapping tape or mailing tape, seal the shipping container.

4.5.3 Place custody tape over opposite ends of the lid.

4.5.4 Mark the container "THIS END UP," or apply arrow labels that indicate the proper position to be maintained during shipping.

4.5.5 Apply a label stating the name and address of the shipper and the receiving laboratory on the outside of the cooler.

4.5.6 Turn the sample over to the courier or carrier for delivery to the laboratory. All samples should be shipped by the fastest available method to the laboratory as soon as possible after sample collection.

NOTE: The courier or carrier is not responsible for sample custody and is not required to sign the COC.

4.5.7 Contact the appropriate laboratory personnel to advise them of the sample shipment.

4.5.8 Review the COC and sample collection forms for completeness and turn them over to site or project management.

5.0 Records

5.1 Records generated as a result of implementation of this SOP will be controlled and maintained in the project record files and in accordance with SQP 4.2.

6.0 Attachments

6.1 Analysis Request and Chain of Custody Record

ATTACHMENT 6.1

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

White: To accompany samples — Yellow: Field copy — *See back of form for special instructions

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

Reference Document No. 368244
Page 1 of ____

Project Name/No. [1]
Sample Team Members [2]
Profit Center No. [3]
Project Manager [4]
Purchase Order No. [6]
Required Report Date [11]

Samples Shipment Date [7]
Lab Destination [8]
Lab Contact [9]
Project Contact/Phone [12]
Carrier/Waybill No. [13]

Bill to: [5]

Report to: [10]

ONE CONTAINER PER LINE

Sample Number [14]	Sample Description/Type [15]	Date/Time Collected [16]	Container Type [17]	Sample Volume [18]	Pre-servative [19]	Requested Testing Program [20]	Condition on Receipt [21]	Disposal Record No. [22]

Special Instructions: [23]

Possible Hazard Identification: [24]
Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal: [25]
Return to Client ☐ Disposal by Lab ☐ Archive (mos.)

Turnaround Time Required: [26]
Normal ☐ Rush ☐

QC Level: [27]
I. ☐ II. ☐ III. ☐ Project Specific (specify):

1. Relinquished by [28] (Signature/Affiliation)	Date: Time:	1. Received by [28] (Signature/Affiliation)	Date: Time:
2. Relinquished by (Signature/Affiliation)	Date: Time:	2. Received by (Signature/Affiliation)	Date: Time:
3. Relinquished by (Signature/Affiliation)	Date: Time:	3. Received by (Signature/Affiliation)	Date: Time:

Comments: [29]

CONTRACTOR QUALITY CONTROL PLAN
REMOVAL ACTIONS AT FOUR SITES LOCATED AT
NAVAL AIR WEAPONS STATION
CHINA LAKE, CALIFORNIA

CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NUMBER 0018

Submitted to:

Department of the Navy
Engineering Field Activity - West
900 Commodore Drive, Building B208
San Bruno, California 94066-2402

Submitted by:

IT Corporation
4585 Pacheco Boulevard
Martinez, California 94553

Revision 1

September, 1995

Issued to: JIM McDONALD Date: 10/9/95

Copy #:_____ ☐ Controlled ☒ Uncontrolled

MZ/09-29-95/WESTDIV/PLANS/CQCPLN1.018

CONTRACTOR QUALITY CONTROL PLAN
REMOVAL ACTIONS AT FOUR SITES LOCATED AT
NAVAL AIR WEAPONS STATION
CHINA LAKE, CALIFORNIA

CONTRACT NO. N62474-93-D-2151
DELIVERY ORDER NUMBER 0018

Revision 1

September, 1995

Approved by: _____ Date: 2 Oct 95
Robert W. Swatek
Program Contractor Quality
Control Manager

Approved by: _____ Date: 10/02/95
for John Warren
Project Manager

Approved by: _____ Date: 10/2/95
Louis E. Stout
Program Manager

Introduction

This Contractor Quality Control Plan (CPCP) has been prepared to describe those QC actions which will be implemented during the removal of Site 13 (Oily Waste Disposal Area), Site 31 (Public Works Pesticide Rinse Area), Site 32 (Golf Course Pesticide Rinse Area), and Site 49 (SWPL/CLPL Industrial Waste Ponds and Sumps) at Naval Weapons Station, China Lake, California for Delivery Order 0018.

The CQCP will be used in conjunction with the Contractor Quality Control Program Plan (CQCPP), Revision 0 and Standard Quality Procedures (SQPs), Revision 0, as applicable and described below:

Contractor Quality Control Program Plan

Section 0.0 - Policy Statement; Applicable in its entirety

Section 1.0 - Introduction; Applicable in its entirety

Section 2.0 - Organization and Responsibilities; Applicable with the following:

add: Project Superintendent
The Project Superintendent reports to the Project Manager and is responsible for the daily supervision of the field work and directing of field crews. He/she will also provide oversight of subcontractors and their daily activities. He/she will coordinate construction remediation activities and schedules with the CQC Manager and prepare daily contractor production reports.

Section 3.0 - Quality Control Management; Applicable in its entirety:

Section 4.0 - Document Control and Records Management; Applicable in its entirety

Section 5.0 - Instructions, Procedures and Drawings; Applicable in its entirety

Section 6.0 - Procurement; Applicable in its entirety

Section 7.0 - Inspections; Applicable in its entirety

Section 8.0 - Calibration and Maintenance of Measuring and Test Equipment; Applicable in its entirety

Section 9.0 - Test Control; Applicable in its entirety

Section 10.0 - Nonconformance Control and Corrective Actions; Applicable in its entirety

Section 11.0 - Change Control; Applicable in its entirety

Section 12.0 - Audits and Surveillance; Applicable with the following modification:

delete subsections 12.1 through 12.8

Standard Quality Procedures

The following Standard Quality Procedures (SQP) have been determined to be applicable:

SQP-1.1 Contractor Quality Control Program
SQP-3.1 Project Self Assessment
SQP-3.2 Indoctrination and Training
SQP-4.1 Document Control
SQP-4.2 Records Management
SQP-5.1 Preparation, Revision and Approval of Plans and Procedures
SQP-7.1 Quality Inspections and Inspection Records
SQP-8.2 Calibration and Maintenance of Measuring and Test Equipment
SQP-10.1 Nonconformance Control
SQP-10.2 Corrective Action
SQP-10.3 Stop Work Order
SQP-11.1 Field Work Variance/Request for Information
SQP-12.1 Quality Audits
SQP-12.2 Management Assessment
SQP-12.3 Quality Surveillance

Standard Operating Procedures

The following Standard Operating Procedures (SOP) have been determined to be applicable:

SOP-1.1 Chain of Custody
SOP-2.1 Sample Handling, Packaging and Shipping
SOP-6.2 Drilling and Heavy Equipment Decontamination
SOP-17.1 Sample Labelling
SOP-17.2 Sample Numbering

DRAWN BY	BJ 3-28-95	CHECKED BY / APPROVED BY	RWS 3/28/95 / 3/28/95	DRAWING NUMBER	761123-A1

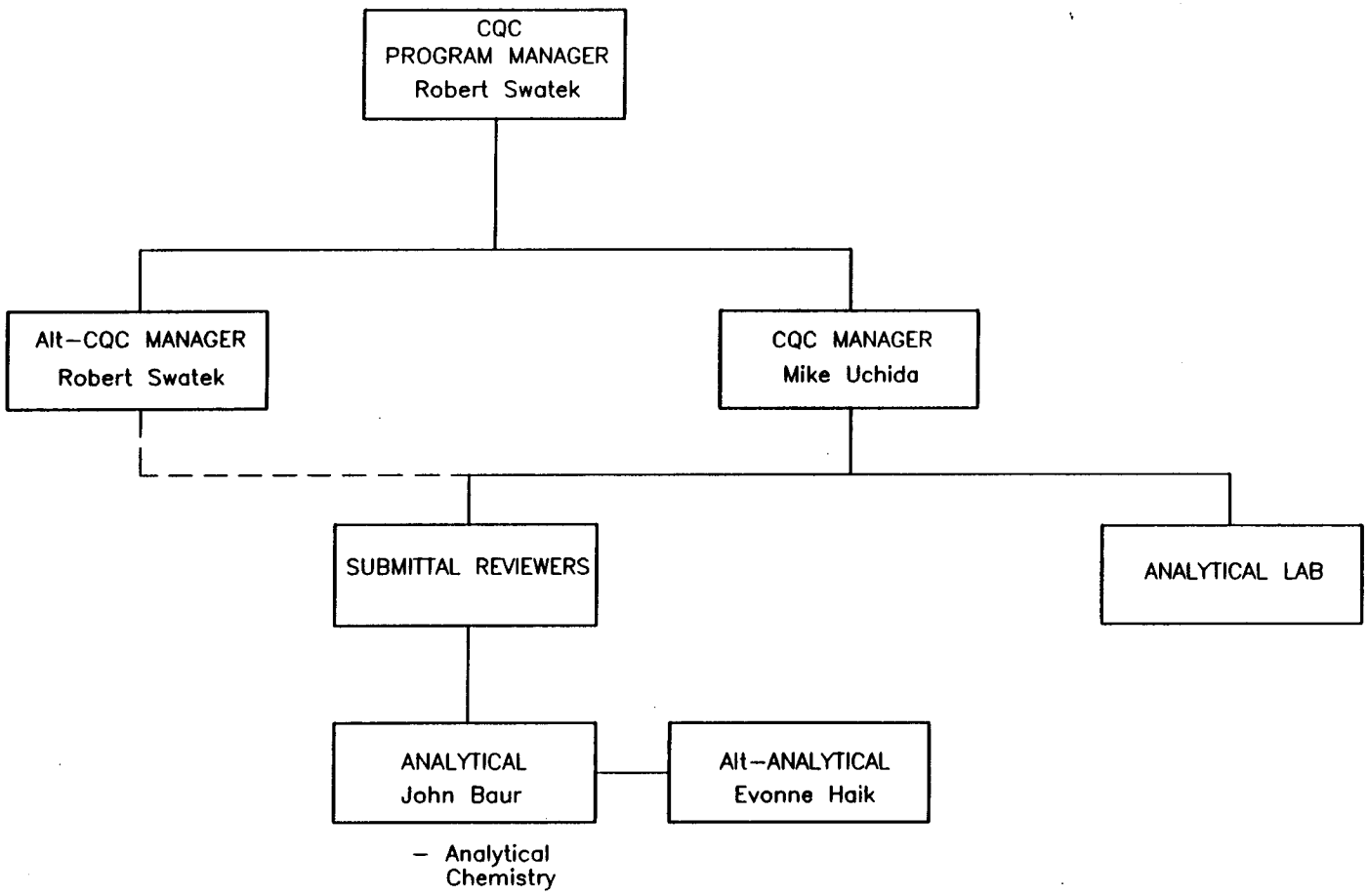


FIGURE 1

QUALITY CONTROL ORGANIZATIONAL CHART

REMOVAL ACTIONS AT FOUR SITES
DELIVERY ORDER #0018
CHINA LAKE, CALIFORNIA

PREPARED FOR

DEPARTMENT OF THE NAVY
WESTERN DIVISION

INTERNATIONAL
TECHNOLOGY
CORPORATION

WD-CLC18/WD7

SUBMITTAL REGISTER

CONTRACT NO. N62474-93-D-2151
D.O. No. 0018

TITLE AND LOCATION
Removal Actions at Four Sites Located at NAWS China Lake, California

CONTRACTOR
IT Corporation

SPECIFICATION SECTION
Basic Contract

TRANS-MITTAL NO. a	ITEM NO. b	SPECIFICATION PARAGRAPH NO. c	DESCRIPTION OF ITEM SUBMITTED d	TYPE OF SUBMITTAL: DATA e	DRAWINGS f	INSTRUCTIONS g	SCHEDULES h	STATEMENTS i	REPORTS j	CERTIFICATES k	SAMPLES l	RECORDS m	CLASSIFICATION: INFORMATION ONLY n	GOVERNMENT APPROVED o	REVIEWER p	CONTRACTOR SCHEDULE DATES: SUBMIT q	APPROVAL NEEDED BY r	AUTHOR s	CONTRACTOR ACTION: CODE t	ACUTAL REVIEW COMPLETION DATE u	SUBMIT TO GOVERNMENT v	GOVERNMENT ACTION: CODE w	RETURN DATE x	REMARKS[1] y
	001	2.1/6.14.5	As-Build Record- Drwg.		X								X					IT						Submit upon completion of D.O.
	002	2.1/6.14.5	As-Built Record - Material		X								X					IT						Submit upon completion of D.0.
	003	3.2.2	Site Health & Safety Plan						X					X		3/02/95	4/01/95	IT		6/28/95	6/30/95		9/19/95	Submit 15 days after D.O. award
	004	5.5.1	Cost Management System Status Report						X				X					IT						Submit monthly
	005	5.5.1	CMS Required Sorts						X				X					IT						Submit monthly
	006	6.3.1.1	CQC Plan Addenda						X					X		3/02/95	4/01/95	IT		6/28/95	6/30/95		9/19/95	Submit 15 days after D.O. award
	007	6.4	CQC Meeting Minutes					X					X					IT						Submit 2 days after each meeting
	008	6.4/6.14.4	Non Compliance Checkoff List									X	X			11/08/95		IT						Initial - 30 days after mob./Subsequent - monthly
	009	6.4	Test Result Summary									X	X					IT						Submit monthly
	010	4.9.5	Manifests									X	X											Government Signs
	011	5.4.1	Work Plan						X					X		3/02/95	4/01/95	IT		6/28/95	6/30/95		9/19/95	Submit Prior to Work
	012	6.13.2	Invoice Certification							X			X					IT						Submit with Invoice
	013	6.13.3	QC Completion Certification							X			X					IT						Submit upon Completion

[1]Days are based on five-day work week.

MZ/09-29-95/WESTDIV/QAFORMS/SUBREG49.018

REMOVAL ACTIONS AT FOUR SITES LOCATED AT
NAVAL AIR WEAPONS STATION
CHINA LAKE, CALIFORNIA
DELIVERY ORDER 0018

CQC MANAGER
LETTER OF DESIGNATION

March 28,1995

Mr. Michael Uchida,

This letter will serve to assign you as IT Corporation's site CQC Manager for the above captioned delivery order. In the role of CQC Manager you have the responsibilities and authorities designated in Sections 2.1.3, 9.5, 9.7, and 9.8 of the Contractor Quality Control Program Plan, Revision 0. Additionally, you are also granted Stop Work authority and will exercise this authority consistent with the CQC Program Plan, Section 10.4 and SQP-9.3. You are granted the authority to approve submittals which have been certified by qualified submittal reviewers as identified on the CQC Organization Chart for this delivery order and as necessary to ensure the quality of the work and direct the removal and/or replacement of nonconforming materials or work. In this capacity you will report directly to the me and will administer the established requirements of the delivery order CQC Plan.

If you have any questions or require additional information, please contact me at (510) 372-9100.

Sincerely,
IT CORPORATION

Robert Swatek
CQC Program Manager

CC: Lou Stout
John Warren

Michael Uchida

Professional Qualifications

Project scientist trained in the implementation of federal, state, and local regulations pertaining to environmental compliance. Conducted Phase I, and environmental risk assessments of commercial and public properties. Field work includes managing 3-4 people during excavation activities and assisting in pilot scale testing of Extran membranes and activated carbon filtration in the treatment of contaminated water.

Education

B.S. Chemistry, University of California Berkeley, Berkeley, California, 1992

Experience and Background

1/93 - Present

Project Scientist. Managed phase out of chlorinated solvents as mandated by EPA Clean Air Act 1990. Oversaw progress of domestic and international sites. Worked in conjunction with corporate environmental manager of phase in of non-chlorinated solvents. Principal author of variance sent to EPA for extension on usage of chlorinated solvents.

Conducted Phase I site assessments of commercial and private property. Researched local, state, and Federal records in investigation of past, present, and future areas of environmental concern. Provided client with a comprehensive report of overview of subject properties(s) in addition to suggesting potential areas of environmental liability.

Conducted Environmental Impact Report of the construction of a hazardous waste storage facility. Co-authored section on Air Emissions impacts. Assessed potential air offenses and likely mitigation measures.

Conducted Risk Characterization for Superfund site according to U.S. EPA RAGS. Calculated potential health effects from non-carcinogenic and carcinogenic chemicals.

Co-authored environmental assessment of 7 Formerly Used Defense Sites according to CEQA. Co-authored workplan, preliminary assessment reports, and environmental assessment reports. Determined potential environmental impacts and likely mitigation measures.

Teamed in pilot scale testing of water treatment system using EXTRAN membranes and activated carbon filtration.

Conducted field sampling of groundwater and soils in accordance with Federal and State regulations.

Field supervised remedial excavations of contaminated sites. Assured all activities were in accordance with site specific health & safety plan.

4/92 - 1/93 ***Field Chemist, IT Corporation, Martinez, California.*** Worked with operations personnel to identify, segregate, and package hazardous waste for commercial and government clients. Duties include interpretation of analytical results, data management, classification of waste, and packaging for transportation and disposal. Prepared associated paperwork including profiles, manifests, attached sheets and storage inventory forms. Maintained working knowledge of applicable DOE, federal, state, and local regulations regarding hazardous waste handling, storage, transportation and disposal. Kept current of approved treatment/disposal sites' packaging and transportation requirements. Supported IT's emergency response operations.

Training/Certifications

40 Hour Hazardous Waste Worker Training (29 CFR 1910.120)
8 Hour Hazardous Waste Supervisor Training (29 CFR 1910.120)
First Air & CPR Training
Hazardous Chemical Handling Training

REMOVAL ACTIONS AT FOUR SITES LOCATED AT
NAVAL AIR WEAPONS STATION
CHINA LAKE, CALIFORNIA
DELIVERY ORDER 0018

ALTERNATE CQC MANAGER
LETTER OF DESIGNATION

March 28, 1995

Mr. Robert Swatek,

This letter will serve to assign you as IT Corporation's alternate site CQC Manager for the above captioned delivery order. In the case where the designated CQC Manager, Mr. Michael Uchida, is unable to perform the CQC Managers duties, you will serve in that capacity. In this role, you will have the responsibilities and authorities designated in Sections 2.1.3, 9.5, 9.7, and 9.8 of the Contractor Quality Control Program Plan, Revision 0. Additionally, will also have Stop Work authority and will exercise this authority consistent with the CQC Program Plan, Section 10.4 and SQP-9.3. You are granted the authority to approve submittals which have been certified by qualified submittal reviewers as identified on the CQC Organization Chart for this delivery order and as necessary to ensure the quality of the work and direct the removal and/or replacement of nonconforming materials or work. You will be authorized to act as an alternate for 14 consecutive working days or 30 nonconsecutive working days at a maximum. In the case where it is believed that these time periods will be exceeded you must notify me so that I may arrange with EFA-West and the ROICC to have this position replaced. You will report directly to the IT C&R QA/QC Manager who will administer the established requirements of the delivery order CQC Plan.

If you have any questions or require additional information, please contact me at (510) 372-9100.

Sincerely,
IT CORPORATION

for Louis E. Stout
Program Manager

MZ\11-14-94\WESTDIV\QA\LTRDESIG.019

Robert W. Swatek

Professional Qualifications

Mr. Swatek has 20 years of diverse Quality Assurance experience in the nuclear, environmental, and construction fields. His experience has been spent in the development, maintenance, implementation and management of corporate and project-specific QA/QC programs for major civil, structural, mechanical and environmental programs . These programs have successfully implemented the requirements of the NRC, ASME, EPA, DOE, DOD and industry consensus documents for both commercial and government settings. He is both experienced and knowledgeable in applying the requirements of ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities", DOE Order 5700.6c "Quality Assurance," DNFSB recommendation 90-2 "Order Compliance," EPA QAMS-004/80, "Guidelines and specifications for preparing Quality Assurance Program Plans," EPA QAMS-005/80 "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," ISO-9000, and various industry accepted QA standards and regulations. His environmental QA expertise includes the federal regulatory requirements of RCRA, CERCLA, SARA, NEPA, NRC, DOE, and USACE. Mr. Swatek has performed as a project manager on government and commercial Quality Assurance support services contracts, and has been examined and certified by the American Society of Quality Control (ASQC) as a Quality Auditor.

Education

Boise State University, Boise, Idaho; Business Administration - 1986
Long Beach City College, Long Beach, California; Quality Assurance - 1980
San Diego City College, San Diego, California; HVAC - 1977
National Board of Boiler and Pressure Vessel Inspector schools for ASME Section I, III, VIII-1 and Safety Valve Repair
Hartford Steam Boiler Inspection and Insurance school for Authorized Nuclear Inspectors
40 hours Health and Safety Training per OSHA 29 CFR 1910.120
8 hours OSHA Supervisors' Health and Safety Training
Lead Auditor Training Course - Battelle

Registrations/Certifications

American Society for Quality Control; Certified Quality Auditor - Certification No. 9989
National Board of Boiler and Pressure Vessel Inspectors Commission 8885 with Nuclear Endorsement
ANSI Lead Auditor (ANSI N45.2.23, NQA-1 and DOE Training)
ANSI Level III Inspector, Administrative (ANSI N45.2.6)

Experience and Background

1990 - Present

Manager, Quality Assurance, Martinez and San Jose EES Groups, IT Corporation, Martinez, California. Mr. Swatek's responsibilities include planning, cost accounting, resource management, training and development of personnel and quality assurance consulting for government and commercial clients. He performs as a QA Manager on field investigation activities associated with facility site characterization, remedial investigations (e.g., geologic and geophysical surveying, geotechnical field exploration and testing, environmental sampling and monitoring, radiological and groundwater monitoring), and feasibility studies, RCRA and CERCLA programs and IT site closures. As the IT Martinez EES QA Manager, he develops and maintains QA programs for regional operations including technical manuals of practice. Performs audits, assessments and surveillances of offices and specific project activities for implementation and compliance with QA and technical programs. He reports to the IT Regional Manager and assists project managers in review and development of project plans and procedures.

As the program manager, Quality Assurance/Quality Control for the US Navy Western Division Remedial Action Contract Mr. Swatek is responsible for the development, maintenance and administration of the Quality Program implemented at various Construction and Remediation projects in support of the Department of Defense Base Remediation and Closures. In this position he provides senior level quality oversight and management of delivery order QC Managers. His responsibilities include assignment of quality control personnel, cost estimating, training and development of personnel, analytical/geotechnical laboratory assessment, evaluating program effectiveness including facilitator of the Total Quality Management Program.

As the QA Manager for the Decontamination and Decommissioning of a U.S. DOE Radiological Research Laboratory operated by the University of Davis, CA. he is responsible for the preparation of a project specific quality assurance management plan responsive to U.S. DOE order 5700.6c. Project activities include performing personnel training, independent assessments, and interfacing with U.S. DOE and University personnel on quality related matters. He provides Senior level oversight of quality related activities performed in response to the QA program and coordinates with field personnel on quality system implementation and improvement suggestions.

As the project manager for a Quality/Regulatory Compliance support services contract with Westinghouse Hanford Company (200K) Mr. Swatek has provided Subject Matter Expert (SME) services and oversight of the work being conducted to maintain the Quality Assurance System Requirements Document, Baseline Analysis Matrix (BAM) and development of the ER-Quality Assurance Management Program. His work is highly dependent upon his understanding of the Hanford Federal Facility agreement and consent order (Tri-Party Agreement) which includes Washington

Administrative Codes, USEPA Regulations, USDOE and RL orders and industry standards. He consults with WHC ER-Program personnel, reviews contractor documents, establishes engineered cost estimates and Level IV schedules. He assists ER-Program personnel in the integration of QA provisions to systems engineering, records management, and field office management plans and policies to ensure conformance with DOE Order 4700.1 and DNFSB 90-2.

As the QA Manager for the Nevada Test Site, Groundwater Characterization Project (GCP), Mr. Swatek has prepared the Quality Assurance Project Plan (QAPjP) and participated in the development of the GCP Data Quality Objectives Process. He reviews technical, administrative and QA procedures and consults with DOE-NV and project management on the application of QA in a scientific research and investigative arena.

As the IT QA Manager for a major Remedial Investigation/Feasibility Study at a large military facility in Sacramento, California, he is responsible for the development, verification of implementation and continued improvement of the Quality Assurance Program Plan and Project Plans for the $12 million RI/FS project which includes 34 individual sites at the Base. The RI/FS activities include extensive soil sampling, installation of over 140 monitoring wells and aquifer testing. He performs audits, surveillance and inspection of project office and field activities, including training of personnel implementing quality affecting activities. He provides interface with clients and subcontractors regarding quality, establishes budgets, resource planning, and acts as the project spokesman on all quality related matters.

As the Project Manager for the Westinghouse Hanford Company Regulatory/Quality Assurance Support Services (1.2 M) Project, he was responsible for the development of the Westinghouse Environmental Program Office Quality Assurance Requirements Document (QARD), the design and installation of a computer data base for tracking and cross referencing regulatory requirements to implementing program documents. Providing training programs and lectures, development of the Westinghouse Quality Assurance Program Plan for environmental applications, and supporting Westinghouse Environmental Program office with review of planning documents. Responsibilities included budget and schedule implementation, development of task force personnel, coordination of subcontractors and acting as team leader in the development of major program documents.

As the IT QA Manager for the field investigation, and remedial clean-up action of Fuel/POL sites for the U.S. Army Corp of Engineers at Hamilton Army Air Field, he was responsible for the development, verification of implementation and continued improvement of the Chemical Quality Control Program. Responsibilities included performing audits, surveillances, consulting with Project Management and training of personnel performing quality affecting activities.

1988 - 1990 ***Manager, Quality Assurance, ASEA Brown Bouveri/Combustion Engineering, Inc., Windsor, Connecticut.*** Responsible for the Honolulu Resource Recovery Venture H-POWER Project, a 50 MW Municipal Solid Waste to Energy power plant. Duties and responsibilities include development and implementation of Owner QA/QC Program. Verification and coordination of Subcontractor QA/QC Programs including inspection and support activities for civil, structural, mechanical and electrical quality-affecting activities.

1987 - 1988 ***Manager, Quality Assurance, Parsons Brinckerhoff Quade & Douglas, Inc., Houston, Texas.*** Responsible for a high-level nuclear Exploratory Shaft Facility in Salt. Duties and responsibilities included the development, control, and implementation of the overall NQA-1 Quality Assurance Program. Providing interface with DOE, NRC and subcontractors regarding quality assurance activities. Performing audits of the Quality Assurance Program for project office and subcontractors including the training of personnel and Design Review Board members.

1981 - 1987 ***Manager, Quality Assurance, Morrison-Knudsen Engineers, Inc., Boise Idaho.*** Responsible for a high-level Nuclear Waste Repository in Salt/Basalt. Duties and responsibilities included the development, control and implementation of the overall NQA-1 Quality Assurance Program. Providing interface with DOE, NRC and subcontractors regarding quality assurance activities. Performing audits of the Quality Assurance Program for corporate, field, and vendor locations including the training of personnel who perform quality-affecting activities.

Project Manager for a quality assurance consulting contract with Oxbow Geothermal Engineering in Reno, Nevada, supplying QA services for a 40 MW geothermal power plant. Responsibilities included engineering specification reviews, vendor evaluations, source inspections, construction inspections, audits of the project, and acting as primary spokesman for Oxbow Engineering on all quality related matters.

Staff Engineer - Quality duties and responsibilities included development and maintenance of Corporate Quality Assurance Program. Preparation and review of engineering specifications for project-related materials and equipment. Developing and providing training programs for quality assurance-control personnel at both the project and corporate level. Assignments included:

- **Project Staff Quality Engineer** for the Vermont Yankee Reactor Recirculation System Piping Replacement. Duties and responsibilities included conducting and participating in Quality/Assurance Audits of the site QA program, Vendor Audit/ Surveillance activities, and review and correction of Process Control documents relating to work activities.

- **Project Staff Quality Engineer** for the Central and Southwest Utilities Oklaunion Unit 1, a 740 MW coal-fired power plant. Duties and responsibilities included corporate support activities for civil, structural, and mechanical quality-affecting functions, coordination and implementation of the QC program and procedures, resolution of quality concerns with the client, and providing weld engineering and nondestructive examination support.

- **Project Senior Quality Engineer** for the Wisconsin Electric Power Point Beach Unit 1 Steam Generator Replacement and Modification Upgrade Project. Duties and responsibilities included corporate support functions for the development of the project quality-affecting procedures, conducting and participating in Quality Assurance Audits of the site QA program, providing vendor surveillance and project support in quality and technical matters for structural and mechanical disciplines.

- **Project Senior Quality Engineer** for the Washington Public Power Supply System, Units 3 and 5. Duties and responsibilities included developing, revising, and reviewing project quality-affecting procedures and instructions, conducting and participating in Quality Assurance Audits of the site QA program, conducting QA indoctrination and training sessions for project personnel and providing project support in quality and technical matters for civil, structural, and mechanical disciplines.

- **Power Engineering Quality Engineer** for the Washington Water Power Companies Kettle Falls Unit 1, a 46 MW wood-fired power plant. Duties and responsibilities included performing engineering specification reviews and assisting in the preparation of specifications for critical materials and equipment. Developing and implementing quality control procedures for civil, structural, and mechanical quality-affecting activities. Providing welding and nondestructive examination support and representing the project as primary spokesman for all quality-related matters.

- **Project Senior Quality Engineer** for the Nevada Power Reid Gardner Unit 4, a 740 MW coal-fired power plant. Duties and responsibilities included coordination and implementation of the site QC program for civil, structural, and mechanical systems, interface on quality matters with client, state, and inspection agency, monitoring of subcontractor QC programs and providing weld engineering and nondestructive examination support.

1977 - 1981 ***ASME Authorized Nuclear Inspector, Hartford Steam Boiler Inspection and Insurance Company, Burbank, California.*** Duties and responsibilities included providing third-party inspection as required by the American Society of Mechanical Engineers various codes and standards. Consulting with clients on quality system programs, development of training programs for inspection personnel, participation in ASME audits, joint reviews, and nuclear surveys.

Specific manufacturing facilities and field projects:

- ACE Buehler Tank and Heater Company
  - Unfired Pressure Vessels
  - Boilers and Heaters
- Portland Cement Company Unit 1
  - Waste Heat Boiler
- Cryogenic Experts, Incorporated
  - Cryogenic Heat Exchangers
- Greer Hydraulic Company
  - 3000 psi Hydraulic Cylinders
- Shell Oil Company Units 1 and 2
  - Oil-fired Process Boilers
- Diablo Canyon Units 1 and 2
  - 1100 MW Pressurized Water Reactors
- San Onofre Unit 2
  - 1100 MW Pressurized Water Reactor
- Pacific Scientific Company
  - Nuclear Component Supports
- Associated Pipe and Engineering
  - Nuclear Piping Spools
  - Nuclear Expansion Joints

1977 - 1977 ***Sr. Stationary Engineer, International Telephone and Telegraph Cable Hydrospace, National City, California.*** Directly responsible for operation and maintenance of high-pressure fossil boilers and related equipment. Implementation of quality assurance/quality control system, including resolution of technical matters.

Professional Affiliations

American Society of Mechanical Engineers (ASME)
Veterans of Foreign Wars (VFW)
International Order of Foresters

REMOVAL ACTIONS AT FOUR SITES LOCATED AT
NAVAL AIR WEAPONS STATION
CHINA LAKE, CALIFORNIA

DEFINABLE FEATURES OF WORK MATRIX

Spec. Section	Para. No.	Feature of Work	Prep		Initial		Follow-up	Remarks
			Req	Date	Req	Date	Req	
Work Plan		Underground Utility Locating	X		X		X	
Work Plan		Excavating and Trenching	X		X		X	
Work Plan		Removing USTs	X		X		X	
Work Plan		Soil Storing, Transporting & Disposing	X		X		X	
Work Plan		Bioremediation Unit Installing	X		X		X	
Work Plan		Removing Structures	X		X		X	
Work Plan		Backfilling	X		X		X	

TESTING PLAN AND LOG

CONTRACT NO. N62474-93-D-2151 DELIVERY ORDER NO. 0018	PROJECT TITLE AND LOCATION Removal Actions at Four Sites Located at Naval Air Weapons Station, China Lake, California	CONTRACTOR IT Corporation

SPECIFICATION SECTION AND PARAGRAPH NUMBER	TEST PROCEDURE	TEST NAME	ACCREDITED/ APPROVED LAB YES NO	SAMPLED BY	LOCATION OF TEST ON SITE OFF SITE	FREQUENCY	DATE COMPLETE	DATE FORWARDED TO CONTR. OFF	REMARKS
Work Plan	8080	Pesticides	TBD	IT	Off	Per Work Plan			
Work Plan	413.2	Oil & grease	TBD	IT	Off	Per Work Plan			
Work Plan	8015	TPH Ex-tractables	TBD	IT	Off	Per Work Plan			
Work Plan	96 hr. static acute bioas-say	Bioassess-ment analysis	TBD	IT	Off	Per Work Plan			
Work Plan	8240	VOAs	TBD	IT	Off	Per Work Plan			
Work Plan	8330	Explosives	TBD	IT	Off	Per work Plan			
Work Plan	6010/7000 series	CAM 17 metals	TBD	IT	Off	Per Work Plan			
Work Plan	SW846 Ch.7	Reactive cyanide	TBD	IT	Off	Per Work Plan			
Work Plan	9065	Phenols	TBD	IT	Off	Per Work Plan			
Work Plan	N/A	Bioreme-diation Unit Test	N/A	IT	On	Per Work Plan			

SITE HEALTH AND SAFETY PLAN
NAVAL AIR WEAPONS STATION (NAWS)
CHINA LAKE, CALIFORNIA

CONTRACT NO. N62474-93-D-2151
Delivery Order No. 18

Submitted to:

Department of the Navy
Engineering Field Activity, West
Naval Facilities Engineering Command
900 Commodore Drive, Building B-103
San Bruno, California 94066-2402

Submitted by:

IT Corporation
4585 Pacheco Boulevard
Martinez, California 94553

Revision 1

October 1995

Issued to: JIM McDONALD Date: 10/9/95

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MZ/10-05-95/WESTDIV\PLANS\H&SPLN18.RV1

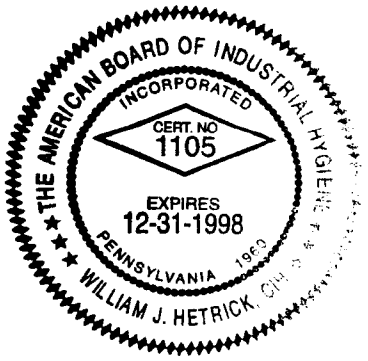
SITE HEALTH AND SAFETY PLAN
NAVAL AIR WEAPONS STATION (NAWS)
CHINA LAKE, CALIFORNIA

Revision 1

October 1995

Approved by: _____ Date: 10/6/95
Louis E. Stout
IT Program Manager

Approved by: _____ Date: 10/6/95
William Hetrick
IT Program CIH



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B	Material Safety Data Sheets and Occupational Health Guidelines
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List of Acronyms

ABIH	American Board of Industrial Hygiene
AIDS	Acquired Immune Deficiency Syndrome
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
ATSDR	Agency for Toxic Substances and Disease Registry
bpm	Beats Per Minute
BCSP	Board of Certified Safety Professionals
°C	Degrees Celsius
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Department of Industrial Relations, Division of Occupational Safety and Health
CCR	California Code of Regulations
CET	Certified Environmental Trainer
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CPR	Cardiopulmonary Resuscitation
CSP	Certified Safety Professional
CRZ	Contamination Reduction Zone
dBA	Decibels, A-weighted
DOT	Department of Transportation
DTSC	Department of Toxic Substances Control
EFA	Engineering Field Activity
EKG	Electrocardiogram
EPA	Environmental Protection Agency
EZ	Exclusion Zone
°F	Degrees Fahrenheit
FADL	Field Activity Daily Log
FID	Flame Ionization Detector
FM	Factory Mutual
FR	Federal Register
GFCI	Ground Fault Circuit Interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
HBV	Hepatitis B Virus
HEPA	High Efficiency Particulate
HIV	Human Immunodeficiency Virus
HS	Health and Safety
IDLH	Immediately Dangerous to Life and Health
IIPP	Injury and Illness Prevention Plan
IT	IT Corporation
LEL	Lower Explosive Limit

MSDS	Material Safety Data Sheet
NIOSH	National Institute of Occupational Safety and Health
NOSC	Navy On-Scene Coordinator
NOSCDR	Navy On-Scene Commander
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PEL	Permissible Exposure Limit
PHSP	Program Health and Safety Plan
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppm	Parts per Million by Weight
PS	Project Superintendent
ROICC	Resident Officer in Charge of Construction
SEIR	Supervisor's Employee Injury Report
SHSO	Site Health and Safety Officer
SHSP	Site Health and Safety Plan
SIR	Safety Inspection Report
SPM	Senior Project Engineer/Manager
TBA	To be Announced
TSM	Tailgate Safety Meeting
UL	Underwriter's Laboratory
USA	Underground Services Alert
USACE	U.S. Army Corps of Engineers
USN	U.S. Navy
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WBGT	Wet Bulb Globe Temperature
WOHA	Washington Occupational Health Associates

Project Health and Safety Plan Acknowledgment

I understand and agree to abide by the provisions as detailed in this Site Health and Safety Plan for the activities described in the Project Work Plans. Failure to comply with these provisions may lead to disciplinary action which may include dismissal from the work site, termination of employment or, for subcontractors, termination of the work contract.

Printed Name	Company	Signature	Date

Disclaimer

This Site Health and Safety Plan was developed with the goal of providing the best available and most current industrial health, safety and regulatory information. The recommendations and guidance provided herein are based on currently accepted industrial hygiene principles and safety practices. All such advice and instruction is intended to reflect the present level of health and safety efforts consistent with prevailing professional standards. This representation is in lieu of all warranties either expressed or implied, and no responsibility is assumed for the misapplication of any materials, advice or instruction provided herein.

Any reference contained in the Site Health and Safety Plan to products and manufacturers is intended only for purposes of illustration and is not meant to be, and should not be, construed as an endorsement by IT or its subsidiaries.

1.0 Introduction

1.1 Objective

The objective of this Site Health and Safety Plan (SHSP) is to ensure that safe working conditions exist during the remediation activities at Naval Air Weapons Station (NAWS), China Lake, California. The safety procedures outlined have been established based on preliminary analysis of potential hazards within the site. This SHSP describes the health and safety requirements and procedures to be used while conducting field work and includes:

- Responsibilities of persons on site;
- Training Program;
- Medical Surveillance Program;
- Activity Hazard Analysis;
- Hazard Control Program;
- Personal Control Program;
- Decontamination Procedures;
- Emergency Response Plan
- Spill Containment Program
- Industrial Hygiene Monitoring Program; and
- Certain Specific Work Procedures.

This document, in combination with IT's Corporate Health and Safety Policy manual, also serves as the company's Injury and Illness Prevention Plan (IIPP) and Code of Safe Work Practices. Sites 49, 13, 31, and 32 comprise the scope of remediation activities for this SHSP. Work will be initated on Site 49 with specific addenda to be provided on Sites 13, 31, and 32.

1.2 General Site Descriptions

Site 49 is comprised of wastewater evaporation pond systems located in both the China Lake Propulsion Laboratory and the Salt Wells Propulsion Laboratory (CLPL/SWPL). Twenty-one evaporation pond systems are included in the removal action; seven ponds are located in CLPL and the remaining fourteen ponds are located in SWPL. Each pond system consists of underground piping, a concrete sump structure (sump, clarifier, or trap), and an evaporation pond (clay-lined or synthetic-lined). The degree of contamination and types of contaminants present varies between ponds.

Site 13 is the location of two trenches formerly used for disposal of oil kitchen wastes, waste motor oils, lubricants, and possible waste solvents. The two trenches are located in close proximity to the NAWS Wastewater Treatment Facility. These trenches are subparralel to one another and approximately 100 ft. long by 10 ft. wide by 10 ft. deep.

Sites 31 and 32 are pesticide rinse areas used for cleaning of pesiticde application equipment and temporary storage of pesticide residues and wash water. Each site consists of a 500-gallon underground storage tank, associated piping, overlain by a concrete wash pad.

1.3 Policy Statement

It is the policy of IT Corporation (IT) to provide a safe and healthful work environment for all its employees and subcontractors. IT considers no phase of operation or administration to be of greater importance than injury or illness prevention. Safety takes precedence over expediency or shortcuts, and every reasonable step to reduce the possibility of injury, illness, or accident will be taken.

This SHSP prescribes the procedures that must be followed during field work associated with the NAWS China Lake project. Operational changes which could affect the health or safety of personnel, the community, or the environment will not be made without the prior approval of the IT Senior Project Engineer/Manager, and the Program Certified Industrial Hygienist (CIH).

The provisions of this SHSP are mandatory for all IT personnel and subcontractors assigned to the project. IT requires all visitors to the work site to abide by the requirements of this SHSP. The Program CIH will provide written revisions to this SHSP when changes warrant. No changes to the plan will be implemented without prior approval of the Program CIH or his authorized representative.

1.4 References

This SHSP complies with Federal Occupational Safety and Health Administration (OSHA), California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), United States Environmental Protection Agency (EPA), California Environmental Protection Agency (Cal/EPA), and California Department of Toxic

Substances Control (DTSC), and U.S. Army Corps of Engineers (USACE) regulations. This SHSP follows the guidelines established in the following documents:

- Standard Operating Safety Guidelines (EPA, June 1992);
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities; Department of Health and Human Services (DHHS) [National Institute for Occupational Safety and Health (NIOSH)] Publication No. 85-115.
- Title 29 of the Code of Federal Regulations (CFR), Parts 1910 and 1926 including Parts 1910.120/1926.65 or in California Title 8 California Code of Regulations (T8CCR) (Cal/OSHA Construction and General Industry Safety Orders) including Section 5192 (Hazardous Waste Operations and Emergency Response);
- U.S. Army Corps of Engineers Safety and Health Requirements Manual (USACE EM 385-1-1, October 1992).
- IT Corporate Health and Safety Procedures.

The requirements of each applicable corporate health and safety policy apply to the work conducted on this project. All IT employees and subcontractors must follow the Base's fire, safety and traffic regulations as well as all applicable federal, state, local and USACE EM 385-1-1 safety regulations.

2.0 Responsibilities

2.1 All Personnel

Each person is responsible for his/her own health and safety, for completing tasks in a safe manner and for reporting any unsafe acts or conditions to his/her supervisor and the Project Superintendent (PS). All persons on-site are responsible for continuous adherence to health and safety procedures during the performance of any project work. In no case may work be performed in a manner which conflicts with the intent of, or the inherent safety precautions expressed in, this SHSP. After due warning, persons who violate procedure and work rules may be dismissed from the site, terminated, or have their contract revoked. Blatant disregard or repeated infractions of health and safety policies are grounds for disciplinary action up to, and including, dismissal, and/or removal from the work area.

All IT and subcontractor personnel are required to read and acknowledge their understanding of this SHSP. All project personnel are expected to abide by the requirements of this SHSP and cooperate with project management in ensuring a safe and healthful work site. Site personnel are required to immediately report any of the following to the PS:

- Accidents and injuries, no matter how minor;
- Unexpected or uncontrolled release of chemical substances;
- Any signs or symptoms of chemical exposure;
- Any unsafe or malfunctioning equipment; and
- Any changes in site conditions which may affect the health and safety of project personnel.

2.2 Senior Project Engineer/Manager

The Senior Project Engineer/Manager (SPM) has overall responsibility for the health and safety of all personnel on the project. His/her responsibility with regard to health and safety is to maintain company policy and resolve health and safety issues with the assistance and guidance of the Program CIH. The SPM will provide the Program CIH with the company name and representatives of those contractors being considered for hire, as well as those hired, to allow required preliminary information to be collected in a timely manner.

The SPM is responsible to:

- Notify the Program CIH when field operations begin so that field support can be scheduled;

- Ensure that the SHSP is read and signed by all field personnel on the project, including subcontractors. The SHSP must also be signed by the Program CIH and the SPM;

- Ensure that all provisions of the SHSP are followed. Contact the Program CIH for any variances or modifications desired;

- Demonstrate a personal commitment to safety on the project;

- Ensure that tailgate safety meetings are conducted daily, signed by all field workers and reviewed by the PS and the SPM. The SPM must have completed the Hazardous Waste Supervisor Course;

- Ensure that Field Activity Daily Log (FADL) forms are completed for each day of operations, signed and dated by the author, and that all persons listed have signed the SHSP and tailgate form;

- Have supervisors inspect the project at least weekly, with inspections and corrective actions documented on FADL forms. The SPM is to inspect the project for safety hazards periodically;

- Ensure correction of any reported or observed safety hazard;

- Report all near-miss, injury, illness and vehicle accident incidents to the Program CIH and Resident Officer in Charge of Construction (ROICC) within 24 hours and ensure that a Supervisor's Employee Injury Report (SEIR) form is initiated;

- Notify the Program CIH when field work lasts more than six months so that the SHSP can be reviewed and updated as needed;

- Immediately notify the Program CIH upon receiving notice of any regulatory agency inspection; and

- Ensure that the project files receive copies of:

  - all internal and external HS correspondence
  - all air sampling records (including "none-detected")
  - all accident reports and Accident Review Board documentation

- documentation of audits and corrective actions
- air monitoring equipment calibration records
- all FADLs.

The SPM will lead at least one site safety audit team per quarter while field activities are conducted and will ensure that all accidents, incidents and/or near-misses are investigated in a timely manner. The SPM will ensure that management performs an investigation of all incidents or accidents which had the potential to cause a lost-time or hospitalization incident or fatality within 24 hours of the incident.

The SPM for this delivery order is John Warren.

2.3 Program Certified Industrial Hygienist (CIH)

The Program CIH is responsible for the preparation and modification (as necessary) of this SHSP. The Program CIH will approve changes and update the SHSP as warranted by altered site conditions and shall have the only authorization to effect such changes (except those changes outlined in the Emergency Response Plan). The Program CIH will advise the SPM on health and safety issues which may have an impact on project operations. In addition, the Program CIH is responsible to:

- Oversee and review the work of the Site Health and Safety Officer (SHSO);
- Administer the general health and safety program;
- Provide technical assistance to the SPM and the PS;
- Investigate significant accidents, illnesses and near-misses. Recommend corrective actions as appropriate. Review all Accident/Incident Investigation Reports;
- Establish the required personal protective equipment for each work area;
- Assist the PS and SHSO in establishing decontamination area locations;
- Evaluate and approve contractors regarding health and safety compliance both prior to accepting the contract and upon completion of the project, as appropriate; and

- Establish proper employee exposure monitoring and assess the appropriateness of protective measures.

The Program CIH is William Hetrick. Mr. Hetrick is certified by the American Board of Industrial Hygiene (ABIH).

2.4 Project Superintendent

The Project Superintendent (PS) reports to the SPM and is responsible for field enforcement of the SHSP. This includes communicating project health and safety requirements to all on-site project personnel (both IT and subcontractor personnel), consulting with the Program CIH regarding changes to the SHSP, and conducting periodic health and safety inspections with the SHSO. The PS is responsible for informing the Program CIH and the SPM of any changes to the workplan, prior to implementation, so that health and safety issues introduced by those changes may be properly addressed. The PS will be on-site during all project related activities or will delegate his responsibilities to qualified supervisory personnel [i.e., person(s) having 8-hours of hazardous waste operations supervisory training per 29 CFR 1910.120 (e) (4)/1926.65(e)(4)], as appropriate.

Other responsibilities include:

- Reading and being familiar with the Project SHSP, as well as appropriate IT Policies and Procedures;
- Directing work so as to ensure personnel safety and protection of property and the environment;
- Presenting tailgate safety meetings (a responsibility shared with the SHSO);
- Providing all required safety supplies to work crews prior to each task;
- Demonstrating a personal commitment to safety on the project;
- Observing project personnel for signs of chemical or physical trauma;
- Conducting jobsite safety audits with the SHSO at least weekly;
- Immediately notifying the SPM and Program CIH upon receiving notice of any jobsite inspection by a regulatory agency;

- Correcting any hazards disclosed by project workers or the SHSO;
- Rendering appropriate disciplinary action to individuals who do not strictly adhere to the project SHSP;
- Immediately notifying the SPM, SHSO, and Program CIH of any illnesses, accidents, injuries, or near-misses related to the project, and submitting appropriate documentation to the Program CIH with 24 hours.
- Assist the Program CIH and/or SHSO in establishing appropriate site control zones.

The Project Superintendent is Dennis Alexander. A qualified alternate supervisor will be available in case the PS is temporarily away from the jobsite (due to illness or other emergency). The qualified alternate PS that will be available on site in the absence of the PS will be the lead foreman.

2.5 Site Health and Safety Officer

The Site Health and Safety Officer (SHSO) will represent the Program CIH on-site during field activities. As such, he/she will be responsible for providing independent surveillance of the routine implementation of the project SHSP. The SHSO may not, however, authorize changes to or variances from the SHSP. Any modifications of the project SHSP must be approved by the Program CIH with the written concurrence of the Contracting Officer.

Other duties of the SHSO include:

- Immediately stopping work if Immediately Dangerous to Life or Health (IDLH) or other extremely hazardous conditions are encountered.
- Verifying that all personnel have the necessary training and medical clearance prior to entering the site;
- Identifying all site personnel with medical restrictions to the PS;
- Determining that monitoring equipment is properly calibrated and used, and that results are properly recorded and filed;

- Informing the Program CIH of significant changes in either the environment or work procedures which may require modification of the SHSP;
- Observing work party members for symptoms of on-site exposure or stress;
- Overseeing implementation of the SHSP, reporting any deviations from the Plan to the PS and the Program CIH;
- Immediately notifying the PS of any unsafe conditions observed, and providing technical guidance to the PS for the correction of the condition;
- Recording daily maximum and minimum temperatures;
- Conducting employee exposure monitoring for workplace contaminants, noise and/or heat stress as outlined in Section 8;
- Monitoring the use of required protective clothing and safe work practices;
- Assisting the Project Administrator in purchasing safety-related equipment;
- Determining and posting routes to capable medical facilities and emergency telephone numbers (including poison control facilities), and arranging emergency transportation to medical facilities;
- Notifying local public emergency officers of the nature of the operations, and posting of their telephone numbers in an appropriate location;
- Conducting and documenting required project specific training;
- Conducting job site safety audits at least daily;
- Ensuring that training and medical records are maintained on-site for all IT and subcontractors personnel;
- Monitoring project personnel to ensure ongoing compliance with the SHSP;
- Assisting the PS in establishing appropriate Work Zones;
- Presenting tailgate safety meetings (a responsibility shared with the PS) and maintaining attendance records;
- Monitoring that decontamination procedures are meeting established criteria;

- Acting as Project Hazard Communication Coordinator as required by 29 CFR 1910.1200 or in California T8CCR 5194;

- Responding to employee's/contractor's health and safety concerns; and

- Periodically auditing subcontractor qualifications to ensure only properly qualified personnel are allowed in the work area.

- Ensure employees are trained on the hazards of any hazardous substances used. MSDSs must be on-hand for all hazardous materials (other than wastes) and containers must be properly labelled;

- Ensure that project safety equipment is inspected regularly (monthly for fire extinguishers).

The Site Health and Safety Officer (SHSO) for this field work is Jim Truman. The SHSO shall designate another qualified project worker as to serve as alternate SHSO during periods when the SHSO cannot be on site (due to illness or other emergency). This person has been tentatively identified as Joel Brown.

2.6 Subcontractor Management and Personnel

Subcontractor management is responsible for the compliance of their personnel with this Project SHSP. Since subcontractors are hired for their specific expertise, they must assume primary responsibility for the health and safety of their personnel. The subcontractor's Field Supervisor or Crew Leader will also be responsible for performing a weekly safety inspection of their operations. A copy of this inspection must be submitted to the PS each week. The subcontractor's Field Supervisor must have successfully completed 8 hours of Supervisory training per 29 CFR 1910.120 (e)(4)/1926.65(e)(4) or in California T8CCR Section 5192(e)(4) if the subcontractor personnel will be performing work within either the Exclusion Zone (EZ) or Contamination Zone (CRZ).

Subcontractors must also:

- Comply with all applicable Occupational Safety and Health Administration (OSHA) regulations as defined in Title 29 Code of Federal Regulations Parts 1910 and 1926 or in compliance with applicable Cal/OSHA standards, found in Title 8 of the California Code of Regulations (T8CCR), as well as the United States Army Corps of Engineers "Safety and Health Requirements Manual" (EM 385-1-1).

- Perform all work in accordance with this SHSP.

- If work will be performed in the EZ or CRZ, provide documentation for each on-site worker of successful completion of either 24 or 40 hours training (depending on the work to be conducted) in health and safety practices for hazardous waste operations per 29 CFR 1910.120/1926.65 or in California T8CCR 5192. This must be received prior to the employee arriving on-site.

- For work in the EZ or CRZ, provide documentation for each on-site worker of a doctor's approval for the worker to perform hazardous waste remediation work based on an annual medical exam and work history review prior to the worker arriving on site.

- Provide updated documentation as on-site individuals complete annual HAZWOPER refresher training and/or receive annual medical examinations for workers entering the EZ or CRZ. Such documentation must be provided prior to the expiration date of the previous year's training/physical examination.

- Provide their own basic personal protective equipment (including safety boots, safety glasses, hard hats, and the like).

- Report all incidents/accidents/injuries/near-misses immediately to the PS. Provide input to IT's investigation of any mishap or near miss. Provide documentation to IT of the subcontractor's internal investigation of the mishap/near miss.

- Provide proof of additional (non-HAZWOPER) training upon request (e.g., documentation of forklift training).

- Submit to the Program CIH a task-specific hazard analysis for their anticipated work.

- Provide awareness level training to affected IT workers regarding any material, equipment or operation which may pose a hazard to the IT employees.

- Provide a Material Safety Data Sheet (MSDS) to IT for all materials used on the project which are regulated by the Hazard Communication Standard (29 CFR 1910.1200) or in California T8CCR 5194. MSDSs shall be approved by IT Corporation prior to the material being brought on site.

- Notify IT in writing prior to bringing any radioactive materials or devices (e.g., nuclear density gauges) onto the jobsite. Such notification must identify by name the subcontractor's Radiation Safety Officer and list the company's radioactive material license number.

- Provide own first aid kits and first aid trained individual.

- Submit personnel to "reasonable cause" drug and alcohol testing when directed to do so by the Senior Project Engineer/Manager (in accordance with IT Policy HS101). Results of such testing are to be provided to IT Corporation immediately upon receipt.

- Remove any worker from the project who tests positive for either drugs or alcohol.

- Have in place an active and effective Drug free Workplace Program in compliance with the Federal Drugfree Workplace Act.

- Provide written notification to subcontractor's own employees of the results of any industrial hygiene monitoring conducted by IT on those employees.

- Immediately inform the IT Project Superintendent of the presence, or anticipated presence, of regulatory agency officials at the jobsite. Provide documentation to IT of any citations or notices of violation issued to the subcontractor for work on, or associated with the project. Such documentation shall include a copy of the written citation and a summary of the subcontractor's corrective action plan.

2.7 On-Site Personnel and Visitors

No visitor will be allowed within the Work Zones without authorization from the SPM and the PS. Visitors requesting authorization to enter the Contamination Reduction Zones (CRZs) or Exclusion Zones (EZs) must meet the requirements established for Project Personnel, including appropriate medical exams and training. On-site Navy personnel will also be held to these requirements.

3.0 Project Hazard Analysis

3.1 Scope of Work

The general scope of the removal actions for each site under this delivery order is presented herein. More detailed information on the removal actions is presented in the Work Plans prepared for these sites.

The removal activities at Site 49 include the following:

- Delineation of buried pipes and underground utilities
- Cleaning and removal of concrete wastewater settling structures
- Excavation, cleaning, and removal of identified underground piping
- Excavation and disposal of pond sludges and soil
- Backfill of excavated area with imported fill soil
- Disposal of settling structure concrete, sludges, wash water, and pond liner materials.

Removal activities at Sites 13, 31, and 32 have not been finalized. Following approval by the appropriate agencies, an addendum to this SHSP will be prepared which documents the removal activities by site.

3.2 Activity Hazard Analysis

The activity hazard analysis identifies potential safety, health, and environmental hazards and provides for the protection of personnel, the community, and the environment for each task to be performed. Because of the complexity and constant change of remediation projects, supervisors must continually inspect the work site to identify hazards which may harm site personnel, the community, or the environment. The PS must be aware of these changing conditions and discuss them with the SPM and the Program CIH. The Project PS will keep supervisors for subcontractors informed of the changing conditions. Changes to the activity hazard analysis may be originated by the SHSO, but must be approved by the

Program CIH. Appendix D contains an activity hazard analysis for each major task associated with this project and is supplemented by the following sections.

3.2.1 Materials Handling

Loading and unloading materials and setting up and dismantling equipment presents a variety of hazards. These include cuts, abrasions and lacerations from sharp objects; back injuries from poor lifting techniques; crushing injuries from falling or moving loads; pinch points; and being struck by moving equipment or loads.

Site operations shall be organized to minimize the amount of drum and container movement. All employees involved in the transfer of drums or containers shall be warned of the potential hazards associated with the contents of the drums or containers during tailgate safety meetings prior to beginning transfer operations. Tailgate safety meetings should also include information on safe handling techniques, including:

- Proper lifting techniques;
- Procedures and equipment used to minimize sources of ignition during transfer operations; and
- Positioning of drums and containers to minimize obstruction of the work site.

Employees are not to stand upon or work from drums or containers at any time.

U.S. Department of Transportation (DOT) specified salvage drums or containers and suitable quantities of proper absorbent shall be kept available and utilized in areas where spills, leaks or ruptures may occur. Drums or containers that cannot be moved without rupture, leakage or spillage shall be emptied into a sound container using a device classified for the material being transferred.

3.2.2 Vehicle Traffic

The project worksite is located within an active military base with both industrial and personal vehicle traffic nearby. Work in such areas presents a risk of being stuck by a vehicle. Collisions between vehicles are also possible unless safe driving practices are used.

All IT employees who will be driving restricted-visibility vehicles (e.g., trucks, vans and pick-ups) at the project site shall have successfully completed IT's Safe Driver Training Course. Vehicle operators will check carefully for nearby traffic before proceeding at a cautious pace on facility roadways. Unless otherwise marked, speeds should be held to 15 mph or less while on site.

Care should be taken to ensure that trucks, equipment and materials are placed in a manner that keeps obstruction of local traffic to a minimum. During work activities, it may become necessary to move equipment in order to accommodate traffic and site activities.

Workers on foot should not wander into the active roadways. If work in active traffic areas is required, workers will wear bright orange safety vests, and the work area will be marked with lighted barricades, cones or flags to warn traffic.

Where traffic control is necessary, base representatives will be contacted to ensure minimal disruption of base activities. When the base cannot provide traffic control officers, project workers will do so using high visibility road vests, hand-held stop signs and traffic cones.

3.2.3 Maintenance/Troubleshooting

Equipment and machinery maintenance and troubleshooting work can expose project workers to contaminated materials and other hazards. Troubleshooting electrical and mechanical equipment can expose workers to shock hazards, and crushing or pinch hazards.

Whenever employees or subcontractors are working on equipment or in areas where the activation of the equipment or the charging of hazardous materials lines might endanger the worker's safety, lockout and tagout procedures (IT Policy HS315) are required. Should the project extend more than 30 days with lockout/tagout planned for more than seven calendar days, or when locking/tagging out specialized equipment having its own lockout requirements, the Program CIH shall be notified for an addendum to this SHSP.

General Lockout/Tagout Requirements

Lockout and tagout procedures are required during maintenance of powered tools or equipment, during valve changeouts and other work on hazardous waste or materials lines, and during confined space entries. Other tasks may also required lockout and tagout

procedures if use of nearby equipment or material transfer lines could harm employees. The requirements of lockout and tagout include:

- Locks and tags are to be used when a machine, equipment or piping system is capable of being locked out. Tags alone are allowed only when the equipment will not accept locks.

- Authorized padlocks shall be assigned to each authorized employee. Each group's lock will be individually keyed and the shift supervisor shall maintain the master keys.

- All new equipment installed must be designed to accept a lockout device.

- Where multiple items must be locked out, a group lock box must be used.

- Where multiple locks must be placed on an item, a multiple lock hasp must be used.

- Only the protected employee may remove his/her personal lock. When the employee is no longer present and the lock must be removed, only that employee's immediate supervisor may remove the lock and tag, and only after ensuring that the employee is out of harm's way.

- All locks must be accompanied by a tag indicating the name of the employee applying the lock, the date the lock was applied, equipment name or number, the reason for the lockout and a warning against the potential hazard of activation.

- A legend must be displayed warning against activation and stating that the lock and tag may be removed only by authorized personnel.

- Tags must be single-use, hand-attachable, legible and designed to withstand the environment where they are in use. Tags must be self-locking and non-releasable with a minimum unlocking strength of 50 pounds.

- A "Lockout Log" (HS315 Attachment 3) shall be maintained by the site supervisor as part of the SHSP.

- The SPM or PS is responsible for informing the client of the lockout/tagout procedure to be used at the jobsite. This must be documented on Field Activity Daily Logs (FADLs).

- Subcontractors are to use IT's lockout/tagout procedure. Their own procedure may be used only after it has been reviewed and approved by the Project CIH.

- If the client has their own lockout/tagout requirements, these shall be implemented only after IT's requirements have been met.

- The SPM and PS shall assure that locks, hasps and other equipment and site specific training are provided.

Lockout/tagout procedures are not required when work is conducted on equipment where an employee has direct control over the cord(s) or plug(s) connected to the associated equipment.

Lockout/Tagout Checklist

Where lockout/tagout procedures are required, the following steps shall be followed:

- Check equipment file for specific lockout/tagout procedures.

- Determine the requirements for lockout. Document each energy source to the equipment.

- Conduct a survey to locate and identify all isolation devices that apply to the equipment.

- Use the equipment type-specific procedures if applicable (HS315 Attachments 4-7). Complete the "Lockout/Tagout Procedure for Specific Equipment" form (HS315 Attachment 8), logging all data, and return to supervisor.

- Shut off energy source(s) to affected equipment.

- Affix lock(s) and tag(s) to each energy source controlling the device.

- Identify work on process lines or vessels and determine isolation requirements.

- Blind, blank, disconnect or double-valve and vent all hazardous materials lines (including steam). Identify isolation points with tags.

- When a tag only is used because the equipment can't be locked out, complete the following:

  - Remove fuses, block machine, etcetera.
  - Complete HS315 Attachment 8 and give to site supervisor.

- Relieve all stored energy (e.g., capacitor banks, springs, compressed air, hydraulic and steam).
- Verify that isolation of energy has occurred by attempting to activate equipment at the on/off switch.
- Return the control switch to the off position before proceeding.

Before returning any equipment to service following lockout and tagout, the following procedures are required:

- Ensure that all nonessential items (e.g., tools and cleaning rags) are removed from the equipment.
- Ensure that equipment components are intact.
- Check work area to ensure that all employees are safely positioned or removed from the area.
- Notify all affected employees and site supervisor before re-energizing the equipment.
- Remove lockout/tagout device.
- Re-energize equipment or open valves and restore flow in process line; place back into service.

Where equipment must be locked out for longer than one work shift, the individual lock(s) of the outgoing shift working on equipment will be removed and replaced by the on-coming shift's individual lock(s). The authorized employees of the on-coming shift must inspect and "try" the system to ensure de-energization. The site supervisor shall re-audit the system as necessary.

3.2.4 Hand Tools

Use of hand tools may expose workers to cuts, lacerations or puncture wounds if inadequate hand protection is worn or tools are improperly stored. Damaged hand tools may also expose employees to injuries from shattered tools and flying debris.

The following safe work practices apply to the use of hand tools:

- Only use a tool for its designed use.
- Do not use damaged tools.
- Driving faces of hammers, chisels, drift pins, bars, and similar tools must be inspected to eliminate mushroomed heads, broken faces and other defects.
- Tools must be returned to their proper storage place.
- Sharp tools must not be carried in pockets.
- Wood handles must be sound and securely wedged or fastened to the tool. Tape must not be used to cover defects such as cracks.
- When hand tools are being used overhead, those working or standing below must be notified.
- Pipe wrenches must be inspected regularly. Replace the heel and jaw sections if found to be defective or worn out.
- Pipe wrenches must not be used to bend, raise or lift pipe.
- Always wear safety glasses to protect the eyes.

3.2.5 Power Tools

Power tools present many potential hazards, including shock and electrocution, injuries from accidental activation and injuries from using damaged or malfunctioning equipment.

When using power tools, the following precautions shall be followed:

- Power tools will be inspected and their operation tested prior to being placed in service.
- Eye protection (safety glasses or goggles) must be worn whenever operating power tools.
- Power tools must be grounded or of the double-insulated type.
- Power tools shall not be used in wet locations.
- All power tools must be protected by a Ground Fault Circuit Interrupter (GFCI).

- Splicing, cutting or "repairing" electrical wire by unauthorized personnel is prohibited.

- Plugs and cords must be protected from damage.

- Grounding plugs are never to be removed.

- Electrical tools are not to be used inside a confined space without prior approval by the SHSO or Program CIH.

- All electrical tools must be turned off before connecting or disconnecting the power supply.

- Extension cords must be visually inspected each time they are used. Cords must be disconnected from the power source before coiling for storage.

- Extension cords used with portable electric tools shall be of three-wire type and shall be rated for hard or extra-hard usage (Types S, ST, SO, STO, SJ, SJO, SJT, or SJTO).

3.2.6 Use of Torches

Personnel using torches may be exposed to metal fumes and burns from hot equipment or the torch itself. Operating torches increases the potential for fires and also presents an explosion hazard. Additionally, the use of torches exposes nearby personnel to potential eyesight damage.

To prevent injuries and fires, the following rules apply to the use of torch.

- Any use of a torch requires that an IT Hot Work Permit be completed in accordance with IT Procedure HS314 "Hot Work in Hazardous Locations" and posted in the immediate area. The Base Fire Department must also be contacted for any required Base Hot Work Permits.

- No cutting or welding is allowed when combustible vapor concentrations exceed 10 percent LEL.

- All combustibles (including plastic sheeting) in the area must be removed or protected from sparks, flames and/or slag.

- A designated fire watch with a charged fire extinguisher rated 5A: 30 BC (minimum) must be in the immediate vicinity during all hot work. The fire watch must remain after hot work completion to check for flare-ups.

- Hot work is not allowed inside any confined space without prior approval of the SPM and Program CIH.

- Torch operators must wear, at a minimum:
  - nonflammable gloves with gauntlets
  - steel-toed work boots
  - leather aprons and shirts with sleeves and collars
  - hard hats
  - properly shaded eye protection
  - respiratory protection (see Chapter 5.0)
  - hearing protection.

- Torches will be lighted using sparking devices not by open flames.

- Flash screens must be provided to protect the eyes of bystanders.

- Fuel gas and oxygen hoses must be distinguished from each other.

- Couplings must not disconnect by means of a straight-pull motion.

- Oil or grease must never come in contact with oxygen equipment.

- Never use leaking equipment.

- Never use oxygen from a system without a pressure regulation device.

- Gas cylinders must be protected against heat.

- Gas cylinders must not be placed where they might form a part of any electrical circuit.

- Backflow preventors must be used on all oxygen and fuel gas supply lines.

- Gas cylinders in service must be secured upright and placed so they will not fall or be knocked over.

- Gas cylinders must be handled in suitable cradles with valve caps installed; they must never be lifted by magnet, rope, or chain.

- Oxygen cylinders in storage must be separated from fuel gas cylinders a distance of 20 feet or by a noncombustible barrier 5 feet high.

- Valve stem wrenches must be left in place while cylinders are in use.

3.2.7 Confined Space Entry

Certain tasks required under this project may require entry into a confined space. A confined space is defined as an enclosure which is large enough for an employee to enter, but which has limited means of access and egress and is not designed for continuous employee occupancy. All confined spaces are initially considered permit required.

A permit-required confined space is a confined space as defined above which also contains one or more health and/or safety hazards. This can include chemical, mechanical, electrical, or other hazards.

Access to the sumps and all work within them must be conducted in accordance with IT Policy HS300, "Confined Spaces, Industrial." Key provisions of this policy include:

- Combustible gas and oxygen levels shall be measured at the confined space opening and inside the confined space prior to entry and continuously during occupancy. The person conducting the monitoring must have completed IT's Qualified Person (QP) training.
- Oxygen levels must be at least 20 percent at all times during occupancy.
- Combustible gas readings must not exceed 10 percent of the LEL at any time during occupancy.
- A confined space entry permit must be completed, reviewed, and approved by the SHSO and posted outside the confined space entrance prior to entry.
- The entrant must have successfully completed Confined Space Entry training. Training records will be maintained on-site.
- At a minimum, modified Level D protection must be worn by all confined space entrants.
- An attendant trained in Confined Space Entry shall be posted outside the manhole entrance at all times during occupancy and shall remain in contact with the entrant. A second attendant must be nearby.
- Communications signals shall be established prior to entry. See Section 12.3.
- All confined space entry must be supervised by a QP on site.

- All appropriate lockout/tagout procedures must be implemented prior to entry and must remain in effect until operations inside the space have been completed.

- Additional requirements regarding confined space entry are found in IT Policy HS 300 and in the USACE Safety Manual. Copies of both of these documents must be maintained on-site and enforced by the SHSO.

- The China Lake Fire Division has authorized confined space rescue personnel. The Fire Division has been specifically trained for confined space rescue. This information will be included in all Confined Space Entry permits. Information regarding confined spaces can be obtained by contacting the Naval Air Weapons Station, China Lake Confined Space Program Manager at (619) 939-2781.

3.2.8 Noise

Some of the equipment used on the project generates loud noise. Exposure to sound levels above 85 dBA can cause temporary impairment of hearing. Prolonged and repeated exposure to sound levels above 85 dBA can cause permanent hearing damage. The risk and severity of hearing loss increases with the intensity and duration of the exposure. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of incidents.

All on-site IT and subcontractor personnel shall wear hearing protection, with a Noise Reduction Rating (NRR) of at least 25, when noise levels exceed 85 dBA (or wherever voices must be raised in order to be understood at arms length). The SHSO will perform sound level monitoring or noise dosimetry on operations which require hearing protection. All site personnel who may be exposed to noise shall also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss, in accordance with IT Procedure HS402.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, wherever possible, barriers or increased distance will be used to minimize worker exposure to noise.

Blasting or use of explosives is not permitted without written permission from the Navy's Contracting Officer and the Program CIH, and then only during designated times.

3.2.9 Heat and Cold Stress

3.2.9.1 Heat Stress

Wearing personal protective equipment (PPE) can put site personnel at considerable risk of heat stress and heat related illnesses if proper precautions are not implemented. Heat related illnesses range from transient heat fatigue to heat stroke and death. Heat related illnesses are caused by a number of interacting factors which include environmental conditions, clothing, work load, and characteristics of the individual worker.

Individuals vary in their susceptibility to heat stress. Factors that influence an individuals tolerance for heat include physical fitness, diet, alcohol/drug use, sleeping habits, acclimation, genetics, medical condition, age and weight.

The signs of heat stress disorders are given below.

Heat Cramps. Heat cramps are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include muscle spasms and pain in the hands, feet and abdomen.

Heat Exhaustion. Heat exhaustion occurs from increased stress on various body organs. Signs and symptoms include:

- Pale, cool, moist skin;
- Heavy sweating;
- Dizziness, nausea; and/or
- Fainting.

Heat Stroke. Heat stroke is the most serious form of heat stress and should always be treated as a medical emergency. The body's temperature regulation system fails, and the body temperature rapidly rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Take person to a shower or cool bath or use ice packs. Monitor for drowning potential if the victim is cooling down in a bath tub

or any type of container with enough water to drown if unconsciousness develops. Do not give anything to drink in case person vomits. Signs and symptoms of heat stroke include:

- Red, hot unusually dry (sometimes moist) skin;
- Lack of, or reduced perspiration;
- Nausea;
- Dizziness and confusion;
- Strong, rapid pulse and/or
- Coma.

Sunburn. Operations will require IT and subcontractor employees to work outside during daylight hours, typically seven to nine hours per day. Under these conditions, workers are at great risk for developing sunburn on unprotected skin.

Sunburn is a burn to the skin caused by overexposure to ultra-violet light (sunshine). The symptoms of exposure are not usually apparent until two to four hours after the exposure ceases. Depending upon the severity of the exposure the symptoms can range from reddening of the skin accompanied by mild discomfort, to painful deep burns and blisters. Although light-haired, fair-skinned, blue-eyed personnel are at the greatest risk of sunburn, all complexion types can develop sunburn if the exposure is long and intense enough.

Sunscreen products with sun protection factor ratings of 15 or higher will be available to project personnel. Areas or primary concern include; nose, cheeks, ears and the back of the neck. Sunscreen will be applied as necessary and reapplied after each break.

Prevention

Heat stress is a major hazard to personnel working in impermeable protective clothing. Therefore, measures will be taken in preventing heat stress, including:

- Site workers will be encouraged to drink plenty of water throughout the day. Each worker should drink at least 16 oz. of water before going on site regardless if they are thirsty or not.

- On-site drinking water will be kept cool to encourage personnel to drink frequently.

- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion and heat cramps.

- All employees shall be informed of the importance of adequate rest, acclimation and proper diet in the prevention of heat stress disorders.

- Work/rest schedules will be adjusted by the PS and SHSO to account for the acclimatization of workers upon first encountering heat stress conditions.

- Workers will be instructed to limit their intake of alcohol during hot weather, as alcohol inhibits the body's ability to handle heat by causing dehydration.

One or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measured immediately prior to rest period) in excess of 110 beats per minute:

- A work regimen that will provide adequate rest periods for cooling down will be established, as required.

- Cooling devices such as vortex tubes or cooling vests must be used when personnel must wear impermeable clothing in conditions of extreme heat.

- Employees must be instructed to monitor themselves and coworkers for signs of heat stress and to take additional breaks as necessary.

- A shaded rest area must be provided. All breaks must take place in the shaded rest area.

- Employees shall not be assigned to other tasks during breaks.

- Employees shall remove impermeable garments during rest periods. This includes white Tyvek-type garments.

Monitoring Program

For each day of field operations, the daily maximum and minimum temperatures on-site will be recorded. Additional heat stress monitoring shall be initiated by the SHSO whenever ambient temperatures on site exceed 85°F (or 70°F when workers are wearing impermeable clothing). At the discretion of the Program CIH, environmental and/or physiological monitoring will be carried out. Environmental monitoring shall consist of the determination of Wet Bulb Globe Temperatures (WBGTs) when ambient temperatures exceed the values listed above. Physiologic monitoring may consist of pulse rate and/or

body temperature determinations. Monitoring and interpretation of monitoring results will be in accordance with IT Procedure HS400, "Working in Hot Environments."

Reporting

Individuals experiencing the symptoms of heat stress shall notify the PS. The distressed individual shall immediately halt field activities and be treated for heat stress. Early detection and treatment of heat stress will prevent further serious illness or injury and lost work-time. Proper and effective heat stress treatment can prevent the onset of more serious heat stroke or exhaustion conditions. Individuals having progressed to heat exhaustion or stroke become more sensitive and predisposed to additional heat stress situations. Regardless of ambient temperature, physiological monitoring will be implemented if heat stress is experienced.

If symptoms of heat stress are observed, the following procedures will be implemented:

- Instruct the affected person to lie down in a cool, shaded area or air-conditioned room and elevate feet. Abbreviated decontamination procedures may be followed.

- Summon medical support, if appropriate. This is required in all cases of heat stroke or unconsciousness.

3.2.9.2 Cold Stress

Cold stress is not anticipated to be encountered during the execution of this project. If cooler than expected conditions are encountered (e.g. $\leq$ 45 °F) during the work hours, a revision to this SHSP will be developed. However, workers should be aware that most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a fall in the deep core temperature of the body.

In the event that the weather becomes unusually cold (temperatures below 45 °F) project workers should be protected from exposure to cold so that the deep core temperature does not fall below 36 degrees Celsius (°C). Lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

Due to the moderate climate at the job site, cold stress is not a serious concern; however, all personnel must be aware that prolonged exposure to cold without proper clothing may impair their ability to work safely. To prevent such occurrence, the following measures must be implemented:

- Project workers must wear warm clothing, such as mittens, heavy socks, etc., when the air temperature is below 45°F. Protective clothing, such as Tyvek or other disposable coveralls, may be used to shield employees from the wind.

- When the air temperature is below 35°F, clothing for warmth, in addition to chemical protective clothing, shall be worn by employees. This should include:

  - Insulated suits, such as whole body thermal underwear
  - Wool socks or polypropylene socks to keep moisture off the feet
  - Insulated gloves
  - Insulated boots
  - Insulated head cover such as hard hat, winter liner, or knit cap
  - Insulated jacket, with wind and water resistant outer layer.

- At air temperatures below 35°F, the following work practices must be implemented:

- If the clothing of a site worker might become wet on the job site, the outer layer of clothing must be water impermeable.
- If a project worker's underclothing becomes wet in any way, the worker must change into dry clothing immediately. If the clothing becomes wet from sweating (and the employee is not uncomfortable), the employee may finish the task at hand prior to changing into dry clothing.
- Project workers must be provided with a warm (65°F or above) break area.
- Hot liquids such as soups or warm, sweet drinks shall be provided in the break area. The intake of coffee and tea should be limited, due to their circulatory and diuretic effects.
- The buddy system shall be practiced at all times on site. Any site worker observed with severe shivering shall leave the work area immediately.
- Project workers should dress in layers, with thinner lighter clothing worn next to the body.
- Project workers should avoid overdressing when going into warm areas or when performing strenuous activities.

- Employees handling liquids with a high vapor pressure, such as gasoline, methanol, or hexane, shall take special precautions to avoid soaking of gloves and clothing with those materials.

3.2.10 Fire Prevention

During dry weather, the potential for fire exists in any unpaved grassy perimeter regions of the site. Where VOC levels are high, both a fire and explosion hazard exist. Sparks from operating equipment, or even contact with hot catalytic converters can cause ignition.

Smoking or open flames including matches or lighters are prohibited in Site 49 except in designated smoking areas specified by the NAWS China Lake personnel. Vehicles and equipment will not be left idling or parked in or around areas where catalytic converters may cause a fire. Equipment and vehicles should stay on the paved areas.

All flammable liquids will be stored in Underwriters Laboratory (UL) or Factory Mutual (FM) approved storage cabinets. Small quantities of most flammable liquids (five gallons or less) may be stored in work areas, or carried in vehicles, providing those materials will be used that day and will be contained in a safety can or other approved container. Class IA flammable liquids should be limited to two gallons in an approved safety can. Any flammable wastes will be stored or disposed of in metal containers, clearly marked as containing flammable materials. Storage of combustible materials, in work areas, will be kept to a minimum.

Portable dry-chemical fire extinguishers must be provided to each project site as follows:

MINIMUM RATING	REQUIRED LOCATION
1A, 5BC	Each Company Owned or Leased Vehicle
2A, 10BC	Each Trailer
2A, 20BC	Each Fuel-dispensing Vehicle
3A, 40BC	Solvent Storage Areas

Portable fire extinguishers shall be inspected monthly, and serviced at least annually by a person licensed or registered by the State Fire Marshal.

Within occupied trailers, only UL approved electrical extension cords may be used. When outdoors, only double insulated or grounded electrical power tools may be used.

An IT Hot Work permit must be completed and posted prior to any hot work (such as welding or cutting) on site, including hot work performed by subcontractors. The NAWS China Lake Fire Department must also be contracted to determine if other permits are required prior to hot work.

In case of a fire on the site, the PS or the SHSO will assess the situation and determine the proper response. All personnel NOT trained in the use of fire extinguishers shall evacuate the area involved. Only IT personnel trained in the use of extinguishers may attempt to extinguish the fire with available extinguishers, if safe to do so. If these trained employees do not wish to make the attempt, they are to evacuate also. In the event of <u>any</u> fire, IT will call the Base NAWS China Lake Fire Department at the number listed in Section 12.6 and notify the ROICC immediately. Fire fighting is a job for the fire department. No property or equipment is so important as to risk an employee's life.

3.2.11 Environmental Hazards

Poisonous or stinging insects, spiders and/or snakes may be a concern for project personnel some site activities. Disease vectors, such as ticks, may also be present. Physical hazards are also posed by native vegetation in the area, including thistles and other thorny weeds.

Site workers should inspect protected areas (e.g., boreholes, pits and storage areas) prior to reaching into them or entering them in any way. Portable toilets have been the source of spider and snake bites. They should be inspected prior to each use. Stinging insects and

their nests shall be avoided wherever possible, and workers shall wear long pants and gloves if necessary to protect them from insect bites and sharp or irritating plants.

3.2.11.1 Ticks

Ticks are vectors of many different diseases including rocky mountain spotted fever, Q fever, tularemia, Colorado tick fever, and lyme disease. They attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites.

Periodically during the workday, employees will inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.

- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.

- Do not twist the tick as you pull and do not squeeze its bloated body. That may actually inject bacteria into your skin.

- Thoroughly wash your hands and the bite area with soap and water. Then apply an antiseptic to the bite area.

- Save the tick in a small container with the date, the body location of the bite, and where you think the tick came from.

- Notify the SSHO of any tick bites as soon as possible.

Recently, lyme disease has been the most prevalent type of disease transmitted by ticks in the United States.

3.2.11.2 Spiders

Black Widow spider (Latrodectus spp.) is a sedentary, web spider found in most warm parts of the world. Only the females bit, and then only if threatened or molested. The spider's perception of threat may be different than your intent. The bite may go unnoticed and may not hurt. But the subsequent severe abdominal pain from a Black Widow's bite resembles appendicitis. There is pain also in muscles and in the soles of the feet, but usually no swelling at the site of the bite. Alternately, the saliva flows freely, then the mouth is dry. The bite victim sweats profusely. The victim should be transported to the closest medical facility immediately.

Brown Spider (also known as brown recluse spider, violin spider) (Loxosceles spp.) commonly lives in houses on the floor or behind furniture. Bites occur when a spider has been disturbed. In very severe cases, a red zone appears around the bite, then a crust forms and falls off. The wound grows deeper and does not heal for several months. The spider's venom may cause destruction of red blood cells and other blood changes. The victim may develop chills, fever, joint pains, nausea and vomiting. Brown spider bite victims should be transported to the nearest medical facility immediately.

Scorpions of the family Vejovidae are common throughout Southern California. Vejovid scorpions rarely exceed 3 inches in length. Scorpions feed at night on insects and spiders that are caught with the pincers and sometimes stung. The stinger is in the tip of the tail. Vejovid scorpions burrow in the earth and are sometime found under rocks and other objects laying on the ground. Scorpions sting in self defense. Most stings are not serious, but may produce excruciating pain at the site of the sting. The victim may develop nausea and vomiting and severe abdominal pain. First aid consists of applying cold to the site of the sting and possibly a soothing lotion such as calamine. Sting victims should be transported to the nearest medical facility immediately.

3.2.11.3 Insects

Ants, bees, wasps, hornets, and yellowjackets occasionally cause death. Death from the sting of such creatures is almost always due to acute allergic reaction. The stinging apparatus and venom sac sometimes remain at the site of the sting and must be removed. Some relief from the pain can be obtained by applying cold. Soothing lotions, such as calamine may reduce itching.

If the victim has a history of allergic reactions to insect bites or is subject to attacks of hay fever or asthma, or if he is not promptly relieved of symptoms, call a physician or take the victim immediately to the nearest location where medical treatment is available. in a highly sensitive person, do not wait for symptoms to appear, since delay can be fatal.

3.2.11.4 Snakes

There are various types of poisonous snakes indigenous to the western United States. The degree of toxicity resulting form snake bites depends on the potency of the venom, the

amount of venom injected, and the size of the person bitten. Poisoning may occur from injection or absorption of venom through cuts or scratches.

The most effective way to prevent snake bites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg. No attempt at killing snakes should be made; many people are bitten in such an attempt.

If someone is bitten by a potentially poisonous snake, the following treatment should be initiated:

- Keep patient calm
- Notify emergency medical services
- Wash the wound and keep the affected body part immobile
- Apply direct pressure to site of bite if bleeding is extreme
- Keep the affected area lower than the heart
- Carry a victim who must be transported, or have him/her walk slowly
- Transport to closest medical facility.

3.2.12 Dust

Remediation and demolition activities can create airborne dust. Excessive generation of dust can limit visibility, cause irritation to workers and create airborne chemical contamination which spreads the overall extent of contamination and puts nearby unprotected personnel at risk of overexposure.

Project personnel will take all reasonable precautions to minimize the generation of dust at the worksite. Such precautions include operating vehicles in a slow and deliberate manner and working materials in a wet state whenever possible. Where dust generation exceeds the criteria stated in Table 8-1, the Program CIH will be contacted to establish an air monitoring program and dust reduction measures (up to and including misting of the dust cloud or ceasing operations) shall be implemented.

Additional dust control measures include:

- The soil may be treated with dust suppressants if necessary.
- Dry brooming and dry power brooming are prohibited. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming.
- Air blowing shall not be permitted for cleaning surfaces.
- Only wet cutting is permitted for cutting concrete blocks and concrete.

3.2.13 Slip, Trip and Fall Hazards

Poor housekeeping results in a workplace which is laden with slip, trip and fall hazards. Such accidents can cause serious injuries, including broken bones, contusions, and/or deep lacerations.

To minimize slip, trip and fall hazards caused by poor housekeeping, the following measures shall be taken:

- Work areas shall be inspected daily for adequate housekeeping and findings recorded on daily inspection reports.
- All stairways, passageways, gangways, and accessways shall be kept free of materials, supplies, and obstructions at all times.
- Loose or light material shall not be stored or left on roofs or floors that are not closed in, unless safely secured.
- Tools, materials, extension cords, hoses, or debris shall not be placed where they may cause tripping or other hazards.
- Tools, materials, and equipment subject to displacement or falling shall be adequately secured.
- Empty bags having contained lime, cement, and other dust-producing material shall be removed and properly disposed of immediately.
- Scrap lumber and debris shall be cleared from work areas and accessways.

3.2.14 Sanitation

Break Area

A designated break area shall be established in the support zone. The break area shall contain drinking water and be arranged to provide shade to workers during hot weather (›85 °F).

Potable Water

The following rules apply for all field operations:

- An adequate supply of potable water shall be provided;
- Portable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap;
- All containers used for drinking water shall be clearly marked and not used for any other purpose; and
- Disposable cups will be supplied; both a sanitary container for unused cups and a receptacle for disposing of used cups shall be provided.

Outlets for nonpotable water shall be identified to clearly indicate that the water is unsafe and is not to be used for drinking or washing. There shall be no cross connection (open or potential) between potable and nonpotable water systems. Nonpotable and potable water systems shall be physically separated so as to minimize confusion and possible cross contamination.

Toilet Facilities

A minimum of one separate toilet facility shall be provided for each 20 employees, or fraction thereof, of each sex. Such facilities may include both urinals and toilets, with the provision that the number of toilets is at least half of the minimum required number of facilities. Where there are less than five employees, separate toilet facilities for each sex are not required provided the toilet facilities can be locked from the inside and contain at least one toilet.

Toilet facilities on the site are to be kept clean, maintained in good working order and provided with an adequate supply of toilet paper. Toilets are to be placed only in cleared

areas to reduce the chance of becoming home to biting reptiles, insects, spiders, etc. The toilet should be inspected before each use.

Food Handling and Storage

There shall be no handling of food in the contaminated work areas of the work area. Food may be stored in refrigerators, however, those refrigerators may only be used for storage of foods, and beverages. Refrigerators used for sample or chemical storage should be clearly marked as such.

Trash Collection

Trash generated by project personnel will properly be disposed of in trash receptacles. These receptacles will be emptied regularly.

3.2.15 Use of a Nuclear Density Gauge

Soil density testing may be conducted using a nuclear density gauge. A nuclear density gauge is an electronic instrument which uses a small amount of radioactive material to measure the density and moisture of construction materials. The Cesium-137 (Cs-137) source capsule is in a holder threaded and adhered in the base of the gauge. The Americium-241/Be (Am-241) source is within the gauge and cannot be reached without disassembly of the gauge.

The radioactive material used in the gauge is in a dual sealed source capsule. This means it is inside of a stainless steel capsule which is sealed by welding, and inside of a second stainless steel capsule which is sealed by welding. There is little possibility that the radioactive material will escape. Current source construction techniques are to deposit the Cesium-137 into a ceramic material and fire it. If a source constructed in this manner was breached, the radioactive material may break or chip, but it would not be in a dust form. The use of a ceramic binder would compromise the intimacy of the Americium-Beryllium mixture so the Am-241/Be is pressed into a pellet.

All use of nuclear density gauges by IT personnel must be performed in compliance with the following requirements:

- Only authorized users may operate the density gauge. An authorized user is an IT employee who has been properly trained on the use of the device and the

hazards of radiation, and who has been so designated by IT's California Radiation Safety Officer (RSO), Jim Truman at (310) 830-1781. Authorized users must carry a letter of designation from the RSO.

- The RSO shall be notified of the planned use of the gauge at least two weeks prior to gauge use so that state nuclear license reciprocity arrangement maybe made for use of the gauge on a federal facility.

- The RSO will notify the Radiological Health Branch of the State Department of Health Services regarding the transfer of gauges, and will maintain all records as required by the license and the regulations.

- The SHSO will assure that gauges are stored and secured in an appropriate area.

- All use of the nuclear density gauge shall be in compliance with IT Corporation's Radiation Safety Plan, and each user shall have read and reviewed a copy of this plan.

- At no time is the operator to leave the equipment unattended while out of its storage case, or in the possession of an unauthorized person.

- Keep all unauthorized persons out of the immediate operating area (at least 5 feet away).

- The operator must verify that the gauge has had leak test measurements at the proper interval.

- When not being used for field measurements the gauge will be placed in the "SAFE" position and returned to its storage case.

- When using the gauge the operator will wear the personal monitoring device (radiation dosimeter) assigned. When the operator is not using the gauge, the monitoring device will be kept in a low background, low heat area.

- During transportation the gauge shall be fully secured in the transporting vehicle and located away from personnel. When transported in a closed vehicle (car or van), the case will be locked and the vehicle will be locked when the operator is not with the vehicle. When transported in an open bed vehicle (pickup truck), the case will be locked and the case securely fastened and locked to the truck bed when the operator is not with the vehicle. The gauge will only be transported in an approved DOT shipping container with all the required labels and marking. The authorized user will inspect the shipping

case to assure that it is physically sound and that all closure devices (hinges, hasps, latches, etc.) are properly installed, secured and free of defects.

- No one shall attempt to repair, modify or open the sealed source under any circumstances.

- The operator shall examine the integrity of the shutter of the gauge prior to sue. If shutter integrity is in question, do not operate the gauge and notify the RSO.

- When field testing is complete the gauge will be returned to its place of storage as soon as possible.

- At all times, operators will observe as low as reasonably achievable (ALARA) principles to minimize any dose received. This may include: being near the equipment only when necessary, standing away from the equipment when possible during operation, always have base pointed away from body.

- The following documents will be with the equipment storage case at all times (except as required during transport of the gauge):

  - Copy of the License,
  - Copy of authorization letter/card from RSO,
  - Copy of the Gauge Operations Manual,
  - Copy of the current Leak Test Certificate,
  - Copy of the current Transit Case Certificate.

- All personnel using the gauges will be assigned a personal monitoring device (dosimeter) as determined by the RSO. These will be either a film badge which is exchanged monthly, or a thermoluminescent dosimeter which is exchanged quarterly. The badge will be returned to the RSO at the designated time. Badge loss must be reported immediately and supported by a memo to the RSO which includes date of incident, persons involved, description of the incident, and measures taken to prevent a reoccurrence.

- All radioactive material/equipment will be stored in the designated area only. Equipment will be locked in its case while not in use. The storage area will be locked at all times and key access authorized for operators only. Regulation requires that the storage area meet the following:

  - Storage locker or separate room with a minimum of 10 feet from any permanent work station;

  - Security against unauthorized removal with key/combination lock control;

- Signs posted which state:

  1. "CAUTION RADIOACTIVE MATERIAL"

  2. Notice to Employees (Form RH-2364).

  3. Notice of where a copy of the; License, Radiation Safety Plan, and Title 17 CCR may be viewed.

- Area includes circuit for charging equipment.

While-in-transit involving over-night storage, the case should be covered so it is not visible from outside the vehicle while the operator is not present. If appropriate, the gauge should be chain locked in its case to the steering wheel in the cab of the truck.

- Any incident involving potential dispersement of radioactive material, theft or loss of the gauge must be immediately reported to the RSO.

3.2.16 Portable Electric Equipment

Various types of portable electric equipment (including portable generators, ground fault circuit interrupters and flexible cords) will be used during the course of the project. To minimize electric shock hazards, the following rules apply to these pieces of equipment.

Portable and Vehicle-Mounted Generators

All portable and vehicle-mounted generators must be grounded, except under the following conditions:

(1) The noncurrent-carrying metal parts of equipment located on the vehicle and the equipment grounding conductor terminals of the receptacles are bonded to the generator or vehicle frame, and

(2) The generator supplies only equipment located on the vehicle or the generator and/or cord - and plug - connected equipment through receptacles mounted on the vehicle or on the generator, and

(3) The frame of a vehicle-mounted generator is bonded to the vehicle frame, or

(4) The generator is single-phase, portable or vehicle-mounted, rated not more than 5 KW, and the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces.

Ground Fault Circuit Interrupters

Ground fault circuit interrupters shall be used on all electrical power lines used at the project site. The ground fault interrupter shall be placed as close to the power source as feasible in each case.

Flexible Cords

Flexible cords and cables shall be protected from accidental damage. Sharp corners and projections shall be avoided. When passing through doorways or other pinch points, protection shall be provided to avoid damage.

3.2.17 Other Safe Work Practices

- Horseplay is not permitted at anytime on the job.
- Workers shall not use equipment on which they have not been trained.
- Eating, drinking, taking of medications, smoking and applying cosmetics are allowed only in clean areas.

3.3 Hazardous and Toxic Materials

This section discusses the hazards associated with materials that are anticipated to be encountered during site removal activities. The Program CIH will update this section as information developed during this project warrants.

Hazard and Toxic Materials - Site 49

Available analytical data for sludges present in the settling structures and ponds are presented as Table 3-1A and 3-1B of the Site 49. These data show the presence of volatile organic compounds, semi-volatile organic compounds, metals, and explosive compounds in varying concentrations. Clay and earth liner materials within each pond may contain some or all of these compounds.

Table 3-1A and 3-1B contain the maximum concentrations of all health significant contaminants detected in pond sludge and sump sludge samples, respectively.

Health effects along with routes of exposure for health significant site contaminants are detailed in the following paragraphs:

Lead - Lead has no local toxic effects. Systemic poisoning symptoms are nonspecific: fatigue, headache, poor sleeping, aching bones and muscles, constipation, abdominal pains, and decreased appetite. All these symptoms are reversible with time away from exposure. Continued exposure results in anemia, pallor, "lead line" on the gums, and decreased hand grip strength. Lead also has central nervous system effects and has been implicated in producing learning deficiencies in exposed children. Compounds of lead display a variety of toxic effects that are more specific to the compound than the lead. Some of these compounds have been found to be carcinogenic in experimental animals.

Trichloroethylene

TCE vapor is irritating to the eyes, nose and respiratory tract and inhalation of high concentration can lead to severe CNS effects such as unconsciousness, ventricular arrhythmias, and death due to cardiac arrest. Contact with the liquid is irritating to the skin and can lead to dermatitis by defatting the skin. The euphoric effect of TCE has lead to craving and habitual sniffing of its vapors.

Trimethylbenzene

Trimethylbenzene, as a vapor, is somewhat unpleasant and may cause irritation of the eyes , nose, and throat. Overexposure to high concentrations may cause narcosis and central nervous system (CNS) depression. As a liquid, it is irritating to the eyes and may cause skin irritation.

Dinitrobenzene

Dinitrobenzene is listed as a suspected and confirmed carcinogen. It causes long term damage to the blood and liver. Signs and symptoms include headache, nausea, vomiting, dizziness, yellowish color in the eyes, hair and skin. Continued exposure produces weakness, difficult breathing, cyanosis, and progression to convulsions, coma, and death.

TNT - Trinitrotoluene

TNT is a highly dangerous explosive that occurs as pale yellow flakes in a pure state. It will detonate if confined and exposed to heat or shock. Exposure can cause allergenic skin reactions and yellowing of the skin and hair. It causes nausea, vomiting, and anorexia. The target organs for chronic exposure are the liver and blood system.

Explosive Compounds (RDX, HMX, Nitroglycerine)

These compounds can affect the body if inhaled, come in contact with the eyes or skin, or swallowed. Exposure to these compounds can cause liver damage with yellow jaundice and anemia which may by fatal. They may also cause irritation of the eyes, nose, and throat with sneezing, coughing, and sore throat. As well as skin rash and stain the skin, hair, and nails a yellowish color. They may affect the ability of the blood to carry oxygen. This may result in a bluish discoloration of the skin, weakness, drowsiness, shortness of breath and unconsciousness. In addition, muscular pains, heart irregularities, kidney irritation, cataracts of the eyes, menstrual irregularities, and nerve damage may result.

Additional chemicals identified and listed in Table 3-2 present a minimal health risk due to low concentrations identified from sampling. It must be kept in mind that even though previous site analytical data does not reveal any other significant chemical hazards to site personnel, the potential still exists for "hot spots" not previously identified. Both the action levels and initial levels of PPE have been developed to account for these potential hazards. Table 3-2 contains the entire list of contaminants detected at each of the sites and satisfies requirements of the State of California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Table 3-3 contains information on the hazardous and toxic materials that may be encountered during the execution of this project.

3.4 Exposure Standards

Threshold Limit Values (TLVs) refer to airborne concentrations of substances which represent conditions that nearly all employees may be repeatedly exposed to day after day without adverse effect. These TLVs are prescribed by the ACGIH and are based upon the best available information obtained through industrial experience and animal or human studies. Because of the wide variation in individual susceptibility, a small percentage of workers may experience discomfort from some substances at concentrations below the

recommended values. It has been policy to use these guidelines for good hygienic practices; however, whenever applicable, stricter guidelines may be utilized.

Currently, exposure guidelines to pesticides and other chemical substances are regulated by OSHA. These exposures are based upon the time-weighted average (TWA) concentration for a normal 8-hour workday and a 40-hour work week. Several chemical substances have short-term exposure limits (STEL) or ceiling values which allow a maximum concentration to which workers can be exposed continuously for a short period of time without suffering from irritation, chronic or irreversible tissue damage, narcosis of a sufficient degree to result in accidental injury, impaired self-rescue abilities, or substantially reduced work efficiency.

The STEL is defined by the ACGIH as a 15-minute TWA exposure which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. Exposure above the TLV-TWA up to the STEL should not be longer than 15 minutes and should not occur more than four times per day. There should be at least 60 minutes between successive exposures in this range. An averaging period other than 15 minutes may be recommended when this is warranted by observed biological effects. OSHA requires that a 15-minute "Ceiling" concentration never be exceeded for that chemical constituent. This notation appears as the letter "C" after the chemical name. Table 3-4 contains the exposure guidelines for identified health significant contaminants.

TABLE 3-1A

MAXIMUM CONCENTRATIONS OF HEALTH SIGNIFICANT CONTAMINANTS DETECTED IN POND SLUDGE SAMPLES AT SITE 49

CONTAMINANT	MAXIMUM CONCENTRATION (mg/kg)
Dinitrobenzene	N/A
HMX	3300
Lead	287
Nitroglycerin	N/A
PETN	N/A
RDX	6100
Trichloroethylene	2.9
Trimethylbenzene	.0056
2,7,6 Trinitrotoluene	275

NA=Chemical either not analyzed for or not detected at the detection limit specified.
Sources: NAWS, China Lake, California, "Engineering Evaluation/Cost Analysis, Site 49 Removal Action," Navy, 1995.

TABLE 3-1B

MAXIMUM CONCENTRATIONS OF HEALTH SIGNIFICANT CONTAMINANTS DETECTED IN SUMP SLUDGE SAMPLES AT SITE 49

CONTAMINANT	MAXIMUM CONCENTRATION (mg/kg)
Dinitrobenzene	49,000
HMX	341,000
Lead	8460
Nitroglycerin	1610
PETN	5800
RDX	253,000
Trichloroethylene	242
Trimethylbenzene	17.000
Trinitrotoluene	62,900
2,7,6 Trinitrotoluene	441

NA=Chemical either not analyzed for or not detected at the detection limit specified.
Sources: NAWS, China Lake, California, "Engineering Evaluation/Cost Analysis, Site 49 Removal Actinon," Navy, 1995.

TABLE 3-2

PROPOSITION 65 WARNING AND NOTIFICATION

As required under the Safe Drinking Water and Toxic Enforcement Act of 1986 (also known as Proposition 65), on February 27, 1987, the Governor published a listing of those chemicals determined by the State of California to cause cancer, birth defects, or other reproductive harm. Proposition 65 requires that businesses that handle any of the listed chemicals notify people in the affected area of that fact. IT Corporation anticipates handling some of the listed chemicals at Site 49 Site at NAWS China Lake.

The chemicals present on sites that have been determined to cause cancer include:

- Arsenic
- Benzene
- Cadmium
- Cobalt
- Dichlorobenzene
- Dichloroethane
- Dichloromethane
- Diesel Engine Exhaust
- Lead
- Nickel
- Tetrachloroethylene

The following contaminants on site have been determined by the State to cause reproductive harm:

- Diesel Engine Exhaust
- Dinitrobenzene
- Lead
- Mercury
- Toulene

TABLE 3-3
HAZARDOUS AND TOXIC MATERIALS
NAVAL AIR WEAPONS STATION CHINA LAKE
SITE 49

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
Dinitrobenzene	Pale white or yellow solids	MW: 168 BP: 606°F MP: 245°F VP: <1 mm Hg Sol: 0.05% FP: 302°F LEL: N/A UEL: N/A IP: 10.71 eV	Caustics, tin and zinc	Contaminated sludge 49,000 mg/kg	Blood, eyes, skin, liver, cardiovascular system, CNS.	Irritation of eyes, nose, respiratory system, headache, nausea, dizziness, fatigue, dermatitis, abdominal pain, cyanosis, coma, death.
LEAD	Metal: a heavy, ductile, soft gray solid	MW: 207.2 BP: 3164°F MP: 621°F VP: O mm Sol: insoluble FP: N/A LEL: N/A UEL: N/A IP: N/A	Strong oxidizers, hydrogen peroxide, active metals (sodium, potassium).	Contaminated pond sludge 287 mg/kg	Kidneys, blood, gastrointestinal tract, CNS	Pallor, blue gums, lethargy; colic, abdominal pain, constipation; anemia, weight loss.
Trimethylbenzene (mesitylene)	Clear, colorless liquid. Peculiar aromatic odor.	MW: 120 BP: 328°F MP: -48°F VP: 415 Sol: N/A FP: 112 LEL: 1.47 UEL: N/A IP: N/A	Strong oxidizers	Contaminated sludge 17,000 mg/kg	CNS	Irritation to eyes & skin, CNS depression

TABLE 3-3
HAZARDOUS AND TOXIC MATERIALS
NAVAL AIR WEAPONS STATION CHINA LAKE
SITE 49
(Continued)

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
RDX Cyclotrimethylene - trinitramine	With PE crystalline solid	MW: 132 BP: N/A MP: 399° F VP: .0004 mm Hg @ 230° F Sol: insoluble FP: Explodes LEL: Explodes UEL: Explodes IP: N/A	Other explosive materials, solvents adhesives, metals, alkalis. Avoid shock, heat and other energy sources.	Contaminated pond and sump sludge 6100 - 253,000 mg/kg	Skin, eyes, bone marrow, liver.	Dermatitis, eye and skin irritation, weakness, fatigue, convulsions, unconsciousness.
Trichloroethylene	Colorless liquid with a sweet odor like chloroform	MW: 131 BP: 188° F MP: -123° F VP: 50 mm Hg Sol: 0.1% FP: None LEL: 11% UEL: 41% IP: 9.47 eV	Strong caustics; when acidic, reacts with aluminum; chemically active metals (barium, lithium, sodium, magnesium, titanium)	Contaminated sump sludge 24.2 mg/kg	Skin, respiratory system, heart, liver, kidneys, skin, CNS.	Irritation of eyes; dermatitis, headache, vertigo, blurred vision; nausea, vomiting, tremors; loss of feeling in extremities.
HMX (Cyclotetramethylene tetranitramine)	White, crystalline, odorless solid	MW: 296.2 BP: N/A MP: 280° F VP: N/A Sol: insoluble FP: N/A LEL: N/A UEL: N/A IP: N/A	Other highly explosive materials, solvents, adhesives, metals, strong alkalis, plastics, paints, other various materials. Avoid shock, heat, other energy sources.	Contaminated sludge 341,000 ppm	Skin, eyes, bone marrow, liver	Dermatitis, eye and skin irritation, weakness, fatigue, dizziness, convulsions, unconsciousness

TABLE 3-3
HAZARDOUS AND TOXIC MATERIALS
NAVAL AIR WEAPONS STATION CHINA LAKE
SITE 49
(Continued)

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
Nitroglycerine	Colorless to pale liquid or solid.	MW: 227.1 BP: 122-140°F Decomposes MP: N/A VP: .003 mm Hg Sol: .1% FP: N/A LEL: N/A UEL: N/A IP: N/A	Heat, shock, acids	Contaminated pond sludge 1610 mg/kg	CNS, blood, skin and cardiovascul ar	Queasiness, nausea, headache, CNS, skin irritation
PETN Pentaeryhritol Tetranitrate	Colorless crystals	MW: 316.1 BP: N/A MP: 286.3 °F VP: .094 millibar @ 282°F Sol: insol. in water FP: N/A LEL: N/A UEL: N/A IP: N/A	Heat, shock detonates @ 210°C	Contaminated sludge 5800 mg/kg	Eyes, skin	Irritation to eyes and skin

TABLE 3-3
HAZARDOUS AND TOXIC MATERIALS
NAVAL AIR WEAPONS STATION CHINA LAKE
SITE 49
(Continued)

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
TNT (Trinitrotoluene)	Flakes, pales yellow in color	MW: 227 BP: 464°F MP: 180°F VP: 0.05 mm Sol: 0.017% FP: N/A LEL: N/A UEL: N/A IP: 10.59 eV	Strong oxidizers, sodium hydroxide, potassium hydroxide, and other highly alkaline materials. Shock sensitive.	Contaminated sludge 62,900 ppm	Eyes, skin, gastro-intestinal tract, blood, liver	Eye irritation, dermatitis, anorexia, vomiting, aplastic anemia, and discolors skin and hair pale yellow.

MW: Molecular weight.
BP: Boiling point at 1 atmosphere pressure, in degrees Fahrenheit (°F).
MP: Melting point in °F.
VP: Vapor pressure at 1 atmosphere pressure and 68°F.
Sol: Solubility in water at 68°F, as percentage (%) by weight.
FP: Flash point, closed cup method, in °F.
LEL: Lower explosive limit in air, as % by volume.
UEL: Upper explosive limit in air, as % by volume.
IP: Ionization potential, in electron-volts (eV).
CNS: Central nervous system.
mm Hg: Millimeters of mercury.
eV: Electron volts.
°F: Degrees Fahrenheit
°C: Degrees Celsius
%: Percent
ppm: Parts per million
mg/m3: Milligrams per cubic meter.
µ/l: Micrograms per liter.
>: Greater than.
<: Less than.
N/A: Not applicable.

TAb.. 3-4
EXPOSURE GUIDELINES FOR IDENTIFIED
HEALTH SIGNIFICANT SITE CONTAMINANTS
NAVAL AIR WEAPONS STATION CHINA LAKE
SITE 49

CONTAMINANT (SYNONYMS)	OSHA PEL		ACGIH TLV		NIOSH REL		IDLH	WARNING PROPERTIES
	8-HR TWA	15-MIN STEL	8-HR TWA	15-MIN STEL	8-HR TWA	15-MIN STEL		
Dinitrobenzene	1.0 mg\m³	-	1.0 mg/m³	-	-	-	200 mg/m³	Odor Thresh: Not established Eye Irr Lvl: Not established
HMX (Cyclotetramethylene-tetranitramine)	None established	-	None established	-	-	-	Not established	Odor Thresh: Not established Eye Irr Lvl: Not established
Lead	0.05 mg/m³	-	0.05 mg/m³	-	0.1 mg/m³	-	100 mg/m³	Odor Thresh: Not established Eye Irr Lvl: Not established
Trimethylbenzene	None established	-	25 ppm	-	25 ppm	-	Not established	Odor Thresh: Not established Eye Irr Lvl: Not established
RDX (Cyclonite) cyclotrimethylene - Trinitramine	None established	-	None established	-	1.5	3 mg/m³	Not established	Odor Thresh: Not established Eye Irritant
Nitroglycerine	.2ppm ceiling skin	-	.05 ppm skin	-	-	.1 mg/m³ skin	75 mg/m³	Odor Thresh Not Available; Eye Irritant
PETN Pentaeryhritol tetranitrate	None established	-	None established	-	None established	-	None established	Odor Thresh: Not established Eye Irr Lvl: Not established
Trichloroethylene	100ppm <200ppm	300 ppm 5 min max in 2 hrs	50 ppm	100 ppm	CA	-	1000 ppm	Chloroform like Odor; Eye Irritant
TNT (Trinitrotoluene)	.5 mg/m³ skin	-	0.5 mg/m³	-	-	-	500 mg/m³	Odor Thresh: Not established Eye Irr Lvl: Not established

OF: Olfactory fatigue occurs quickly after initial detection of odor.
OSHA: Occupational Safety and Health Administration.
PEL: Permissible Exposure Limit.
ACGIH: American Conference of Government Industrial Hygienists.
TLV: Threshold Limit Value.
TWA: Time-weighted average.
STEL: Short-term exposure limit.
Hr: Hour.
Min: Minute.

f/cc: Fibers per cubic centimeter.
mg/m3: Milligrams per cubic meter.
ppm: Parts per million by volume.
Odor Thresh: Odor threshold.
Eye Irr Lvl: Eye Irritant level.
< : Less than.
> : Greater than.
≅ : Approximately.

TABLE 3-5

MINIMUM CLEARANCE FROM ENERGIZED OVERHEAD ELECTRIC LINES

Nominal System Voltage	Minimum Required Clearance
0 - 50 kV	10 feet
51 - 100 kV	12 feet
101 - 200 kV	15 feet
201 - 300 kV	20 feet
301 - 500 kV	25 feet
501 - 750 kV	35 feet
751 - 1000 kV	45 feet

4.0 Buddy System

Project staffing during hazardous waste operations shall meet the requirements and intent of the "buddy system," which requires that at least two persons are required to be at the work area when work is conducted in the exclusion zone which might result in worker contamination.

The buddy system is a method of organizing employees into work groups and is designed to provide those employees with assistance when needed. Each employee in a work group is designated to be observed by at least one other person. Assignment of designated partners should take place during the Tailgate Safety Meeting (TSM).

The responsibility of the buddy is to:

- Provide assistance if needed;
- Maintain line of sight contact or verbal contact with workers in the EZ;
- Observe for signs of chemical or physical trauma or heat/cold stress such as:
  - changes in complexion and skin discoloration,
  - changes in coordination or demeanor,
  - excessive saliva and pupillary response,
  - changes in speech pattern;
- Periodically verify the integrity of all protective clothing; and
- Notify the SHSO if emergency help is needed.

Entry to or exit from the EZ under the conditions described earlier without a designated partner is prohibited.

The buddy system shall be used whenever workers enter the Exclusion Zones or whenever confined space entry or hot work is performed.

5.0 Personal Protective Equipment

5.1 Respiratory Protection

Respiratory protective equipment shall be NIOSH-approved and respirator use shall conform to American National Standards Institute (ANSI) Z88.2, OSHA 29 CFR 1926.103, and 29 CFR 1910.134 requirements. IT Procedure HS601 further defines the respiratory protection program which details the selection, use, inspection, cleaning, maintenance, storage, and fit testing of respiratory protective equipment. This procedure complies with the requirements contained within 29 CFR 1926.103 and will be maintained in the SSHO's site office along with the rest of IT's Health and Safety Policies and Procedures.

All personnel (including visitors) performing on-site activities and using an air purifying respirator must have successfully passed a qualitative respirator fit test in accordance with OSHA 29 CFR 1926.103 within the last 12 months. Documentation of fit testing is the responsibility of each employer. Fit testing and any training related to respiratory protection for IT personnel will be documented on the IT Respiratory Training Completion Form.

5.2 Levels of Protection

The following is a brief description of the PPE which will be required during various phases of the project. The EPA terminology for protective equipment will be used; Levels A, B, C, and D. At a minimum, four sets of appropriate PPE will be maintained at the site for USN visitor usage. IT procedure HS 600 further defines IT's PPE program.

5.2.1 Level A Protection

Level A protection use is not anticipated during this project.

5.2.2 Level B Protection

Level B Protection is required when airborne concentrations of hazardous materials exceed or are expected to exceed twice the OSHA permissible exposure limit (PEL) in confined spaces or when action level criteria established in Table 8-1 require Level B to be used. Prior to implementing Level B protection, the Program CIH must be notified for review and

approval of the intended upgrade. The following equipment will be used for Level B Protection.

- Full face, pressure demand, supplied air respirator, either self-contained or airline with an egress bottle.
- Surgical scrubs
- Steel-toed PVC* boots with steel shank
- Saranax* coated Tyvek coveralls with elastic hood, wrists and ankles
- Latex gloves (inner)
- Nitrile* gloves (outer)
- Hearing protection (muffs or plugs as determined from noise monitoring)
- Hard-hat
- Duct tape openings (ankles, wrists, and respirator)

  *Or other materials of construction as appropriate and approved by the Program CIH

5.2.3 Level C Protection

Level C protection shall be used when:

- The types of air contaminants have been identified, concentrations have been measured, and an air-purifying respirator (APR) is available that can remove contaminants

- The substance has adequate warning properties and all criteria for the use of an APR has been met.

Level C protective equipment at a minimum shall consist of:

- Full-face APR with NIOSH/Mine Safety and Health Administration (MSHA)-approved cartridges

- Combination filter/cartridge providing protection against:

  - Not more than 1,000 parts per million (ppm) organic vapors, chlorine, chlorine dioxide, hydrogen chloride, sulfur dioxide, and escape only from hydrogen sulfide

  - Dusts, fumes, and mists having a TWA less than 0.05 milligrams per cubic meter (mg/m^3)

  - Asbestos-containing dusts and mists

  - Radionuclides

- Surgical scrubs

- Steel-toed PVC* boots with steel shank

- Saranax coated tyvek coveralls with elastic hood, wrists and ankles (poly-coated* when there is a potential for contaminated water contact)

- Latex gloves (inner)

- Nitrile* gloves (outer)

- Hearing protection (if necessary)

- Hard-hat

- Duct tape openings (ankles, wrists, and respirator).

  *Or other materials of construction as appropriate and approved by the Program CIH.

5.2.4 Level D Protection

Level D PPE shall be used when:

- Work functions preclude significant splashes, immersions, or the potential for unexpected inhalation of, or contact with, hazardous concentrations of harmful chemicals

- Atmospheric concentrations of contaminants are less than one-half the TLV/PEL and consistent with the action level established in Table 8-1.

Level D PPE at a minimum shall consist of:

- Standard work uniform or coveralls
- Steel-toed work boots with steel shank
- Safety glasses
- Hearing protection (if necessary)
- Splash shield (if necessary)
- Hard-hat
- Leather palm gloves (if necessary).

Level D-modified PPE at a minimum shall consist of:

- Standard work uniform or coveralls
- Steel-toed PVC* boots with steel shank
- Tyvek* coveralls with hoods and elastic wrists and ankles
- Latex gloves (inner)

- Nitrile gloves (outer)
- Hearing protection (if necessary)
- Splash shield (if necessary)
- Hard-hat
- Safety glasses
- Duct tape openings (ankles, wrists).

  * or other materials of construction as appropriate

5.3 Activity Specific Levels of Protection

The required level of protection is specific to the activity being conducted. At the NAWS China Lake project site, the initial levels of PPE are as follows:

Task	Activity	Initial Level of PPE
1	Mobilization: personnel, equipment, support facilities	D
2	Survey of underground utilities, piping, observations	D
3	Cleaning of wastewater settling structures	C
4	Removal and cleaning of underground piping using pressure washing equipment	C
5	Removal and cleaning of pond sludges on both clay-lined and synthetic-lined ponds	C
6	Excavation of pond soil, loading and transfer of soil to base stockpiles	D/Modified D
7	Transfer of stockpiled soil to site disposal	D

As site activities progress, levels of PPE are subject to change or to modification. Upgrading of PPE can occur when action levels are exceeded or whenever the need arises to protect the safety and health of site personnel. Levels of PPE will not be downgraded without prior approval from the Program CIH. Upgrade of PPE to Level B is not authorized unless approved by the Program CIH.

5.4 Donning/Doffing PPE

All persons entering an EZ shall put on the required PPE in accordance with the requirements of this SSHP. When leaving the EZ, PPE will be removed in accordance with the procedures listed in Section 7.1, in order to minimize the spread of contamination.

6.0 Site Control

The project area will be divided into three work zones: exclusion zone (EZ), a contamination reduction zone (CRZ), and a support zone. The PS and Program CIH or SHSO shall together be responsible for designation of the work zones.

The EZ will include any area where contact with chemical contaminants may occur and will be marked with barrier tape or other means to warn personnel of the hazards.

Immediately adjacent to the EZ, a CRZ with a decontamination area for equipment and personnel will be established. This area will also be delineated with traffic cones and/or barrier tape.

The remainder of the IT project area will be designated as the support zone. No special markings or warning labels are required for this area.

Only personnel who have completed 40 hours of hazardous waste operations as defined under 29 CFR 1910.120/ or in California 8CCR 5192, have completed their 40-hour training or refresher training within the past 12 months, have been certified as fit for hazardous waste operations by a physician within the past 12 months and are wearing the proper PPE shall be allowed within the EZ or CRZ. Personnel without such training may only enter the designated support zone. Only properly trained personnel will be allowed within the EZ or CRZ.

6.1 Hazard Briefing

No person will be allowed on the site during site operations without first being given a site hazard briefing. In general, the briefing will consist of a review of the tailgate safety meeting. All persons on the site, including visitors, must sign the site-specific tailgate safety meeting form. Tailgate safety meetings shall be held daily, involving all personnel on site.

6.2 Documentation of Certification

A subcontractor training and medical file will be established for the project and kept on site during all site operations. The 40-hour training, update, and specialty training (first-aid/cardiopulmonary resuscitation [CPR]) certificates, as well as the current annual medical clearance for all subcontractor personnel, will be maintained within that file. All IT and subcontractor personnel must provide their training and medical documentation to the SHSO prior to the start of field work. At the completion of the project, documentation will be maintained at the project home office.

6.3 Entry Log

The SHSO at the site shall record on their Field Activity Daily Log (FADL) the names of all personnel who enter the EZ. These FADLs shall be incorporated into the project file.

6.4 Entry Requirements

In addition to the entry requirements listed above, no personnel will be allowed in any EZ or CRZ unless they are wearing the minimum PPE as described in Chapter 5.0.

7.0 Decontamination

7.1 Personnel Decontamination

All personnel working in the EZ must undergo personnel decontamination prior to entering the support zone. The personnel decontamination area shall consist of the following steps.

Step 1. Personnel leaving the contaminated zone will remove any gross contamination from their outer clothing and boots.

Step 2. Personnel will remove their Tyvek coveralls and outer gloves. Personnel will remove hard hats, boots, and respirators las (if used).

Step 3. Personnel will thoroughly wash their hands and face before leaving the decontamination zone. Respirators will be sanitized and then air dried. Respirators are to be stored in a clean plastic ziplock bag.

7.2 Equipment Decontamination

Any vehicles with detectable contamination will be decontaminated prior to leaving the decontamination zone. If the level of contamination is low, decontamination for vehicles will be limited to rinsing of tires with water. The SHSO or Program CIH will determine if steam cleaning or pressure washing of vehicles and equipment will be required. decontamination.

7.3 Personal Protective Equipment Decontamination

Whenever possible, single use, external protective clothing shall be used for work within the EZ or CRZ. This protective clothing shall be disposed of in marked containers.

Reusable protective clothing will be rinsed at the site with detergent and water.

8.0 Site Monitoring

8.1 Air Monitoring

Air monitoring is essential to ensure that all field personnel are adequately protected from airborne contaminants. The levels of organic vapors in the work area will be monitored using a photoionization detector (PID), colorimetric detector tubes, or other appropriate equipment as determined by the SHSO and the Program CIH.

Combustible gas and oxygen shall be measured in the work areas if flammable contaminants are anticipated or confined space entry requirements are necessary. Respirable particulate will be monitored using an MIE mini-ram; both VOC and particulate monitoring will be conducted by the SHSO.

All air monitoring results shall be documented in project logs and the SHSO shall inform all employees affected of the results of exposure monitoring.

The Program CIH may direct the SHSO to conduct integrated personal exposure monitoring. Integrated air samples will be analyzed through a laboratory accredited by the American Industrial Hygiene Association (AIHA).

Air monitoring results will be used to determine the effectiveness and/or need for dust control methods and to trigger action levels as specified in Table 8-1.

8.1.1 Locations to be Monitored

All personal, integrated air monitoring samples and direct reading instrumentation readings taken for the purpose of determining appropriate health and safety precautions shall be collected/taken in the approximate "breathing zone" of site personnel.

Since confined space entry will be necessary, combustible gas, oxygen, and total organics readings will be collected and recorded from the top, middle, and bottom of the sump prior to initial entry. Once the IT entry supervisor and/or SHSO has reviewed this information, determined the PPE necessary for entry, and the entry has been initiated, readings shall be taken in the approximate "breathing zone" of the IT employee(s) working within the

confined space. Readings may also be taken in other locations to determine areas of localized contamination or combustibility within the confined space. Work shall stop and all personnel shall exit the confined space when readings exceed acceptable values at any location within the space.

8.1.2 Frequency

Breathing zone air monitoring must be conducted periodically throughout the day while work is being performed in the EZ regardless of the level of protection being worn. Such readings must be documented on FADL forms even if contaminant concentrations show no meter response. EZ monitoring for respirable dust and VOCs will be continuous or no less frequent than hourly when in Level C PPE based on determination by the SHSO. Level D PPE use will require employee monitoring no less frequently than 4 times per shift.

8.1.3 Monitoring Equipment Maintenance and Calibration

All air monitoring equipment (e.g., combustible gas/oxygen meters and aerosol monitors) will be maintained and calibrated in accordance with the specific manufacturers' procedures.

All sampling equipment shall be calibrated in accordance with OSHA sampling protocols and NIOSH methods for the analyte of interest.

All direct reading instrumentation calibrations will be conducted according to manufacturer's instructions before and after each period of use. All air monitoring equipment calibrations and maintenance activities shall be documented on the IT FADL, or equivalent.

When applicable, only manufacturer-trained and/or authorized IT personnel will be allowed to perform instrument repairs or preventive maintenance.

8.2 Noise Monitoring

Noise monitoring may be performed by the SHSO under the direction of the Program CIH if high noise levels are routinely encountered. Hearing protection is mandatory for all employees in noise hazardous areas.

On-site personnel will wear monitoring equipment when directed by the Site Supervisor. The primary noise hazard at this site is from the heavy equipment, such as excavators, graders and loaders. All site personnel within 25 feet of operating equipment shall wear hearing protective devices (either muffs or plugs) until the results from the noise monitoring have been evaluated; at that time, the Site Supervisor will inform site personnel whether continued use of hearing protection is required. Personnel will wash their hands with soap and water prior to inserting ear plugs to avoid initiating ear infections.

8.3 Heat Stress

Heat stress monitoring shall be initiated whenever ambient temperatures on site exceed 85°F. At the discretion of the Program CIH, environmental and/or physiologic monitoring will be carried out. Environmental monitoring shall consist of the determination of Wet Bulb Globe Temperatures (WBGTs). Physiologic monitoring may consist of pulse rate and/or body temperature determinations.

8.4 Safety Reviews

Jobsite safety reviews (audits) shall be conducted by all levels of project management. Specifically:

- The SHSO shall inspect the jobsite at least daily. Findings shall be documented on FADLs and communicated to the PS.

- The PS shall conduct a safety audit with the SHSO at least weekly. Findings shall be documented on FADLs and communicated to project workers, the SPM and Program CIH.

- The SPM shall conduct an on-site safety audit at least monthly. Findings shall be documented on Safety Inspection Report (SIR) forms and copied to the Program CIH. Whenever possible, the Program CIH shall be included in these audits.

- The Program CIH may conduct unannounced jobsite safety audits at anytime. Findings will be documented on SIRs and copied to the SPM and Program Manager.

8.5 Monitoring Records

The SHSO shall ensure that site monitoring records are complete and incorporated into the project file. Any personnel or area air monitoring results will be incorporated into the host

office health and safety files. The Program CIH will be responsible for establishing, maintaining, and forwarding to other IT offices (as necessary) all required monitoring information as described below for placement in individual employee files:

- Employee name, social security number, payroll number
- The date, time, pertinent task information, exposure information
- Description of the analytical methods, equipment used, and calibration data
- Type of PPE worn
- Engineering controls used to reduce exposure.

8.6 Notification

The Program CIH will ensure that each employee is informed in writing of the results which represent that employee's exposure. Monitoring results representative of an employee's exposure shall be reported in writing to the affected employee, with copies retained in the project file and the employee's medical file.

Whenever the results indicate that the representative employee exposure exceeds the Permissible Exposure Limit (PEL), the notification shall state that the PEL was exceeded, and shall provide a description of the corrective action taken to reduce exposure to a level below the PEL.

IT may conduct industrial hygiene monitoring on subcontractor employees. Notification of subcontractor personnel of industrial hygiene monitoring results is the responsibility of the subcontractor.

TABLE 8-1
ACTION LEVELS

When in Level B PPE

Analyte	Action Level	Required Action[1]
Dust	≥ 5.0 mg/m^3 on mini-ram	Stop work[2]/contact CIH
Unknown VOC's	≥ 100 ppm above background in breathing zone (BZ)	Stop work; contact CIH
O_2	≥ 23.5% or ≤ 20%	Stop work; contact CIH
LEL	≥ 10% of LEL	Stop work; contact CIH

When in Level C PPE

Analyte	Action Level	Required Action[1]
Dust	≥ 1.0 mg/m^3 on mini-ram	Stop work[2]/continue dust suppression
Unknown VOC's	≥ 50 ppm above background in breathing zone (BZ)	Stop work; contact CIH
O_2	≥ 23.5% or ≤ 20%	Stop work; determine cause
LEL	≥ 10% of LEL	Stop work; determine cause

When in Level D Modified/D PPE

Analyte	Action Level	Required Action
Dust	≥ .5 mg/m^3 on mini-ram	Level C PPE; continue dust suppression
Dust	≥ .2 mg/m^3 on mini-ram	Level D PPE/initiate dust suppression
Unknown VOC's	≥ 5 ppm above background in BZ	Level C PPE; benzene detector tube
0_2	≥ 23.5% or ≤ 20%	Stop work; determine cause
LEL	≥ 10% of LEL	Stop work; determine cause

When in Support Zone

Analyte	Action Level	Required Action
Dust	< .2 mg/m^3 above background in BZ	Level D PPE
Unknown VOC's	< 5 ppm above background in BZ	Level D PPE

[1] Four instantaneous peaks in any 15-minute period or a sustained reading for 5 minutes in excess of the action level will trigger a response.

[2] Contact with the Program CIH must be made prior to continuance of work. The Program CIH may then initiate integrated air sampling along with additional engineering controls.

No one is permitted to downgrade levels of PPE without authorization from the Program CIH.

9.0 Employee Training

9.1 General

All personnel entering the EZ or CRZ shall have completed at least 40 (or, for certain tasks, 24) hours of hazardous waste operations-related training, as required by 29 CFR 1910.120/ or in California 8CCR 5192, as well as site specific training prior to performing field work. All field employees must have received a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Those personnel who completed the 40-hour training more than 12 months prior to the start of the project shall have completed an 8-hour refresher course within the past 12 months. The PS, SPM, and Program CIH shall have completed an additional 8 hours of relevant supervisory health and safety training. With the exception of subcontractor personnel who will be working only in the support zone, subcontractor personnel must meet the above training requirements with subcontractor supervisors also required to have the 8-hour hazardous waste supervisor training.

A copy of each training certificate will be maintained at the project job site. Subcontractors must provide certificates of training for the project file for all employees assigned to the project, if they will be working in either the EZ or CRZ Training certificates for both subcontractor and IT personnel shall be maintained on-site.

9.1.1 Tailgate Safety Meetings

Prior to the start of the project, all personnel will participate in an initial tailgate safety meeting. During the initial tailgate safety meeting, the SHSP will be discussed. The PS will ensure that the anticipated site hazards are summarized and explained to all personnel, and that those personnel are aware of the precautions they must take to minimize their exposure to those hazards. Tailgate safety meetings will be held at the start of each work shift. All new employees must attend the meeting and be familiar with this SHSP.

Attendance records and meeting notes shall be maintained with the project files.

9.1.2 Material Safety Data Sheets

The SHSP includes MSDS and occupational health guidelines for chemical substances known to be on site (see Appendix B). The SHSP shall be maintained on site, accessible to all site employees. Each employee is required to review and sign the SHSP before starting work on the site. The SHSO will provide training to project personnel covering the hazards of any and all materials for which an MSDS has been obtained.

9.1.3 Site-Specific Health and Safety Plan

The SHSO will present the SHSP (including all attached MSDSs) and discuss it with all personnel assigned to the project. All workers and visitors must read and sign the SHSP acknowledging acceptance of site rules and understanding of site hazards before the start of the site work.

9.2 Site Workers' Basic Course

Each site worker shall have received training in basic 40 hour HAZWOPER or annual 8 hour refresher training as well as site specific training prior to performing field work:

- General site safety
- Physical hazards (fall protection, noise, heat stress, cold stress)
- Names and titles of key personnel responsible for site health and safety
- Safety, health, and other hazards typically present at hazardous waste sites
- Use of PPE
- Work practices by which employees can minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements including recognition of symptoms and signs which might indicate overexposure to hazards
- Worker right-to-know (Hazard Communication, 29 CFR 1910.1200)
- Routes of exposure to contaminants
- Engineering controls and safe work practices

- Components of the site health and safety program
- Decontamination practices for personnel and equipment
- Confined-space entry procedures
- Emergency response plan.

9.3 Supervisors' Course Content

Management and supervisors must receive an additional eight hours of training that includes:

- General site safety and health programs;
- PPE programs;
- Air monitoring techniques;
- Spill containment techniques.

9.4 Site-Specific Training

Site-specific training will be accomplished through an initial review of this SHSP by the SHSO and through the daily tailgate safety meetings. All such training shall include signatures of all attendees and shall be documented to the project files.

9.5 First Aid and Cardiopulmonary Resuscitation (CPR)

At least two employees current in first aid/CPR will be assigned to the project and at least one of these will be on the site whenever operations are ongoing. First aid trained personnel shall also be trained in bloodborne pathogens hazards and precautions as described in IT's Bloodborne Pathogen Exposure Control Plan (IT Health & Safety Procedure HS 512). First aid and CPR training courses are offered to all IT employees. Refresher training in first aid and CPR is required to maintain the currency of the certificate. The SHSO shall be current in first aid/CPR training.

9.6 Instructors

All HAZWOPER training courses for IT employees must either be taught by IT instructors, or by outside firms which have been approved by the Program CIH.

Initial training of project workers on the SHSP shall be conducted by the SHSO or Program CIH.

Daily Tailgate Safety Meetings and other on-the-job training shall be routinely conducted by either the SHSO or the PS. The PS shall not delegate all safety-related training to the SHSO.

10.0 Medical Surveillance Program

10.1 Physical Examinations

All project personnel who may work in the EZ or CRZ shall have completed a comprehensive medical examination, directed by a board certified occupational medicine physician, within the past 12 months that meets the requirements of 29 CFR 1910.120/1926.65 or T8CCR5192. The annual medical typically includes the following elements:

- Medical and occupational history questionnaire
- Physical examination
- Complete blood count, with differential
- Liver enzyme profile
- Chest X-ray, once every three years, for non-asbestos workers
- Pulmonary function test
- Audiogram
- Electrocardiogram (EKG) for persons older than 35 years of age, or if indicated during the physical examination
- Visual acuity
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employer with a letter confirming the worker's fitness for work and ability to wear a respirator. A copy of this letter for all personnel, including subcontractors, will be kept on site during all project site work.

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician on the Certification Form. The physical examinations shall meet the requirements of 29 CFR 1910.120/1926.65, 29 CFR 1910.134 or in

California 8CCR 5192, 5144, and IT H&S Policy HS100 and HS101. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

10.1.1 Preplacement Examination

All employees will receive a preplacement medical examination prior to assignment to field operations.

10.1.2 Annual Examination

Each year subsequent to the placement examination, all employees and subcontractors must undergo an annual examination and drug screen similar in scope to the preplacement examination. IT employees hired prior to 1985 are not required to submit to drug screening. Chest X-rays are taken every third year. The medical and occupational history is updated with each examination.

10.1.3 Exit Examination

IT employees receive an exit examination upon leaving the company if they have not been examined within the previous six months. The exit examination consists of the annual examination without drug screen. The employee's immediate supervisor is to notify the Program CIH within a reasonable time before the termination to allow for the necessary arrangements.

10.2 First-Aid and Medical Treatment

All persons on site must report any near-miss incident, accident, injury, or illness to their immediate supervisor or the Field Supervisor. First aid will be provided by the designated site first aider. Injuries and illnesses requiring medical treatment will be accompanied by an "Authorization for Treatment" Form. The employee's supervisor or the Field Supervisor will complete the "Supervisor's Employee Injury Report" and conduct an accident investigation as soon as emergency conditions no longer exist and first-aid and/or medical treatment has been rendered. The investigation should follow the Accident/Injury Investigation Report. These two reports must be completed and submitted to the SHSO within 24 hours after the incident. The ROICC must also be notified of the accident (via submittal of NAVFAC form 5100/20) within 24 hours.

First-aid kits are kept at the CRZ and in all IT vehicles. If treatment beyond first aid is required, the injured should be transported to the medical facility listed in Chapter 12.0 of this SHSP and the PS should immediately contact IT's contract physician, at his location, Washington Occupational Health Associates (WOHA) at (800) 777-9642. The PS should describe to WOHA the circumstances leading to the injury or illness. If the injured is not ambulatory or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

10.3 Medical Restriction

When a medical care provider identifies a need to restrict work activity, the employee's home office HS Assistant will communicate the restriction to the employee, their supervisor, and the Program CIH. The terms of the restriction will be discussed with the employee and his supervisor. Every attempt will be made to keep the employee working, while not violating the terms of the medical restriction.

10.4 Medical Records

Medical and personal exposure monitoring records will be maintained according to the requirements of 29 CFR 1910.120/1926.65 or in California 8CCR5192 and HS103, and shall be kept for 30 years post employment. Employee confidentiality shall be maintained. Employees and their authorized representatives have access to these records through the HS Assistant.

11.0 Emergency Response Plan and Contingency Procedures

Site personnel must be prepared to respond and act quickly in the event of an emergency or accidental contaminant release. Emergency preparedness and response procedures will aid in protecting site workers and the surrounding environment. Preplanning measures will include employee training, fire and explosion prevention and protection, chemical spill and discharge prevention and protection, and safe work practices to avoid personal injury or exposure.

11.1 Personnel Roles/Lines of Authority

The roles and responsibilities of IT personnel for response to emergencies at the NAWS China Lake project site will be clearly defined and coordinated with IT subcontractors, USN project personnel, and China Lake Fire Department emergency response team. The China Lake Fire Department will evaluate the emergency situation and make the determination whether to involve the China Lake HAZMAT Unit in the response. The responsibilities of specific project individuals and the coordination of China Lake Fire Department are defined as follows.

Project Superintendent. At all times during scheduled work activities, a designated PS shall be present on site. This individual will be responsible for implementing these procedures and determining appropriate response actions. Depending upon the circumstances and time permitting, the PS will review proposed response actions with the SHSO, and the ROICC. Specific responsibilities for the PS include:

- Evaluating and assessing emergency incidents or situations
- Assigning personnel and coordinating response activities on site
- Assuring that field personnel are aware of the potential hazards associated with the site
- Summoning China Lake emergency response team
- Notifying the PM or, in his absence, the Program Manager of an emergency situation

- Coordinating response to an incident with the ROICC
- Assuring that all IT emergency equipment is routinely inspected and functional
- Working with the SHSO regarding the correction of any work practices or conditions that may result in injury to personnel or exposure to hazardous substances
- Assuring that appropriate emergency response agencies are aware of the provisions made herein
- Evaluating the safety of site personnel in the event of an emergency, and providing evacuation coordination if necessary
- Maintaining site facilities and assisting site personnel in accessing those facilities.

The PS will direct all emergency response activities conducted or managed by IT and is responsible for field implementation and enforcement of health and safety policies and procedures. The PS will be fully trained in IT's health and safety policies and procedures. Other responsibilities include overall supervision and management of field activities.

Site Health and Safety Officer. The SHSO is responsible for implementing, communicating, and enforcing health and safety policies and procedures during the course of the project. The SHSO will review the fitness and training records of all field personnel for compliance with the established requirements and will assist in arranging proper training and medical examinations. He will also assist in evaluating health and safety concerns with respect to environmental releases and emergency response actions.

Senior Project Engineer/Manager. The SPM will provide support to emergency responders and dedicate appropriate project resources to the response effort. If required, the SPM will mobilize additional personnel and equipment to the site. The SPM will notify and provide the ROICC with recommendations concerning any additional action(s) to be taken.

11.2 List of Emergency Contacts and Notification

The PS, SPM, and SHSO will be notified immediately in the event of an emergency. The PS will immediately evaluate the incident and, if necessary, notify the China Lake Fire

Department emergency support services. If not previously notified, the SPM, ROICC, and designated environmental contact will be advised of the situation. Telephone numbers for emergency contact personnel are listed in Table 11-1. The list will be maintained with current contacts, and telephone numbers will be posted along with other emergency phone numbers at all telephone locations at the site.

The information provided to the notified person should include the nature of the incident and the exact location and suspected contaminants or material involved. Information regarding the incident that should be reported to the emergency operator includes the following:

- Name and telephone number of the individual reporting the incident
- Location and type of incident
- Nature of the incident (fire, explosion, spill, or release) and substances involved
- Number and nature of medical injuries
- Movement or direction of spill/vapor/smoke
- Response actions currently in progress
- Estimate of quantity of any released materials
- Status of incident
- Other pertinent information.

A complete incident report shall be completed by the SHSO and provided to the ROICC, once the urgency of the emergency incident has been resolved.

11.3 Medical Emergency Response

In the event of severe physical or chemical injury, China Lake emergency response personnel shall be summoned for emergency medical treatment and ambulance service. Their response time is estimated to be between within 15 minutes upon initial notification. The China Lake emergency medical responders will be utilized to provide care to severely injured personnel. Once an initial assessment is made by the emergency medical technicians, the decision on using ground or air transportation for the victims will be made. Minor injuries will be treated on site by qualified first-aid/CPR providers and if additional treatment beyond first aid is required, the injured personnel will be transported to the Ridgecrest Community Hospital. Ridgecrest Community Hospital can provide 24-hour emergency medical care along with the services of a critical care center. Contact IT Corporation Health and Safety, Stacy Shirk, at (510) 372-9100 whenever personnel are

provided medical attention to ensure that appropriate services are rendered and that an authorization for treatment form has been completed.

Transportation routes and maps will be posted in the project office and in each site vehicle prior to the initiation of on-site activities. A copy of this map has been provided as Figure 11-1.

11.4 Personal Exposure or Injury

Every precaution will be taken to aid in the prevention of injuries and/or exposure to contaminants. These precautions are detailed in this SHSP and generally consist of the following measures:

- Personnel will be properly trained for their work duties
- Site personnel will wear appropriate PPE for each specific task or work assignment
- Site personnel will follow the proper field safety protocols as defined
- Site controls will be enforced so that only authorized personnel are able to access the work zones
- Site personnel will be made aware of potential environmental and chemical hazards
- Real-time air monitoring will be performed to evaluate the effectiveness of engineering controls and levels of personal protection
- Proper decontamination procedures will be followed for personnel and equipment.

In the event of personal exposure to contaminants, the following general guidelines will be adhered to:

- Contact/Absorption - Copious amounts of potable water will be used to flush, for at least 20 minutes, contaminants from the skin. This activity will occur in the on-site shower trailer. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. The condition of the individual will be assessed and transport to a medical center arranged if necessary. Do not transport victim unless the recommended flushing period is completed or flushing can be continued during transport.

- Inhalation - The victim will be moved immediately to an area providing fresh air. Decontamination of the victim and artificial respiration will be provided if necessary. The condition of the individual will be assessed and transport to a medical center arranged if necessary.

- Ingestion - Immediately contact local poison control center. The victim will be decontaminated, if necessary, and transported to a medical facility.

11.5 Fire Control

In the event of a fire or explosion, or imminent danger of fire or explosion, all activities shall halt, and the China Lake Fire Department shall be notified immediately. If it is safe to do so, site personnel may remove and isolate flammable or other hazardous materials which may contribute to the fire.

Upon arrival of the China Lake emergency responders, the PS will advise the fire chief or lead representative of the location, nature, and identification of the hazardous materials on site. Prior to intrusive activities at the site, a tour conducted by the SHSO will be given to the China Lake Fire Department and China Lake HAZMAT Unit personnel. Specific hazards inherent with the site will be conveyed at that time.

The following measures will be implemented during site field activities to minimize the risk of fire and/or explosion:

- Smoking is permitted on site only in the designated smoke area

- Good housekeeping procedures will be required on site

- Material storage methods will be in accordance with manufacturers' recommendations

- Flammable liquids will be stored in approved containers and cabinets only

- All storage, handling, or use of flammable and combustible materials shall be conducted by trained personnel

- Entry and exit pathways shall be kept clear of debris or obstacles

- Work areas will be cleared of excess vegetation and obstructions.

Any base-specific guidelines established by the NAWS China Lake will be strictly enforced. Any fire, no matter how small, must be reported to the China Lake Fire Department chief.

11.6 Spills or Control

IT will maintain the following equipment and materials in the CRZ for use during spill response activities:

- Absorbent pads
- Granular absorbent material (noncombustible)
- Polyethylene sheeting
- 55-gallon drums
- Shovels and assorted hand tools.

If a hazardous waste spill or material release to the air, soil, or water at the site is observed, IT will immediately notify the ROICC and China Lake HAZMAT Unit. An assessment will be made of the magnitude and potential impact of the release. If it is safe to do so, site personnel will attempt to locate the source of the release, prevent further release, and contain the spilled and/or affected materials as follows:

- The spill or release area will be approached cautiously. Real-time air monitoring will be continuously performed in the spill vicinity.

- Hazards will be identified based on available information from witnesses or material identification documents (placards, MSDSs, logs). The potential hazards will be evaluated to determine the proper personal protection levels, methods, and equipment necessary for response.

- If necessary, the release area will be evacuated, isolated, and secured.

- If possible, spill containment will initially be made without entering the immediate hazard area.

- Entry to the release area will be made with the PPE, personnel, methods, and equipment necessary to perform the work. Hazardous spill containment and collection will be performed in four steps as follows:

    - Contain the spill with absorbent socks, booms, granules, or construction of temporary dikes.

    - Control the spill at the source by plugging leaks, uprighting containers, overpacking containers, or transferring contents of a leaking container.

    - Collect the spilled material with shovels or heavy equipment as necessary.

    - Store the spilled material for further treatment or disposal. Treatment and/or disposal options of the material will depend on the amount and type of material.

If site personnel cannot safely and sufficiently respond to an environmental release, evacuation of the area may be warranted. The decision to evacuate will depend upon the risk of exposure to SZ personnel and the severity of the release. The ROICC will be notified in the event of a significant spill along with the China Lake HAZMAT Unit. Upon their arrival at the site, the PS will brief them on the current situation at hand and any potential hazards the team may be faced with.

11.7 Site Evacuation Procedures

The authority to order personnel to evacuate the area rests with the PS and SHSO. In the event that site evacuation is required, a continuous, uninterrupted air horn will be sounded for approximately ten seconds. Air horns will be located in the support area. Radio communication may also be used to alert site workers and provide special instructions.

Personnel working in the EZ or CRZ will immediately make their way to the primary meeting location for a "head count." Depending on the severity of the event and allowable time, personnel exiting the EZ and CRZ may be instructed to forgo or modify decontamination procedures.

Personnel in the SZ will immediately report to the primary meeting location for a "head count" and further instructions. The PS and the SHSO will remain in contact to ensure that evacuation procedures are properly executed. If the primary meeting location is unaccessible, personnel shall evacuate to an upwind location as determined by the windsock and perform a "head count."

Situations requiring evacuation may include unusually severe weather conditions, fires, or significant chemical spills or releases. In the event of project evacuation, the ROICC, China Lake Fire Department, and China Lake Police Department will be notified immediately. A site emergency map that delineates evacuation routes, emergency air horn locations, first-aid kit locations, rally point, and site contamination control zone perimeters will be developed once an on-site evaluation of conditions and topography is complete.

11.8 Emergency Decontamination Procedures

Treatment of illnesses or injuries to personnel working within the contaminated areas of the site may be more difficult because of protective clothing requirements and the potential for exposure to the contaminants. The SHSO or Emergency Medical Care Provider must quickly assess the extent of the injury or illness of the victim. A determination will be made if lifesaving medical treatment is critical and if personal decontamination procedures will create additional injuries or aggravate the existing condition. Life-threatening injuries must receive immediate medical attention. Decontamination procedures may be modified, simplified, or eliminated completely under such circumstances.

The following guidelines are established for responding to minor emergencies where an individual may have been injured or overcome by exposure to a hazardous substance at the site. If a truly serious injury exists, only portions of these guidelines may be appropriate to ensure prompt medical treatment.

- Notify supervisory and safety personnel, and verify that the area is safe to remain.
- Select an emergency decontamination location upwind and/or uphill from any spills, and determine most effective pathway to emergency vehicles.
- Field decontamination should be performed in two stages: washing with soapy water, followed by a clear water rinse.

- Upon arrival at the injured party, stabilize any life-threatening problems, such as spills or fires, and remove (i.e., brush or blot with absorbency pads) visible, gross contamination. If possible, prevent coming in contact with any contamination present at the scene. However, do not delay with this task, and be prepared to transport immediately to the decontamination area.

- Have support personnel perform real-time air monitoring.

- Determine type, nature, and extent of exposure or injury based on mechanism.

- Quickly cut or tear first layer of protective clothing (outer suit) off of the injured party and discard. If cutting, always cut away from the body toward the extremities to avoid inflicting further injury.

- Without delay, efficiently move the injured away from the accident scene, possible contamination, or any hazardous substances. Relocate to a nearby "clean" area to expedite removal of respiratory protection and establish communication.

- If the individual is unconscious, evaluate if an adequate airway exists and breathing and circulation are present (ABCs). If absent, commence rescue breathing or CPR without delay.

- Move the injured to the decontamination area and transfer responsibilities to support personnel.

- Using soapy solution, support personnel should carefully wash outer garments as needed and rinse.

- Spray outer protective clothing with clear water.

- Quickly remove tape from the injured's wrists and ankles—assume the individual is injured until an assessment indicates otherwise.

- Carefully, but quickly, cut second layer of protective clothing (inner suit, boots, and gloves) off injured party. Always cut away from the body toward the extremities to avoid inflicting further injury.

- Be prepared to turn emergency care over to Emergency Medical Service personnel. Otherwise, administer appropriate standard first aid to injuries.

- Following stabilization of any injuries, monitor and be on the alert for shock, wrap the injured in a warm blanket or other items to conserve body heat, and be prepared for vomiting.

- Cover any contact surfaces of transport equipment with a protective sheet or plastic.
- Inform all arriving personnel and transport crew of nature and extent of injuries and any potential hazards present.

11.9 Adverse Weather Conditions/Natural Disasters

Adverse weather can take many forms. Thunder and lightning storms, earthquakes, hail, high winds, and tornados are a few examples. Sudden changes in the weather, extreme weather conditions, and natural disasters can create a number of subsequent hazards. Generally, poor working conditions arise, and slip, trip and fall hazards exist. Natural disasters can create many secondary hazards such as release of hazardous materials to the environment, structure failure and fires.

Routinely monitoring weather conditions and reports may help reduce the impact of severe weather and natural disasters. It may be necessary to halt certain hazardous operations or stop work altogether to allow the situation to pass. The SHSO must decide what operations, if any, are safe to perform based on existing conditions and anticipated conditions.

The best protection against most severe weather episodes and natural disasters is to avoid them. This means seeking shelter before the storm hits. Stay away from pipes and electrical equipment should lightning be a threat and watch for damage caused by lightning strikes nearby.

Earthquakes. The following general guidelines will be adhered to in the event of an earthquake:

- If you are indoors, duck or drop down to the floor. Take cover under a sturdy desk, table or other furniture. Hold on to it and be prepared to move with it. Hold the position until the ground stops shaking and it is safe to move. Stay clear of windows, fireplaces, and heavy furniture or appliances. Do not rush outside. You may be injured by falling glass or building parts. Do not try using the stairs or elevators while the building is shaking or while there is danger of being hit by falling glass or debris.
- If you are outside, get into the open, away from buildings and power lines.

- If you are driving - stop if it is safe - but stay inside. Do not stop on or under a bridge, overpass or tunnel. Move your care as far out of the normal traffic pattern as possible. Do not stop under trees, light posts, electrical power lines or signs.

11.10 Critique and Follow-Up of Emergency Procedures

The ROICC shall be verbally notified immediately and receive a written notification via NAVFAC form 5100/20 within 24 hours of all accidents or incidents including releases of toxic chemicals, fires, or explosions. The report shall include the following items:

- Name, organization, telephone number, and location of the Contractor
- Name and title of the person(s) reporting
- Date and time of accident/incident
- Location of accident/incident (i.e., site location, facility name)
- Brief summary of accident/incident including pertinent details such as type of operation ongoing at time of accident
- Cause of accident/incident, if known
- Casualties (fatalities, disabling injuries)
- Details of any existing chemical hazard or contamination
- Estimated property damage, if applicable
- Nature of damage, effect on contract schedule
- Action taken by Contractor to ensure safety and security
- Other damage or injuries sustained (public or private).

The PS and the SHSO will investigate the cause of the incident to prevent its reoccurrence. The investigation should begin as soon as practical after the incident is under control, but not later than the first work day after the incident. Investigations will follow the procedures described below:

- Interview witnesses and participants as soon as possible or practical.

- Determine the chronological sequence of events (opinions as to cause should not be solicited at this time).

- Note the location, movement, displacement, liquid levels, sounds, noises, or other sensory perceptions experienced by the participants or witnesses.

- Obtain weather data.

- Ascertain the location and position of all switches, controls, etc.

- Verify the condition of all safeguards.

After the facts have been collected, causal factors should be identified. Two causal factors typically exist, apparent and contributing; and there may be several of each. Apparent factors are those which are self-evident or readily deduced. Contributing factors usually become apparent by questioning why the apparent causal factor was allowed to exist.

TABLE 11-1
EMERGENCY TELEPHONE NUMBERS

Public Agencies

China Lake Fire Department	911
Ambulance	911
China Lake Police Department	911
OSHA	805-395-2718

Key Project and IT Personnel

Program Manager	Louis E. Stout (510) 372-9100
Program CIH	William Hetrick (510) 372-9100
Project Manager	John Warren (714) 660-5465
Senior Project Engineer	Christopher Corey (714) 660-5387
Project Superintendent	Dennis Alexander (619) 446-2144
Site Health and Safety Officer (SHSO)	Jim Truman (619) 446-2144
Alternate SHSO	Joel Brown (619) 446-2144
Occupational Physician:	
Dr. Elaine Theizaiult	(800) 229-3674
Medical Incident Reporting:	
Stacy Shirk	(510) 372-9100
Navy Contact (ROICC)	Jim McDonald (619) 927-1508
Base Health and Safety Office	(619) 939-2315
Agency for Toxic Substance and Disease Registry (ATSDR)	(404) 639-0615
Navy On-Scene Commander (NOSCDR)	Lt. Burke (619)939-3324

Medical Care Facilities

Hospital Name:	Ridgecrest Community Hospital
Hospital Address:	1081 North China Lake Blvd.
Hospital Telephone:	(619) 446-3551

Other Important Telephone Numbers

Explosives Safety Officer	TBD
Confined Space Program Manager	(619) 939-2781
Base Fire Inspector	(619) 939-2402
Base Operator	(619) 939-9011

12.0 Summary and Checklist

12.1 Summary

A brief summary of the major requirements of the project SHSP will be provided in the site-specific training.

12.2 Checklist

- ☐ Air horn
- ☐ First aid kits (one per vehicle and facility)
- ☐ Fire extinguishers (one per vehicle and facility)
- ☐ Safety glasses or goggles, ANSI approved
- ☐ Hard hats, ANSI approved
- ☐ Ear plugs
- ☐ Noise dosimeters/sound level meter with calibrator
- ☐ Combustible gas/oxygen indicator
- ☐ Impermeable gloves
- ☐ Work gloves
- ☐ Steel toed work boots, ANSI approved
- ☐ Tyvek suits coated (yellow)
- ☐ Photoionization detector and gas
- ☐ Duct tape
- ☐ Trash bags
- ☐ Eyewash
- ☐ Portable toilet
- ☐ Drinking water and disposable cups
- ☐ Air purifying respirators (full-face)
- ☐ Organic vapor/HEPA cartridges, NIOSH approved
- ☐ Traffic control signs and vests
- ☐ Thermometer
- ☐ Barricades with lights
- ☐ Traffic cones
- ☐ Barricade tape
- ☐ Towels
- ☐ Personal sampling pumps
- ☐ Pulse rate meter
- ☐ Airflow calibrator
- ☐ Charcoal tubes
- ☐ Filter cassettes
- ☐ SHSP

APPENDIX A

SITE AND HOSPITAL LOCATION MAPS

DRAWING NUMBER	761123
CHECKED BY	
APPROVED BY	
DRAWN BY	MLWH 10/2/95

Ridgecrest Community Hospital
1081 North China Lake Blvd.
619-446-3551
Directions to hospital:

- exit Naval Weapons Center China Lake from the main gate
- immediately turn left onto North China Lake Blvd.
- Ridgecrest Community is located 1 block on the left

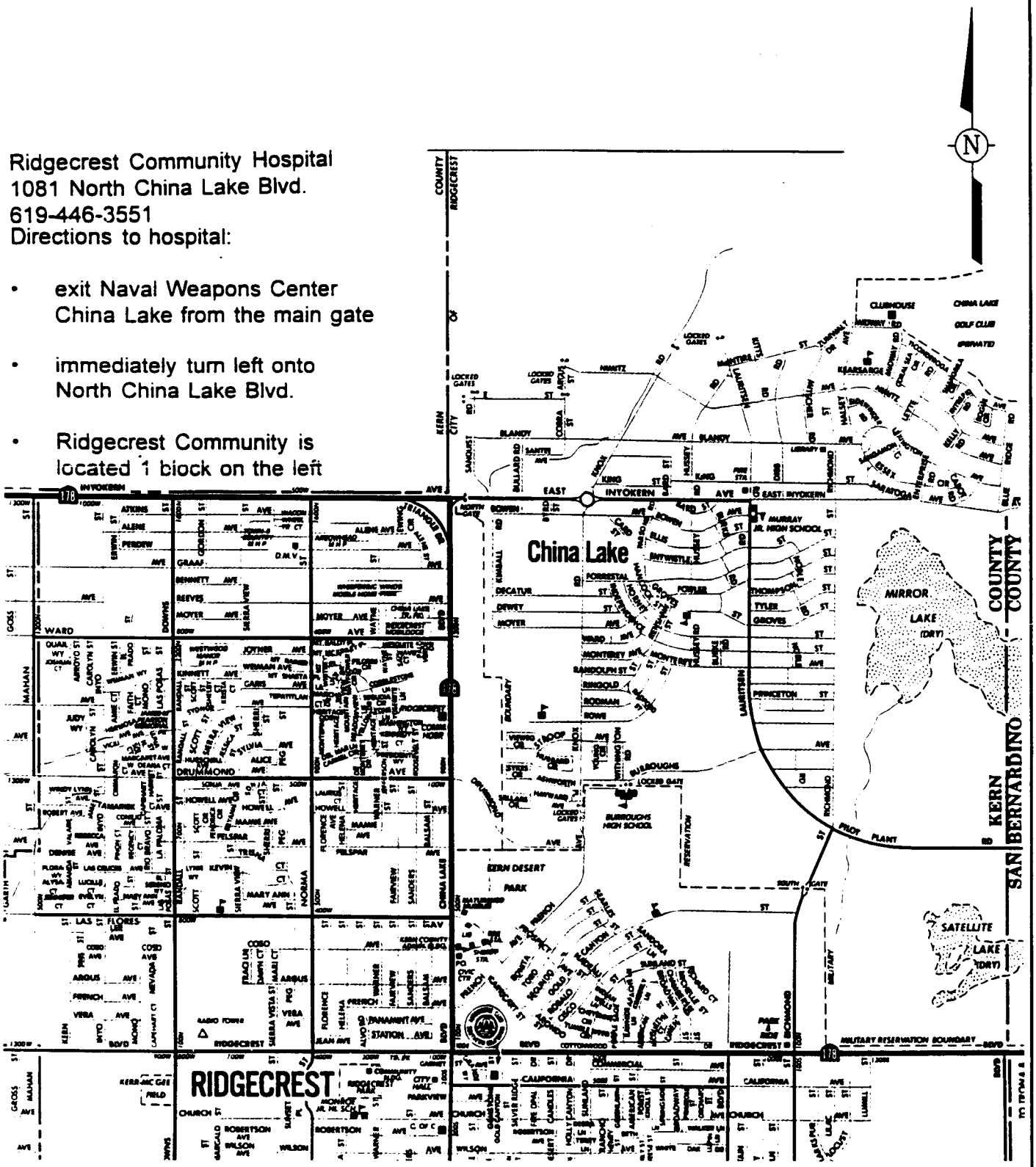

FIGURE 11-1

SITE MAP

PREPARED FOR

NAWS CHINA LAKE DO #18
CHINA LAKE, CALIFORNIA

INTERNATIONAL TECHNOLOGY CORPORATION

REFERENCE: "AAA" KERN COUNTY TRAVEL MAP

VDB-12(MS18)

APPENDIX B

MATERIAL SAFETY DATA SHEETS

Occupational Health Guideline for Dinitrobenzene (All Isomers)

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

SUBSTANCE IDENTIFICATION

- Formula: Ortho: 1,2-$C_6H_4(NO_2)_2$; Meta: 1,3-$C_6H_4(NO_2)_2$; Para: 1,4-$C_6H_4(NO_2)_2$
- Synonyms: O-dinitrobenzene; 1,2-dinitrobenzene; m-dinitrobenzene; 1,3-dinitrobenzene; p-dinitrobenzene; 1,4-dinitrobenzene
- Appearance: Pale yellow solid.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for dinitrobenzene is 1 milligram of dinitrobenzene per cubic meter of air (mg/m^3) averaged over an eight-hour work shift. The American Conference of Governmental Industrial Hygienists has recommended for dinitrobenzene a Threshold Limit Value of 0.15 ppm with a skin notation.

HEALTH HAZARD INFORMATION

- **Routes of exposure**

Dinitrobenzene can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. It is readily absorbed through the skin, either as solid, liquid, or vapor. Even a small amount absorbed from clothes or shoes may cause toxic symptoms.

- **Effects of overexposure**

Dinitrobenzene may affect the ability of blood to carry oxygen. A bluish discoloration of the skin may occur with headache, irritability, dizziness, weakness, nausea, vomiting, shortness of breath, drowsiness, and unconsciousness. If treatment is not given promptly, death may occur. The onset of symptoms may be delayed. Consuming alcohol may make symptoms worse. Dinitrobenzene may also cause an unpleasant taste or burning sensation in the mouth, dry, throat, and thirst. The eyes, hair, and skin may become yellowish. Dinitrobenzene may cause reduced vision. In addition, liver damage may occur. Repeated or prolonged exposure to dinitrobenzene may cause anemia.

- **Reporting signs and symptoms**

A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to dinitrobenzene.

- **Recommended medical surveillance**

The following medical procedures should be made available to each employee who is exposed to dinitrobenzene at potentially hazardous levels:

1. Initial Medical Examination:

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Examination of the blood, liver, cardiovascular system, and eyes should be stressed.

—A complete blood count: Dinitrobenzene has been shown to cause methemoglobinemia. Those with blood disorders may be at increased risk. A complete blood count should be performed, including a red cell count, a white cell count, a differential count of a stained smear, as well as hemoglobin and hematocrit. Observe for Heinz bodies.

—Liver function tests: Since liver damage has been observed in humans exposed to dinitrobenzene, a profile of liver function should be performed by using a medically acceptable array of biochemical tests.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on an annual basis. Methemoglobin determinations should be performed at any time overexposure is suspected or signs and symptoms of toxicity occur.

- **Summary of toxicology**

Absorption of any isomer of dinitrobenzene, whether from inhalation of the vapor or dust or skin absorption

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These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service Center for Disease Control
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

of the solid, causes anoxia due to the formation of methemoglobin: chronic exposure produces anemia. Exposed workers have complained of an unpleasant taste, burning sensation in the mouth, dry throat, and thirst. Signs and symptoms of overexposure are due to the loss of oxygen-carrying capacity of the blood. Rapid absorption through the intact skin is frequently the main route of entry. The onset of symptoms of methemoglobinemia is insidious and may be delayed for up to 4 hours; headache is commonly the first symptom and may become quite intense as the severity of methemoglobinemia progresses. Cyanosis develops early in the course of intoxication, first in the lips, the nose, and the ear lobes, and is often recognized by fellow workers. Cyanosis occurs when the methemoglobin concentration is 15% or more. Until the methemoglobin concentration approaches approximately 40%, the individual may feel well, have no complaints, and may insist nothing is wrong. At methemoglobin concentrations of over 40%, there usually is weakness and dizziness; up to 70% concentration there may be ataxia, dyspnea on mild exertion, tachycardia, nausea, vomiting, and drowsiness. The ingestion of alcohol has been reported to aggravate the toxic effects of dinitrobenzene. Chronic exposure of workers causes anemia; there are scattered reports of liver injury. Visual impairment has been reported in the form of reduced visual acuity and central scotomas, particularly for red and green colors; yellow discoloration of the conjunctiva and sclera is common. Yellow-brown discoloration of the hair and exposed skin of workers has been reported.

CHEMICAL AND PHYSICAL PROPERTIES

- **Physical data**

1. Molecular weight: 168.1
2. Boiling point (760 mm Hg): Ortho: 318 C (604 F); Meta: 300 C (572 F); Para: 297 C (566 F)
3. Specific gravity (water = 1): Ortho: 1.59; Meta: 1.57; Para: 1.63
4. Vapor density (air = 1 at boiling point of dinitrobenzene): 5.8
5. Melting point: Ortho: 117 C (243 F); Meta: 90 C (194 F); Para: 173 C (343 F)
6. Vapor pressure at 20 C (68 F): All isomers: Much less than 1 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Ortho: 0.01; Meta: 0.05; Para: 0.01
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Reactivity**

1. Conditions contributing to instability: Dinitrobenzene may detonate when subject to shock or when heated under confinement.
2. Incompatibilities: Contact with strong oxidizers may cause fires and explosions. Contact with caustics and metals such as tin and zinc may cause evolution of heat and increase in pressure.
3. Hazardous decomposition products: Toxic gases and vapors (such as oxides of nitrogen and carbon monoxide) may be released in a fire involving dinitrobenzene.
4. Special precautions: Liquid dinitrobenzene will attack some forms of plastics, rubber, and coatings.

- **Flammability**

1. Flash point: Explodes
2. Impact sensitivity (minimum fall of a 2 kg weight to cause at least one explosion in ten trials): Greater than 100 centimeters
2. Autoignition temperature: Data not available
4. Flammable limits in air, % by volume: Data not available
5. Extinguishant: None

- **Warning properties**

Grant states that "surface contact (with dinitrobenzene) may cause yellowing of the skin, and purportedly of the conjunctiva and cornea, but no original observations on corneal changes were found in the literature." According to Grant, "2,4-dinitrobenzene caused no inflammatory response when this substance was brought into contact with the uveal tract, retina, or conjunctiva" of guinea pigs.

MONITORING AND MEASUREMENT PROCEDURES

- **General**

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

- **Method**

An analytical method for dinitrobenzene is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 4, 1978, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00317-3).

RESPIRATORS

- Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted

are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

• In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

• Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent skin contact with dinitrobenzene or liquids containing dinitrobenzene, where skin contact may occur.

• If employees' clothing may have become contaminated with solid dinitrobenzene, employees should change into uncontaminated clothing before leaving the work premises.

• Clothing contaminated with dinitrobenzene should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of dinitrobenzene from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the dinitrobenzene, the person performing the operation should be informed of dinitrobenzene's hazardous properties.

• Where exposure of an employee's body to liquids containing dinitrobenzene may occur, facilities for quick drenching of the body should be provided within the immediate work area for emergency use.

• Non-impervious clothing which becomes wet with liquids containing dinitrobenzene should be removed immediately and non-impervious clothing which becomes contaminated with dinitrobenzene should be removed promptly and such clothing should not be reworn until the dinitrobenzene is removed from the clothing.

• Employees should be provided with and required to use dust- and splash-proof safety goggles where dinitrobenzene or liquids containing dinitrobenzene may contact the eyes.

SANITATION

• Skin that becomes wet with liquids containing dinitrobenzene should be immediately washed or showered with soap or mild detergent and water to remove any dinitrobenzene.

• Skin that becomes contaminated with dinitrobenzene should be promptly washed or showered with soap or mild detergent and water to remove any dinitrobenzene.

• Workers subject to skin contact with dinitrobenzene should wash with soap or mild detergent and water any areas of the body which may have contacted dinitrobenzene at the end of each work day.

• Eating and smoking should not be permitted in areas where dinitrobenzene or liquids containing dinitrobenzene are handled, processed, or stored.

• Employees who handle dinitrobenzene or liquids containing dinitrobenzene should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to dinitrobenzene may occur and control methods which may be effective in each case:

Operation	Controls
Use in preparation of dyes and dye intermediates; use in organic synthesis in chemical industry as photographic developers, and as explosives	Process enclosure; general dilution ventilation; local exhaust ventilation; personal protective equipment
Use in plastics industry as a substitute for camphor in production of celluloid; as a polymerization inhibitor	Process enclosure; general dilution ventilation; local exhaust ventilation; personal protective equipment
Use as an explosive by substituting for TNT; use in explosive shells	Material substitution

EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

• **Eye Exposure**

If dinitrobenzene or liquids containing dinitrobenzene get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.

• **Skin Exposure**

If dinitrobenzene or liquids containing dinitrobenzene get on the skin, immediately wash the contaminated skin using soap or mild detergent and water. If dinitrobenzene or liquids containing dinitrobenzene penetrate through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Get medical attention promptly.

• **Breathing**

If a person breathes in large amounts of dinitrobenzene, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

• **Swallowing**

When dinitrobenzene or liquids containing dinitroben-

zene have been swallowed and the person is conscious, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having him touch the back of his throat with his finger. Do not make an unconscious person vomit. Get medical attention immediately.

• **Rescue**

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

SPILL AND DISPOSAL PROCEDURES

• Persons not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed.

• If dinitrobenzene is spilled, the following steps should be taken:

1. Remove all ignition sources.
2. Ventilate area of spill.
3. For small quantities, sweep onto paper or other suitable material and burn in a suitable combustion chamber which allows burning in an unconfined condition and is equipped with an appropriate effluent gas cleaning device. Large quantities may be reclaimed; however, if this is not practical, dissolve in fuel oil and atomize in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

• Waste disposal methods:

Dinitrobenzene may be disposed of:

1. By making packages of dinitrobenzene in paper or other flammable material and burning in a suitable combustion chamber which allows burning in an unconfined condition and is equipped with an appropriate effluent gas cleaning device.
2. By dissolving dinitrobenzene in fuel oil and atomizing in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

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RESPIRATORY PROTECTION FOR DINITROBENZENE (ALL ISOMERS)

Condition	Minimum Respiratory Protection* Required Above 1 mg/m³
Particulate Concentration	
5 mg/m³ or less	Any dust and mist respirator, except single-use.
10 mg/m³ or less	Any dust and mist respirator, except single-use or quarter-mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
50 mg/m³ or less	A high efficiency particulate filter respirator with a full facepiece. Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
200 mg/m³ or less	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 200 mg/m³ or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
Escape	Any dust and mist respirator, except single-use. Any escape self-contained breathing apparatus.

*Only NIOSH-approved or MSHA-approved equipment should be used.

HMX

CHEMICAL NAME
CYCLOTETRAMETHYLENETETRANITRAMINE

FORMULA
C4H8N8O8

SYNONYMS
CYCLOTETRAMETHYLENE TETRANITROAMINE
HMX

UN 0226
OCTOGEN
1,3,5,7-TETRAZOCINE, OCTAHYDRO-1,3,5,7-TETRANITRO-
BETA-HMY
HW 4
LX 14-0
OKTOGEN
TETRAMETHYLENENITRAMINE
OHS06100

PERMISSIBLE EXPOSURE LIMIT
NONE ESTABLISHED
CERCLA HAZARD RATINGS - TOXICITY 2 - IGNITABILITY 0 - REACTIVITY 3 -
PERSISTENCE 0

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
NONE SPECIFIED

PHYSICAL DESCRIPTION

COLORLESS CRYSTALS

CHEMICAL AND PHYSICAL PROPERTIES
MOLECULAR WEIGHT: 296.20
BOILING POINT AT 1 ATM, F: EXPLODES
SOLUBILITY IN WATER, G/100 G WATER AT 20C: INSOLUBLE
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF OC): EXPLODES
VAPOR PRESSURE @ 20 C, MMHG: 0.00 MM
MELTING POINT, F: 527 F
UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: EXPLOSIVE

LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: EXPLOSIVE
AUTOIGNITION TEMPERATURE: 549 F
SPECIFIC GRAVITY: 1.78-1.96

INCOMPATIBILITIES
EXPLOSIVE HAZARD AT HIGH TEMPERATURES

PERSONAL PROTECTIVE EQUIPMENT
NO NIOSH/OSHA DATA; RECOMMEND
PREVENT ANY POSSIBILITY OF SKIN CONTACT

WEAR IMPERVIOUS CLOTHING
WEAR GLOVES
WEAR FACESHIELD (8 INCH MINIMUM)

PLACE CONTAMINATED CLOTHING IN CLOSED CONTAINERS FOR STORAGE UNTIL

LOWER; AND 10,000 POUNDS FOR ALL OTHER CHEMICALS FOR WHICH FACILITIES ARE REQUIRED TO PREPARE OR HAVE AVAILABLE MSDS'S.
40CFR370
54FR12992 3/29/89

SECTION 312 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATIO ACT OF 1986 REQUIRES OWNERS OR OPERATORS OF FACILITIES COVERED BY

SECTION 311 TO SUBMIT INVENTORY FORMS (TIER I AND TIER II FORMS). THE THRESHOLDS WOULD APPLY ON OR BEFORE OCTOBER 17, 1989, FOR MANUFACTURING FACILITIES AND SEPTEMBER 24, 1990, FOR NON-MANUFACTURING FACILITIES. THE PROPOSED REPORTING THRESHOLDS ARE AS FOLLOWS: FOR EXTREMELY HAZARDOUS SUBSTANCES DESIGNATED UNDER SECTION 302 OF TITLE III: 500 POUNDS OR THE TPQ, WHICHEVER IS LOWER; AND 10,000 POUNDS FOR ALL OTHER CHEMICALS FOR WHICH FACILITIES ARE REQUIRED TO PREPARE OR HAVE AVAILABLE MSDS'S.
40CFR370
54FR12992 3/29/89

MEDICAL SURVEILLANCE REQUIRED
NO NIOSH/OSHA DATA; ADVISE:
EKG RECOMMENDED IF EMPLOYEE TO WEAR FULL-FACE RESPIRATOR
GENERAL MEDICAL HISTORY
40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES

MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS
48FR38187 08/22/83
48FR39225 08/30/83 (EFFECTIVE DATE CORRECTION)
PHYSICIAN EXAMINATION
INDUSTRIAL EXPOSURE HISTORY
PRE-PLACEMENT AND ANNUAL EXAMS
MEDICAL WARNING FOR REFUSAL OF MEDICAL EXAMINATION
SKIN EXAM

VISION TEST
GASTROINTESTINAL

CERTIFICATIONS
NO FEDERAL AGENCY REQUIREMENT, BUT DUE TO HAZARDOUS NATURE OF SUBSTANCE, ADVISE FOLLOWING:

HEALTH STATUS CLASSIFICATION

OSHA RESPIRATOR CERTIFICATION 29CFR1910.134

DEPARTMENT OF TRANSPORTATION IF OPERATES HEAVY EQUIPMENT

EMPLOYEE HAZARDOUS MATERIALS EDUCATION RECEIPT

EMPLOYEE MEDICAL RECORDS RECEIPT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES

ABDOMINAL CRAMPS
VOMITING

IRST AID PROCEDURES FOLLOWING EXPOSURE

IF THIS CHEMICAL GETS INTO THE EYES, WASH THE EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL HAS BEEN INHALED, REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

WHEN THIS CHEMICAL HAS BEEN SWALLOWED AND PERSON IS CONSCIOUS, IMMEDIATELY GIVE PERSON LARGE QUANTITIES OF WATER. AFTER WATER HAS BEEN SWALLOWED, TRY TO GET THE PERSON TO VOMIT BY HAVING HIM TOUCH THE BACK OF HIS THROAT WITH HIS FINGER. DO NOT MAKE AN UNCONSCIOUS PERSON VOMIT. GET MEDICAL ATTENTION IMMEDIATELY.

ORGANS
EYES
SKIN
GASTROINTESTINAL
CENTRAL NERVOUS SYSTEM

STATUS OF REGULATORY ENFORCEMENT

OSHA STANDARD 29CFR1910.1200 HAZARD COMMUNICATION
REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS HAVING WORKPLACES IN THE MANUFACTURING DIVISION, STANDARD INDUSTRIAL CLASSIFICATION CODES 20 THROUGH 39, TO PROVIDE INFORMATION TO THEIR EMPLOYEES

CONCERNING HAZARDOUS CHEMICALS BY MEANS OF HAZARD COMMUNICATION PROGRAMS INCLUDING LABELS, MATERIAL SAFETY DATA SHEETS, TRAINING, AND ACCESS TO WRITTEN RECORDS
48FR53280 11/25/83

FOLLOWING OSHA STANDARDS APPLICABLE TO SUBSTANCES LISTED 29CFR1910, OTHERWISE ADVISE:

OSHA STANDARD 29CFR1910.94 VENTILATION

OSHA STANDARD 29CFR1910.134 RESPIRATORY PROTECTION

OSHA STANDARD 29CFR1910.20 ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

OSHA STANDARD 29CFR1910.132 PERSONAL PROTECTIVE EQUIPMENT

OSHA STANDARD 29CFR1910.141 SANITATION

****

FOLLOWING INFORMATION RECOMMENDED FOR THE EMERGENCY HANDLING OF HAZARDOUS MATERIALS

IF MATERIAL ON FIRE OR INVOLVED IN FIRE:
* DANGEROUSLY EXPLOSIVE
* DO NOT FIGHT FIRE IN A CARGO OF EXPLOSIVES
* EVACUATE AREA AND LET BURN

IF MATERIAL IS NOT ON FIRE AND IS NOT INVOLVED IN FIRE:
* KEEP SPARKS, FLAMES AND OTHER IGNITION SOURCES AWAY
* KEEP MATERIAL WET
* WET SPILLED MATERIAL BEFORE PICKING IT UP

* DO NOT ATTEMPT TO SWEEP UP DRY MATERIAL

PERSONNEL PROTECTION:
* AVOID BREATHING DUST/VAPORS/FUMES FROM MATERIAL
* WEAR BOOTS, PROTECTIVE GLOVES AND GAS TIGHT GOGGLES
* DO NOT HANDLE BROKEN PACKAGES WITHOUT PROTECTIVE EQUIPMENT
* WASH AWAY ANY MATERIALS WHICH MAY HAVE CONTACTED THE BODY WITH COPIOUS AMOUNTS OF WATER OR SOAP AND WATER
* WEAR SELF-CONTAINED BREATHING APPARATUS WHEN FIGHTING FIRES INVOLVI THIS MATERIAL

EVACUATION PROCEDURE:
* IF MATERIAL ON FIRE, EVACUATE AREA FOR RADIUS 5000 FEET

WASTE

****

OBSERVE ALL FEDERAL, STATE OR LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. CONTACT LOCAL AND/OR STATE ENVIRONMENTAL

AUTHORITIES TO INSURE PROPER COMPLIANCE.

****

EPA HAZARDOUS WASTE NUMBER D003
WASTE WHICH EXHIBITS THE CHARACTERISTIC OF REACTIVITY 40CFR261.23

THIS SUBSTANCE MEETS THE DEFINITION OF A HAZARDOUS WASTE AS DEFINED BY THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) (40CFR260) AND IS SUBJECT TO THE FOLLOWING CONSIDERATIONS:

40CFR260 HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

PROVIDES DEFINITIONS OF TERMS, GENERAL STANDARDS, AND OVERVIEW INFORMATION APPLICABLE TO 40CFR PARTS 260-265

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

IDENTIFIES THOSE SOLID WASTES WHICH ARE SUBJECT TO REGULATION AS

A CALENDAR MONTH MUST SUBMIT AN "EXCEPTION REPORT" TO THE ENVIRONMENTAL PROTECTION AGENCY REGIONAL ADMINISTRATOR (FOR THE REGION IN WHICH THE GENERATION IS LOCATED) IF HE HAS NOT RECEIVE A COPY OF THE MANIFEST WITH THE HANDWRITTEN SIGNATURE OF THE OWNER OR OPERATOR OF THE DESIGNATED FACILITY WITHIN 45 DAYS OF THE DATE THE WASTE WAS ACCEPTED BY THE INITIAL TRANSPORTER.

2). A GENERATOR OF GREATER THAN 100 KILOGRAMS BUT LESS THAN 1000 KILOGRAMS OF HAZARDOUS WASTE IN A MONTH WHO DOES NOT RECEIVE A COPY OF THE MANIFEST WITH THE HANDWRITTEN SIGNATURE OF THE OWNER OR OPERATOR OF THE DESIGNATED FACILITY WITHIN 60 DAYS OF THE DAT

THE WASTE WAS ACCEPTED BY THE INITIAL TRANSPORTER MUST SUBMIT A LEGIBLE COPY OF THE MANIFEST, WITH SOME INDICATION THAT THE GENERATOR HAS NOT RECEIVED CONFIRMATION OF DELIVERY, TO THE EPA REGIONAL ADMINISTRATOR FOR THE REGION IN WHICH THE GENERATOR IS LOCATED.

EFFECTIVE DATE: 3/23/88
(52FR35898 9/23/87)

CAS NUMBER
2691-41-0

REGISTRY TOXIC CHEMICALS NUMBER
XF7450000

BULLETINS

SPECIAL INFORMATION

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Sheet No. 713
Lead (Inorganic)

Issued: 8/90

Section 1. Material Identification

32

Lead (Inorganic) (Pb) Description: Exists widely throughout the world in a number of ores. Its main commercial source is galena (lead sulphide). Lead mineral is separated from crude ores by blast-furnace smelting, drossing, or electrolytic refining. Lead is used mostly in manufacturing storage batteries. Other uses are in manufacturing tetraethyllead and both organic and inorganic lead compounds in ceramics, plastics, and electronic devices; in producing ammunition, solder, cable covering, sheet lead, and other metal products (brass, pipes, caulking); in metallurgy; in weights and as ballast; as a chemical intermediate for lead alkyls and pigments; as a constuction material for the tank linings, piping, and equipment used to handle the corrosive gases and liquids used in sulfuric acid manufacturing, petroleum refining, halogenation, sulfonation, extraction, and condensation; and for x-ray and atomic radiation protection.
Other Designations: CAS No. 7439-92-1, lead oxide; lead salts, inorganic; metallic lead; plumbum.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(73) for a suppliers list.

R	0
I	4
S	-
K	0

Genium

HMIS
H 3
F 1
R 0
PPG*
* Sec. 8

Cautions: *Inorganic lead is a potent systemic poison.* Organic lead (for example, tetraethyl lead) has severe, but different, health effects. Occupational lead poisoning is due to inhalation of dust and fumes. Major affected organ systems are the nervous, blood, and reproductive systems, and kidneys. Health impairment or diseases may result from a severe acute short- or long-term exposure.

Section 2. Ingredients and Occupational Exposure Limits

Lead (inorganic) fumes and dusts, as Pb, ca 100%

1989 OSHA PELs (Lead, inorganic compounds)
8-hr TWA: 50 µg/m³
Action Level TWA*: 30 µg/m³

29 CFR 1910.1025 Lead Standard
Blood Lead Level: 40 µg/100 g

1989-90 ACGIH TLV (Lead, inorganic, fumes and dusts)
TLV-TWA: 150 µg/m³

1988 NIOSH REL
10-hr TWA: <100 µg/m³

1985-86 Toxicity Data†
Human, inhalation, TC_{Lo}: 10 µg/m³ affects gastrointestinal tract and liver
Human, oral, TD_{Lo}: 450 mg/kg ingested over 6 yr affects peripheral and central nervous systems
Rat, oral, TD_{Lo}: 790 mg/kg affects multigeneration reproduction

* Action level applies to employee exposure without regard to respirator use.
† See NIOSH, *RTECS* (OF7525000), for additional mutative, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 3164 °F (1740 °C)
Melting Point: 621.3 °F (327.4 °C)
Vapor Pressure: 1.77 mm Hg at 1832 °F (1000 °C)
Viscosity: 3.2 cp at 621.3 °F (327.4 °C)
Molecular Weight: 207.20
Specific Gravity (20 °C/4 °C): 11.34
Water Solubility: Relatively insoluble in hot or cold water*

Appearance and Odor: Bluish-white, silvery, gray, very soft metal.

* Lead dissolves more easily at a low pH.

Section 4. Fire and Explosion Data

Flash Point: None reported	Autoignition Temperature: None reported	LEL: None reported	UEL: None reported

Extinguishing Media: Use dry chemical, carbon dioxide, water spray, or foam to extinguish fire.
Unusual Fire or Explosion Hazards: Flammable and moderately explosive in the form of dust when exposed to heat or flame.
Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Lead is stable at room temperature in closed containers under normal storage and handling conditions. It tarnishes on exposure to air. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Mixtures of hydrogen peroxide + trioxane explode on contact with lead. Lead is incompatible with sodium azide, zirconium, disodium acetylide, and oxidants. A violent reaction on ignition may occur with concentrated hydrogen peroxide, chlorine trifluoride, sodium acetylide (with powdered lead), ammonium nitrate (below 200 °C with powdered lead). Lead is attacked by pure water and weak organic acids in the presence of oxygen. Lead is resistant to tap water, hydrofluoric acid, brine, and solvents.
Conditions to Avoid: Rubber gloves containing lead may ignite in nitric acid.
Hazardous Products of Decomposition: Thermal oxidative decomposition of lead can produce highly toxic fumes of lead.

Section 6. Health Hazard Data

Carcinogenicity: Although the NTP and OSHA do not list lead as a carcinogen, the IARC lists it as probably carcinogenic to humans, but having (usually) no human evidence. However, the literature reports instances of lead-induced neoplasms, both benign and malignant, of the kidney and other organs in laboratory rodents. Excessive exposure to lead has resulted in neurologic disorders in infants. Experimental studies show lead has reproductive and teratogenic effects in laboratory animals. Human male and female reproductive effects are also documented.
Summary of Risks: Lead is a potent, systemic poison that affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal (GI) system. The most important way lead enters the body is through inhalation, but it can also be ingested when lead dust or unwashed hands contaminate food, drink, or cigarettes. Much of ingested lead passes through feces without absorption into the body. Adults may absorb only 5 to 15% of ingested lead; children may absorb a much larger fraction. Once in the body, lead enters the bloodstream and circulates to various organs. Lead concentrates and remains in bone for many years. The amount of lead the body stores increases as exposure continues, with possibly cumulative effects. Depending on the dose entering the body, lead can be deadly within several days or affect health after many years. Very high doses can cause brain damage (encephalopathy).
Medical Conditions Aggravated by Exposure: Lead may aggravate nervous system disorders (e.g., epilepsy, neuropathies), kidney diseases, high blood pressure (hypertension), infertility, and anemia. Lead-induced anemia and its effect on blood pressure can aggravate cardiovascular disease.

Continue on next page

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Section 6. Health Hazard Data, *continued*

Target Organs: Blood, central and peripheral nervous systems, kidneys, and gastrointestinal (GI) tract.
Primary Entry Routes: Inhalation, ingestion.
Acute Effects: An acute, short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term posures of this magnitude are rare. Reversible kidney damage can occur from acute exposure, as well as anemia.
Chronic Effects: Symptoms of chronic long-term overexposure include appetite loss, nausea, metallic taste in the mouth, lead line on gingival (gum) tissue, constipation, anxiety, anemia, pallor of the face and the eye grounds, excessive tiredness, weakness, insomnia, headache, nervous irritability, fine tremors, numbness, muscle and joint pain, and colic accompanied by severe abdominal pain. Paralysis of wrist and, less often, ankle extensor muscles may occur after years of increased lead absorption. Kidney disease may also result from chronic overexposure, but few, if any, symptoms appear until severe kidney damage has occurred. Reproductive damage is characterized by decreased sex drive, impotence, and sterility in men; and decreased fertility, abnormal menstrual cycles, and miscarriages in women. Unborn children may suffer neurologic damage or developmental problems due to excessive lead exposure in pregnant women. Lead poisoning's severest result is encephalopathy manifested by severe headache, convulsions, coma, delirium, and possibly death.
FIRST AID
Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.
Skin: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Consult a physician if any health complaints develop.
Inhalation: Remove exposed person to fresh air and support breathing as needed. Consult a physician.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. If large amounts of lead were ingested, induce vomiting with Ipecac syrup. Consult a physician immediately.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Physician's Note: For diagnosis, obtain blood pressure, blood lead level (PbB), zinc protoporphyrin (ZPP), complete blood count for microcytic anemia and basophilic stippling, urinalysis, and blood urea nitrogen (BUN) of creatinine. Examine peripheral motor neuropathy, pallor, and gingival lead line. Use Ca-EDTA to treat poison, but *never* chelate prophylactically. Consult an occupational physician or toxicologist.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel and evacuate all unnecessary personnel immediately. Cleanup personnel should protect against inhalation of dusts or fume and contact with skin or eyes. Avoid creating dusty conditions. Water sprays may be used in large quantities to prevent the formation of dust. Cleanup methods such as vacuuming (with an appropriate filter) or wet mopping minimizes dust dispersion. Scoop the spilled material into closed containers for disposal or reclamation. Follow applicable OSHA regulations (29 CFR 1910.120).
Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
EPA Designations
Listed as a RCRA Hazardous Waste (40 CFR 261.33, Appendix II—EP Toxicity Test Procedures)
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1 lb (0.454 kg) [* per Clean Water Act, Sec. 307(a)]
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
Listed as a SARA Toxic Chemical (40 CFR 372.65)
OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).
Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*
Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact. Protective clothing made of man-made fibers and lacking turn-ups, pleats, or pockets retain less dust from lead.
Ventilation: Provide general and local ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.[103]
Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.
Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially washing hands before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area away from all incompatible materials, direct sunlight, and heat and ignition sources.
Engineering Controls: Educate worker about lead's hazards. Follow and inform employees of the lead standard (29 CFR 1910.1025). Avoid inhalation of lead dust and fumes and ingestion of lead. Use only with appropriate personal protective gear and adequate ventilation. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Avoid creating dusty conditions. Segregate and launder contaminated clothing. Take precautions to protect laundry personnel. Practice good personal hygiene and housekeeping procedures. For a variety of reasons, the lead concentration in workroom air may not correlate with the blood lead levels in individuals.
Other Precautions: Provide preplacement and periodic medical examinations which emphasize blood, nervous system, gastrointestinal tract, and kidneys, including a complete blood count and urinalysis. Receive a complete history including previous surgeries and hospitalization, allergies, smoking history, alcohol consumption, proprietary drug intake, and occupational and nonoccupational lead exposure. Maintain records for medical surveillance, airborne exposure monitoring, employee complaints, and physician's written opinions for at least 40 years or duration of employment plus 20 years. Measurement of blood lead level (PbB) and zinc protoporphyrin (ZPP) are useful indicators of your body's lead absorption level. Maintain worker PbBs at or below 40 µg/100 g of whole blood. To minimize adverse reproductive health effects to parents and developing fetus, maintain the PbBs of workers intending to have children below 30 µg/100 g. Elevated PbBs increase your risk of disease, and the longer you have elevated PbBs, the greater your chance of substantial permanent damage.

Transportation Data (49 CFR 172.102)
Shipping Name: Lead compounds, soluble, n.o.s.
Hazard Class: 6.1
ID No.: UN2291
IMO Label: St. Andrews Cross (X, Stow away from foodstuffs)
IMDG Packaging Group: III

MSDS Collection References: 26, 38, 73, 84, 85, 88, 89, 90, 100, 101, 103, 109, 124, 126, 132, 133, 134, 136, 138, 139, 142, 143
Prepared by: MJ Allison, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: MJ Upfal, MD, MPH; Edited by: JR Stuart, MS

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Sheet No. 723
Nickel Metal

Issued: 8/90

Section 1. Material Identification

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Nickel (Ni) Description: Found in ores in combination with sulphur, oxygen, antimony, arsenic, and/or silica. The Orford (sodium sulfide and electrolysis) and the Mond (nickel carbonyl) processes are used to refine nickel. Used in electroplating, casting operations for machine parts, manufacturing acid-resisting and magnetic alloys and tapes, synthesizing acrylic esters; in surgical and dental prostheses, coinage, catalytic gastrification of coal, paint pigments, Ni-Cd batteries, ceramics and glass; and as a catalyst in hydrogenation of fats and oils.
Other Designations: CAS No. 7440-02-0, Raney alloy, Raney nickel.*
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*[75] for a suppliers list.

Cautions: Nickel is an eye, skin, and respiratory tract irritant. *Chronic inhalation of nickel dust or fumes may cause cancer of the lungs and nasal passages. Nickel powder (Raney nickel) is a dangerous fire hazard.*

R	0
I	3
S	2
K	1

NFPA: 4 / 2 / 0 — catalyst
HMIS
H 2
F 4
R 0
PPG†

Genium: 1 / 2 / 0 / - — metal
HMIS
H 2
F 1
R 0
PPG†
† Sec. 8

* Raney nickel is prepared by leaching (with 25% caustic soda solution) aluminum from an alloy of 50% aluminum and 50% nickel. It is used as a catalyst for hydrogenation. Raney nickel, a silvery gray metal powder, is a dangerous fire risk and ignites spontaneously in air (Sec. 4). Nickel catalysts cause many industrial accidents.

Section 2. Ingredients and Occupational Exposure Limits

Nickel, ca 100%

1989 OSHA PEL	1989-90 ACGIH TLV	1988 NIOSH REL	1985-86 Toxicity Data*
8-hr TWA: 1 mg/m³	TLV-TWA: 1 mg/m³	0.015 mg/m³	Dog, intravenous, LD_{Lo}: 10 mg/kg Guinea pig, oral, LD_{Lo}: 5 mg/kg Rat, implant, TD_{Lo}: 250 mg/kg

* See NIOSH, *RTECS* (QR5950000), for additional mutative, reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data

Boiling Point: 4946 °F (2730 °C)
Melting Point: 2651 °F (1455 °C)
Vapor Pressure: 1 mm at 3290 °F (1810 °C)
Atomic Weight: 58.71
Density: 8.90 at 25 °C
Water Solubility: Insoluble

Appearance and Odor: A silvery-white, hard, malleable and ductile metal.

Section 4. Fire and Explosion Data

Flash Point: None reported	Autoignition Temperature: None reported	LEL: None reported	UEL: None reported

Extinguishing Media: Smother with suitable dry powder or use large amounts of water.
Unusual Fire or Explosion Hazards: Nickel is combustible as dust or powder. Raney nickel ignites spontaneously in air. Nickel carbonyl (*MSDS Collection*, No. 226), a highly toxic substance, may form under fire conditions.
Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since nickel dust or powder is toxic if inhaled, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Nickel is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Nickel can react violently with fluorine, ammonium nitrate, hydrogen + dioxane, performic acid, selenium, sulfur, ammonia, hydrazine, phosphorus, and titanium + potassium chlorate. Nickel is also incompatible with oxidants. Raney nickel catalysts may initiate hazardous reactions with sulfur compounds, *p*-dioxane, hydrogen, hydrogen + oxygen, ethylene + aluminum chloride, magnesium silicate, methanol, and organic solvents + heat.
Conditions to Avoid: Avoid incompatibilities.
Hazardous Products of Decomposition: Thermal oxidative decomposition of nickel can produce highly toxic nickel carbonyl.

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Section 6. Health Hazard Data

Carcinogenicity: The IARC and NTP classify nickel as, respectively, a human carcinogen (Group 1) and an anticipated human carcinogen.
Summary of Risks: Nickel dust or fume is a respiratory irritant that with chronic exposure may cause nasal or lung cancer in humans. The 'age latency period for the induction of these cancers appears to be about 25 yr (within a 4- to 51-yr range). Experimental studies show nickel has neoplastigenic, tumorigenic, and teratogenic effects in laboratory animals. Hypersensitivity to nickel is common and can cause conjunctivitis, allergic contact dermatitis, and asthma. The allergic contact dermatitis ("nickel-itch," a pink papular erythema with pustulation and ulceration) usually clears within one week, but sensitization is permanent.
Medical Conditions Aggravated by Long-Term Exposure: Chronic pulmonary, upper respiratory tract, and skin disorders. Carcinoma of the paranasal sinuses, larynx, and lung may also develop.
Target Organs: Nasal cavities, lungs, skin.
Primary Entry Routes: Inhalation, dermal contact, and ingestion.
Acute Effects: Exposure to nickel fumes can cause upper respiratory tract irritation (with nonproductive cough, rapid breathing, dyspnea, chest tightness), metal fume fever (chills, fever, flu-like symptoms), asthma, inflammation of the lungs (noninfectious pneumonia), eye (conjunctiva) irritation, nausea, vomiting, and abdominal pain. Dermal contact causes "nickel itch." Ingesting large doses causes nausea, vomiting, and diarrhea.
Chronic Effects: Prolonged or repeated contact can cause nickel sensitization. Symptoms of sensitization include nickel dermatitis with eczematous skin and lichenification (hardened and leathery skin). Chronic inhalation exposure can cause chronic pulmonary irritation, chronic thickening of the mucous membranes of the nose, nasal sinusitis, anosmia (loss or impairment of the sense of smell), and perforation of the nasal septum. Chronic exposure to dust and fumes may cause carcinoma of paranasal sinuses, larynx, and lung.
FIRST AID
Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.
Skin: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.
Inhalation: Remove exposed person to fresh air and support breathing as needed.
Ingestion: Since oral toxicity for elemental nickel is low, inducing vomiting is seldom necessary. In cases of severe vomiting or diarrhea, treat for fluid replacement.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Physician's Note: Chronic exposure to nickel dust may cause *eosinophilic pneumonitis* (Loeffler's syndrome) which responds well to systemic cortico-steroids. There are cases of host rejection of nickel-containing prostheses after development of nickel sensitivity.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate all unnecessary personnel, remove all heat and ignition sources, and provide maximum explosion-proof ventilation. Cleanup personal should protect against vapor inhalation and dermal contact. Avoid dust generation. Using nonsparking tools, carefully scoop spilled material into appropriate containers for reclamation or disposal. After completing material pickup, wash spill site. Do not release to sewers or waterways. Follow applicable OSHA regulations (29 CFR 1910.120).
Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
EPA Designations
F \ Hazardous Waste (40 CFR 261.33): Not listed
. as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1 lb (0.454 kg) [* per Clean Water Act, Sec. 307(a)]
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
Listed as a SARA Toxic Chemical (40 CFR 372.65)
OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).
Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*
Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.
Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations below the OSHA PEL, ACGIH TLV, and NIOSH REL (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.[103]
Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.
Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area away from incompatible materials (Sec. 2). Protect against physical damage. Store Raney nickel under inert gas or water in tightly closed containers away from heat or ignition sources, acids, caustics, and oxidizing materials.

Engineering Controls: Minimize all possible exposures to potential carcinogens. Avoid vapor inhalation and dermal contact. Use only with appropriate personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Practice good personal hygiene and housekeeping procedures.

Other Precautions: Provide preplacement and periodic medical examinations that emphasize the skin, nasal cavities, and lungs, including a 14" x 17" chest roentgenogram and urine nickel determinations.

Transportation Data (49 CFR 172.102)
IM "hipping Name: Nickel catalyst, wetted with not less than 40% water or other suitable liquid, by weight, finely divided, activated, or spent
IM .azard Class: 4.2
ID No.: UN1378
IMO Label: Spontaneously combustible
IMDG Packaging Group: II

MSDS Collection References: 26, 38, 73, 84, 85, 88, 89, 90, 100, 101, 103, 109, 124, 126, 132, 133, 134, 136, 138, 139, 140, 142, 143
Prepared by: MJ Allison, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: MJ Hardies, MD; Edited by: JR Stuart, MS

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con. , solubility in alcohol,
, as well as viscosity, etc., all
; nitrocellulose. The nitrogen
t more than ± 0.2 % from the
owing specifications are valid

132 °C (270 °F):
2.5 cm³/g NO
0.4 %

0.4 %
re than 0.05 %
ore than 0.05 %
nil

ous explosives must gelatinize
y within 5 minutes at 60 °C

raw material

icture unity: 162.14

OH):
96 %
H_2Cl_2
0.2 %
7.0 %
nan 0.4 %

pale yellow,
; rests of capsules)

- 425.8 kcal/kg = — 1781 kJ/kg

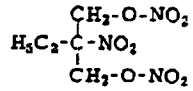
enthalpy of formation:
— 457.4 kcal/kg = — 1914 kJ/kg
oxygen balance: — 95.9 %
nitrogen percentage: 18.66 %
heat of explosion (H_2O liq.): 572 kcal/kg = 2395 kJ/kg
specific energy: 86 mt/kg = 841 kJ/kg
density: 1.053 g/cm³
boiling point: 114 °C = 237 °F

Nitroparaffins are produced by vapor phase nitration with nitric acid vapor. Nitroethane is also prepared in this way. The individual reaction products (nitromethane, nitroethane, nitropropane) must then be separated by distillation.

All these products can be reacted with formaldehyde; polyhydric nitroalcohols are obtained, which can be esterified with nitric acid.

Nitroethylpropanediol Dinitrate

Nitroäthylpropandioldinitrat;
dinitrate d'éthyl-nitropropandiol

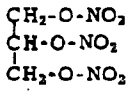


gross formula: $C_5H_9N_3O_8$
molecular weight: 239.2
oxygen balance: —43.5 %
nitrogen percentage: 17.57 %
volume of detonation gases: 1032 l/kg
heat of explosion (H_2O liq.): 1071 kcal/kg = 4470 kJ/kg
specific energy: 127 mt/kg = 1243 kJ/kg

The product is prepared by condensing → *nitroethane* with formaldehyde and by nitration of the resulting nitromethylpropanediol.

Nitroglycerine

glycerol trinitrate; Nitroglycerin; nitroglycérine;
trinitrate de glycérine; NG; Ngl.



yellow oil
gross formula: $C_3H_5N_3O_9$
molecular weight: 227.1

energy of formation: — 369.7 kcal/kg = — 1547 kJ/kg
enthalpy of formation:
— 392.0 kcal/kg = — 1633 kJ/kg
oxygen balance: + 3.5 %
nitrogen percentage: 18.50 %
volume of detonation gases: 782 l/kg
heat of explosion (H_2O liq.): 1616 kcal/kg = 6766 kJ/kg
specific energy: 116 mt/kg = 1139 kJ/kg
density: 1.591 g/cm^3
solidification point:
+ 13.2 °C = 55.8 °F (stable modification)
+ 2.2 °C = 35.6 °F (unstable modification)
specific heat: 0.32 kcal/kg = 1.3 kJ/kg
vapor pressure:

millibar	temperature °C	°F
0.00033	20	68
0.0097	50	122
0.13	80	176
0.31	90	194

lead block test: 520 cm^3/10 g
detonation velocity, confined:
7600 m/s = 25 000 ft/s at ϱ = 1.59 g/cm^3
impact sensitivity: 0.02 kp m = 0.2 N m
friction sensitivity:
up to 36 kp = 353 N pistil load no reaction
critical diameter of steel sleeve test: 24 mm

Nitroglycerin is almost insoluble in water, but is easily taken up by almost all organic solvents; it is sparingly soluble in carbon disulfide. It readily dissolves a large number of aromatic nitro compounds and forms gels with soluble guncotton. Its volatility is insignificant, but is still sufficient to cause headaches.

The acid-free product is very stable, but exceedingly sensitive to impact. The transporation of nitroglycerin and similar nitric acid esters is permitted only in the form of solutions in non-explosive solvents or as mixtures with fine-powdered inert materials containing not more than 5 % nitroglycerin. To avoid dangers, internal transport in the factories is made by water injection (→ *Water-driven Injector Transport*). External transport of pure nitroglycerin and similar products is difficult; in the U.S., special vessels have been developed in which the oil is bubble-free

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covered with water; air bubbles raise the impact sensitivity considerably. Suitably, the produced nitroglycerine is processed immediatly to the products (e.g., explosives; double base powders).

Nitroglycerin is prepared by running highly concentrated, almost water-free, and nearly chemically pure glycerin (dynamite glycerin) into a highly concentrated mixture of nitric and sulfuric acids, with constantly efficient cooling and stirring. At the end of the reaction the nitroglycerin acid mixture is given to a separator, where the nitroglycerin separates by gravity. Following washing processes with water and an alkaline soda solution remove the diluted residual acid.

Since nitroglycerin is dangerous to handle, its industrial production by some continuous method has always been of the highest interest, since it is always desirable to have the least possible quantity of the product in any particular fabrication stage. Accordingly, several competing methods (*Schmidt*, *Meissner*, *Biazzi*, KONTINITRO), have been developed, each method being characterized by a different approach to the problem of safety. The most recent procedures involve the reaction of glycerin and acid in injectors (Nitroglycerin AB).

Nitroglycerin is one of the most important and most frequently used components of explosive materials; together with nitroglycol, it is the major component of gelatinous industrial explosives. In combination with nitrocellulose and stabilizers, it is the principal component of powders and solid rocket propellants.

Specifications

1. Nitroglycerin as a component of explosives

Nitrogen content: not less than	18.35 %
Abel test at 180 °F (82.2 °C): not less than	10 min

2. Nitroglycerin as a component of propellants

nitrogen content: not less than	18.40 %
moisture: not more than	0.5 %
alkalinity, as Na_2CO_3: not more than	0.002 %
acidity, as HNO_3: not more than	0.002 %

3. Glycerol as a raw material

smell:	not offensively pungent
color:	clear, as light as possible
reaction to litmus:	neutral
inorganic impurities:	none
reducing matter (ammoniacal $AgNO_3$ test):	traces only

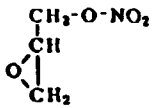
fatty acids:	traces only
ash content:	max. 0.03 %
water content:	max. 0.50 %
net content (oxidation value):	min. 98.8 %
density, d_4^{20}:	1.259—1.261 g/cm³
refraction N_D^{20}:	1.4707—1.4735
acidity: not more than	0.3 ml n/10 NaOH/100 ml
alkalinity: not more than	0.3 ml n/10 HCl/100 ml

Nitroglycerin Propellants

→ *Doubled Base Propellants* and → *Gunpowder.*

Nitroglycide

glycide nitrate; Nitroglycid; nitrate de glycide



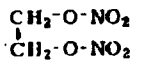
water-clear liquid
gross formula: $C_3H_5NO_4$
molecular weight: 119.1
oxygen balance: —60.5 %
nitrogen percentage: 11.76 %
density: 1.332 g/cm³
lead block test: 310 cm³/10 g
deflagration point: 195—200 °C = 383—390 °F
impact sensitivity: 0.2 kp m = 2 N m

Nitroglycide is soluble in alcohol, ether, acetone, and water; it is highly volatile.

This nitric acid ester of glycide is prepared from dinitroglycerin by splitting off one HNO_3 molecule with concentrated alkali. It is the [illegible]ide of glycerin mononitrate.

Nitroglycol

ethyleneglycol dinitrate; Nitroglykol; dinitrate de glycol; EGDN



colorless, oily liquid
gross formula: $C_2H_4N_2O_6$
molecular weight: 152.1
energy of formation: —359.8 kcal/kg = —1506 kJ/kg
enthalpy of formation: —383.2 kcal/kg = —1603 kJ/kg
oxygen balance: ±0 %
nitrogen percentage: 18.42 %
volume of detonation gases: 816 l/kg
heat of explosion (H_2O liq.): 1765 kcal/kg = 7390 kJ/kg
specific energy: 123 mt/kg = 1205 kJ/kg
density: 1.48 g/cm³
solidification point: —20 °C = —4 °F
vapor pressure:

millibar	temperature °C	°F
0.006	0	32
0.05	20	68
0.35	40	104
1.7	60	140
7.8	80	176
29	100	212

lead block test: 620 cm³/10 g
detonation velocity, confined:
7300 m/s = 24 000 ft/s at ϱ = 1.48 g/cm³
deflagration point: 217 °C = 423 °F
impact sensitivity: 0.02 kp m = 0.2 N m
friction sensitivity:
at 36 kp = 353 N pistil load no reaction
critical diameter of steel sleeve test: 24 mm

Nitroglycol is not hygroscopic, is sparingly soluble in water and readily soluble in the conventional organic solvents; its properties and performance characteristics are practically the same as those of nitroglycerin; it is 150 times more volatile and about four times more soluble in water; it is less viscous and gelatinizes nitrocellulose more rapidly than nitroglycerin.

Glycol can be nitrated in the same vessels as glycerin — in batches or continuously. The same applies to its separation and washing, which are in fact easier, since the nitroglycol is less viscous.

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of highest safety, which meets the most severe break test conditions; and group P5, safe in cut-off conditions.

In the Federal Republic of Germany there are three classes: class I, the classic permissibles; class II, which are safe in the angle-mortar test in position A, with charges of 40 cm in length in the groove; class III, the class of highest safety, which must give no ignition in the angle-mortar test in position B and with the groove filled over its full length the explosive charge (2 m, 6—1/2 ft.).

As an example for possible authorised applications a diagram of the use of the German permitted explosives is given in Table 26.

Table 26. Areas of use and associated authorized application of German permitted explosives

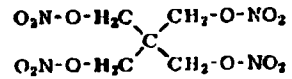
Working points	CH_4 in the mine air %	Type of explosive	Class of safety
Working in stone	0 —0.5	non permitted explosives for rock blasting	—
without coal (except upcasts)	0.5—1.0	permitted explosives	Class I
Working in stone with streaks of coal up to 0.2 m thickness (except upcasts)	0 —0.5	permitted explosives	Class I
	0.5—1.0	permitted explosives	Class II
Working in stone with bands of coal of more than 0.2 m thickness gate-end roads (except upcasts)	0 —0.3	permitted explosives	Class I
	0.3—0.5	permitted explosives	Class II
	0.5—1.0	permitted explosives	Class III
Rises and dips, gate roads, coal faces and adjacent rock in areas near coal faces, upcasts	less than 1.0	permitted explosives	Class III

Peroxides

Organic peroxides may be explosive. They are usually no manufactured for blasting purposes, but rather as catalysts o polymerization reactions. They are utilized when in a safe phlegmatized condition. They will not be discussed in this book except for two substances displaying properties of primar explosives: → *Tricycloacetone Peroxide* and → *Hexame thylenetriperoxide Diamine*.

PETN

pentaeryhritol tetranitrate; Nitropenta; tétranitrate de pentae rythrite; Pentrit; corpent



colorless crystals
gross formula: $C_5H_8N_4O_{12}$
molecular weight: 316.1
energy of formation: —379.9 kcal/kg = —1590 kJ/kg
enthalpy of formation: —402.4 kcal/kg = —1683 kJ/kg
oxygen balance: —10.1 %
nitrogen percentage: 17.72 %
volume of detonation gases: 823 l/kg
heat of explosion (H_2O liq.):
calculated*): 1529 kcal/kg = 6404 kJ/kg
experimental**): 1510 kcal/kg = 6322 kJ/kg
specific energy: 124 mt/kg = 1220 kJ/kg
density: 1.76 g/cm^3
melting point: 141.3 °C = 286.3 °F
melting enthalpy: 36.4 kcal/kg = 152 kJ/kg
specific heat: 0.26 kcal/kg = 1.09 kJ/kg
vapor pressure:

millibar	temperature °C	°F	
0.0011	97.0	207	
0.0042	110.6	231	
0.015	121.0	250	
0.050	131.6	267	
0.094	138.8	282	(near melting point)

* computed by FORTRAN program in the → *ICT*.
** value quoted from *Brigitta M. Dobratz*, Properties of Chemical Explosiv and Explosive Simulants, University of California, Live

lead block test: 523 cm^3/10 g
detonation velocity, confined:
8400 m/s = 27 600 ft/s at ϱ = 1.7 g/cm^3
deflagration point: 202 °C = 396 °F
impact sensitivity: 0.3 kp m = 3 N m
friction sensitivity: 6 kp = 60 N pistil load
critical diameter of steel sleeve test: 6 mm

PETN is very stable, insoluble in water, sparingly soluble in alcohol, ether, and benzene, and soluble in acetone and methyl acetate.

It is prepared by introducing penterythrol into concentrated nitric acid, with efficient stirring and cooling.

The bulk of the tetranitrate thus formed crystallizes out of the acid. The solution is diluted to about 70 % HNO_3 in order to precipitate the remainder of the product. The washed crude product is purified by reprecipitation from acetone.

PETN is one of the most powerful and most brisant explosives, its → *stability* is satisfactory, and its → *sensitivity* is not extreme. It is used in high-efficiency blasting-cap fillings and detonation cords. If phlegmatized with a small amount of wax and pressed, it may be used to produce boosters and fillings for smaller caliber projectiles.

PETN can also be incorporated into gelatinous, industrial explosives (e. g., for seismic prospecting).

Specifications

melting point: not below	140 °C (284 °F)
nitrogen content: not below	17.5 %
Bergmann-Junk test at 132 °C (267 °F): not above	2 ml NO/g
deflagration point: not below	190 °C (374 °F)
acetone-insoluble matter: not more than	0.1 %
acidity, as HNO_3: not more than	0.003 %
alkalinity, as Na_2CO_3: not more than	0.003 %
→ *vacuum test* at 120 °C (248 °F): not more than	5 cm^3

Pentaerythrol (raw material)
$C(CH_2OH)_4$

molecular weight:	136.15
melting point:	260.5 °C (501 °F)

Specifications

melting point: beginning not below	230 °C (446 °F)
moisture: not more than	0.5 %
chlorides:	nil
sulfates, as H_2SO_4: not more than	0.5 %
reaction:	neutral
reducing matter ($AgNO_3$–NH_3–test): not more than	traces

Petrogel L

Trade name of a gelatinous special explosive for seismic use, distributed in t USA by ATLAS. The explosive is cartridged in stiff pasteboard tubes with coupling device.

density:	1.5 g/cm
weight strength	60 %

Petroleum Jelly

Vaseline

This substance is used as gunpowder stabilizer. It is believed th the stabilizing effect is due to the presence of unsaturat hydrocarbons, which are capable of binding any decompositi products formed.

Petron A

Trade name of a powder form special blasting agent for seismic use, distribut in the USA by ATLAS. The explosive in canned with a coupling device.

density in 2" can:	1.38 g/cm^3.

Phlegmatization

The impact sensitivity and friction sensitivity of highly sensiti crystalline explosives (e.g., → *Cyclonite* and → *PETN*) can altered to a considerable extent by the addition in slight percenta of a phlegmatizer, particularly wax. The added wax serves at t same time as a desirable lubricant and as a binder. RDX, PET and → *Octogen* cannot be compacted by pressing, unless th contain phlegmatization additives.

Wax can also be added to pourable mixtures if they cont aluminum powder (→ *Torpex*).

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'95 09:31AM I.T. CORP WILMINGTON

lead block test: 315 cm^3/10 g
detonation velocity, confined:
7200 m/s = 23 600 ft/s at ρ = 1.74 g/cm^3
deflagration point: 395—400 °C = 743—750 °F
impact sensitivity: 1.6 kp m = 16 N m
friction sensitivity: up to 36 kp = 353 N
pistil load no reaction

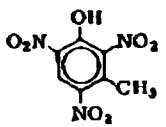
Trinitrochlorobenzene is sparingly soluble in alcohol and benzene, somewhat more soluble in ether, and insoluble in water.

It is prepared from dinitrochlorobenzene by nitration. The manufacture is difficult, and acids of highest concentration must be employed.

Trinitrochlorobenzene is just as insensitive as TNT, its brisance is even somewhat higher, and its density and heat stability are excellent.

2,4,6-Trinitrocresol

Trinitrometakresol; trinitrométacrésol



yellow needles
gross formula: $C_7H_5N_3O_7$
molecular weight: 243.1
energy of formation: —229.7 kcal/kg = —961.2 kJ/kg
enthalpy of formation: —248.0 kcal/kg = —1038 kJ/kg
oxygen balance: —62.5 %
nitrogen percentage: 17.95 %
volume of detonation gases: 711 l/kg
heat of explosion (H_2O liq.): 1024 kcal/kg = 4287 kJ/kg
specific energy: 85.5 mt/kg = 838 kJ/kg
density: 1.68 g/cm^3
melting point: 107 °C = 225 °F

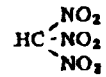
melting enthalpy: 25.5 kcal/kg = 107 kJ/kg
lead block test: 285 cm^3/10 g
detonation velocity, confined:
6850 m/s = 22 500 ft/s at ρ = 1.62 g/cm^3
deflagration point: 210 °C = 410 °F
impact sensitivity: 1.2 kp m = 12 N m
friction sensitivity: up to 36 kp = 353 N
pistil load no reaction

Trinitrocresol is readily soluble in alcohol, ether, and acetone, and is sparingly soluble in water.

It is prepared by nitration of m-cresoldisulfonic acid. during the First World War, 60:40 mixtures of trinitrocresol and picric acid were used (under the name of Kresylith) as grenade fillings, since they melt at a temperature as low as 85 °C (185 °F).

* Trinitromethane

Nitroform



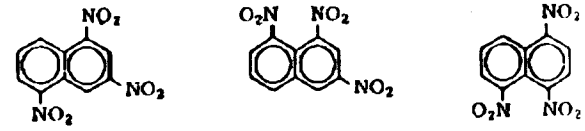
oil with stinging smell
gross formula: CHN_3O_6
molecular weight: 151.0
oxygen balance: +37.1 %
nitrogen percentage: 27.83 % N
density: 1.59 g/cm^3
melting point: 22 °C = 72 °F
boiling point at 23 millibar pressure: 48 °C = 118 °F

Nitroform is obtained when acetylene is introduced into nitric acid; it may also be prepared from tetranitromethane.

Nitroform alone cannot be used either as an oxidant or as an explosive. It is possible, however, to add nitroform to formaldehyde and to prepare explosives from the resulting trinitroethanol product. (→ *Bi-trinitroethylamine* and *Bi-trinitroethylurea*).

Trinitronaphthalene

Trinitronaphthalin; trinitronaphthalène; Naphtit; Trinal



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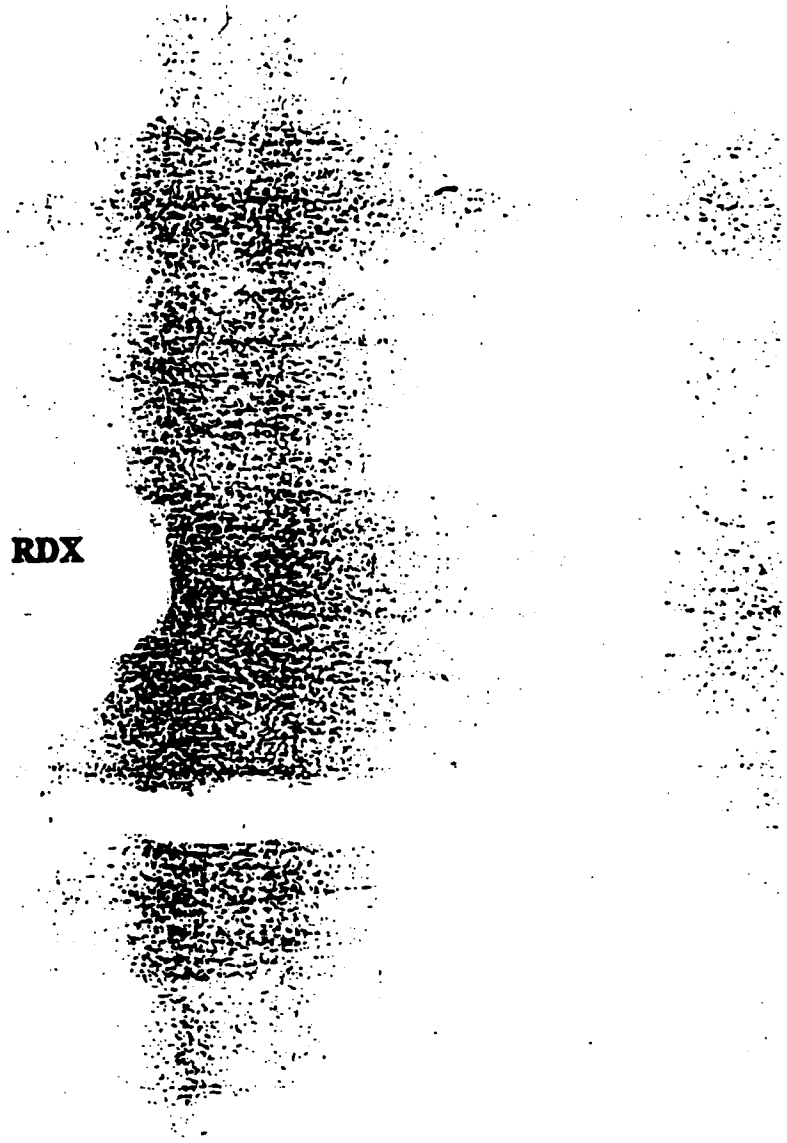

RDX

SOLUBILITY IN WATER, G/100 G WATER AT 20C: INSOLUBLE
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF OC): EXPLODES
VAPOR PRESSURE @ 20 C, MMHG: 0.0004 MM AT 230 F
MELTING POINT, F: 399 F
UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: EXPLOSIVE
LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: EXPLOSIVE

SPECIFIC GRAVITY: 1.82

INCOMPATIBILITIES
EXPLOSIVE HAZARD AT HIGH TEMPERATURES
SHOCK MAY DETONATE OR EXPLODE
THERMAL DECOMPOSITION PRODUCTS ARE HAZARDOUS AND/OR TOXIC
REDUCING AGENTS
ALUMINUM POWDER
CYANIDES
ESTERS

PHOSPHOROUS
THIOCYANATES
KETONES
CAUSTICS
AMMONIA
AMINES

PERSONAL PROTECTIVE EQUIPMENT
NO NIOSH/OSHA DATA; RECOMMEND
PREVENT ANY POSSIBILITY OF SKIN CONTACT

WEAR IMPERVIOUS CLOTHING
WEAR GLOVES
WEAR FACESHIELD (8 INCH MINIMUM)

PLACE CONTAMINATED CLOTHING IN CLOSED CONTAINERS FOR STORAGE UNTIL LAUNDERED OR DISCARDED
IF CLOTHING IS TO BE LAUNDERED, INFORM PERSON PERFORMING OPERATION OF CONTAMINANT'S HAZARDOUS PROPERTIES

GOGGLES

NO STANDARD REQUIREMENT, BUT ADVISE EYE PROTECTION TO PREVENT ANY POSSIBILITY OF EYE CONTACT
WEAR FACE SHIELD OR VENTED GOGGLES

WASHING CHEMICALS FROM THE SKIN
NO STANDARD REQUIREMENT, BUT ADVISE WASHING IMMEDIATELY WHEN SKIN BECOMES CONTAMINATED

ROUTINE CHANGING OF WORK CLOTHING
NO STANDARD REQUIREMENT, BUT ADVISE CHANGING

IF THERE IS ANY POSSIBILITY THAT CLOTHING MAY BE CONTAMINATED LEAVE CLOTHING & EQUIPMENT FOR DECONTAMINATION & DISPOSAL

CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION
NO STANDARD REQUIREMENT, BUT ADVISE REMOVING IMMEDIATELY IF IT IS CONTAMINATED

SPECIFIC EMERGENCY PROVISIONS
NO NIOSH/OSHA DATA. ADVISE:

IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL HAS BEEN INHALED, REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

WHEN THIS CHEMICAL HAS BEEN SWALLOWED AND PERSON IS CONSCIOUS, IMMEDIATELY GIVE PERSON LARGE QUANTITIES OF WATER. AFTER WATER HAS BEEN SWALLOWED, TRY TO GET THE PERSON TO VOMIT BY HAVING HIM TOUCH THE BACK OF HIS THROAT WITH HIS FINGER. DO NOT MAKE AN

UNCONSCIOUS PERSON VOMIT. GET MEDICAL ATTENTION IMMEDIATELY.

ORGANS
EYES
RESPIRATORY SYSTEM
SKIN
MUCOUS MEMBRANES
CENTRAL NERVOUS SYSTEM

KIDNEYS
LIVER

TATUS OF REGULATORY ENFORCEMENT
OSHA STANDARD 29CFR1910.1200 HAZARD COMMUNICATION
REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS HAVING WORKPLACES IN THE MANUFACTURING DIVISION, STANDARD INDUSTRIAL CLASSIFICATION CODES 20 THROUGH 39, TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF HAZARD COMMUNICATION PROGRAMS

INCLUDING LABELS, MATERIAL SAFETY DATA SHEETS, TRAINING, AND ACCESS TO WRITTEN RECORDS
48FR53280 11/25/83

FOLLOWING OSHA STANDARDS APPLICABLE TO SUBSTANCES LISTED 29CFR1910, OTHERWISE ADVISE:

OSHA STANDARD 29CFR1910.94 VENTILATION

OSHA STANDARD 29CFR1910.134 RESPIRATORY PROTECTION

OSHA STANDARD 29CFR1910.20 ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS

OSHA STANDARD 29CFR1910.132 PERSONAL PROTECTIVE EQUIPMENT

OSHA STANDARD 29CFR1910.141 SANITATION

OSHA STANDARD 29CFR1910.151 MEDICAL SERVICES AND FIRST AID

OSHA STANDARD 29CFR1910.133 EYE AND FACE PROTECTION

FACILITIES ON THE CERCLA NATIONAL PRIORITIES LIST (NPL) IN ORDER OF PRIORITY.

53FR41280 10/20/88

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) - TABLE 2-14
DANGEROUS GOODS LIST; THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS, LABEL, PACKAGING AND OTHER REQUIREMENTS.
DESIGNATED AS A DANGEROUS GOOD FOR THE PURPOSE OF AIR TRANSPORATION.

SECTION 311 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 REQUIRES THE OWNER OR OPERATOR OF A COVERED FACILITY TO SUBMIT INDIVIDUAL MSDS'S, OR A LIST OF

CHEMICALS FOR WHICH THE FACILITY IS REQUIRED TO HAVE AN MSDS, TO THE STATE EMERGENCY RESPONSE COMMISSIONS, THE LOCAL EMERGENCY RESPONSE COMMITTEES AND THE LOCAL FIRE DEPARTMENT. THE THRESHOLDS WOULD APPLY ON OR BEFORE OCTOBER 17, 1989, FOR MANUFACTURING FACILITIES AND SEPTEMBER 24, 1990, FOR NON-MANUFACTURING FACILITIES. THE PROPOSED REPORTING THRESHOLDS ARE: FOR EXTREMELY HAZARDOUS SUBSTANCES DESIGNATED UNDER SECTION 302 OF TITLE III: 500 POUNDS OR THE TPQ, WHICHEVER IS LOWER; AND 10,000 POUNDS FOR ALL OTHER CHEMICALS FOR WHICH FACILITIES ARE REQUIRED TO PREPARE OR HAVE AVAILABLE MSDS'S.
40CFR370

54FR12992 3/29/89

SECTION 312 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATIO ACT OF 1986 REQUIRES OWNERS OR OPERATORS OF FACILITIES COVERED BY SECTION 311 TO SUBMIT INVENTORY FORMS (TIER I AND TIER II FORMS). THE THRESHOLDS WOULD APPLY ON OR BEFORE OCTOBER 17, 1989, FOR MANUFACTURING FACILITIES AND SEPTEMBER 24, 1990, FOR NON-MANUFACTURING FACILITIES. THE PROPOSED REPORTING THRESHOLDS ARE AS FOLLOWS: FOR EXTREMELY HAZARDOUS SUBSTANCES DESIGNATED UNDER SECTION 302 OF TITLE III: 500 POUNDS OR THE TPQ, WHICHEVER IS LOWER; AND 10,000 POUNDS FOR

ALL OTHER CHEMICALS FOR WHICH FACILITIES ARE REQUIRED TO PREPARE OR HAVE AVAILABLE MSDS'S.
40CFR370
54FR12992 3/29/89

MEDICAL SURVEILLANCE REQUIRED
NO NIOSH/OSHA DATA; ADVISE:
EKG RECOMMENDED IF EMPLOYEE TO WEAR FULL-FACE RESPIRATOR

GENERAL MEDICAL HISTORY
40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS
48FR38187 08/22/83
48FR39225 08/30/83 (EFFECTIVE DATE CORRECTION)
PHYSICIAN EXAMINATION

INDUSTRIAL EXPOSURE HISTORY
PRE-PLACEMENT AND ANNUAL EXAMS

FORBIDDEN
EXPLOSIVE

****

INTERNATIONAL MARITIME ORGANIZATION HAZARD CLASS
49CFR172.102 OPTIONAL HAZARDOUS MATERIALS TABLE

CLASS A EXPLOSIVE

INTERNATIONAL MARITIME ORGANIZATION LABELING SPECIFICATIONS FOR
DOMESTIC AND EXPORT SHIPMENTS

49CFR172.102

EXPLOSIVE

****

FOLLOWING INFORMATION RECOMMENDED FOR THE EMERGENCY HANDLING OF
HAZARDOUS MATERIALS

IF MATERIAL ON FIRE OR INVOLVED IN FIRE:
* DANGEROUSLY EXPLOSIVE
* DO NOT FIGHT FIRE IN A CARGO OF EXPLOSIVES
* EVACUATE AREA AND LET BURN

IF MATERIAL IS NOT ON FIRE AND IS NOT INVOLVED IN FIRE:
* KEEP SPARKS, FLAMES AND OTHER IGNITION SOURCES AWAY
* KEEP MATERIAL WET
* DO NOT ATTEMPT TO SWEEP UP DRY MATERIAL
* WET SPILLED MATERIAL BEFORE PICKING IT UP

PERSONNEL PROTECTION:
* AVOID BREATHING DUST/VAPORS/FUMES FROM MATERIAL
* WEAR BOOTS, PROTECTIVE GLOVES AND GAS TIGHT GOGGLES
* DO NOT HANDLE BROKEN PACKAGES WITHOUT PROTECTIVE EQUIPMENT
* WASH AWAY ANY MATERIALS WHICH MAY HAVE CONTACTED THE BODY WITH
COPIOUS AMOUNTS OF WATER OR SOAP AND WATER
* WEAR SELF-CONTAINED BREATHING APPARATUS WHEN FIGHTING FIRES INVOLVING
THIS MATERIAL

EVACUATION PROCEDURE:
* IF FIRE UNCONTROLLABLE OR CONTAINER EXPOSED TO DIRECT FLAME
EVACUATE FOR RADIUS OF 5000 FEET

WASTE

****

OBSERVE ALL FEDERAL, STATE OR LOCAL REGULATIONS WHEN STORING OR
DISPOSING OF THIS SUBSTANCE. CONTACT LOCAL AND/OR STATE ENVIRONMENTAL

AUTHORITIES TO INSURE PROPER COMPLIANCE.

****

EPA HAZARDOUS WASTE NUMBER D003

ESTABLISHES PROVISIONS FOR THE HAZARDOUS WASTE PERMIT PROGRAM UNDER SUBTITLE C OF THE SOLID WASTE DISPOSAL ACT, AS AMENDED BY THE RESOURCE CONSERVATION AND RECOVERY ACT

40CFR271 REQUIREMENT FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

SPECIFIES THE PROCEDURES EPA WILL FOLLOW IN APPROVING, REVISING, AND WITHDRAWING APPROVAL OF STATE PROGRAMS AND THE REQUIREMENTS STATE PROGRAMS MUST MEET TO BE APPROVED BY THE ADMINISTRATION UNDER SECTION 3006(B) OF RCRA

GENERATORS OF HAZARDOUS WASTES ARE SUBJECT TO THE FOLLOWING STANDARDS:

1). A GENERATOR OF GREATER THAN 1000 KILOGRAMS OF HAZARDOUS WASTE IN A CALENDAR MONTH MUST SUBMIT AN "EXCEPTION REPORT" TO THE ENVIRONMENTAL PROTECTION AGENCY REGIONAL ADMINISTRATOR (FOR THE REGION IN WHICH THE GENERATION IS LOCATED) IF HE HAS NOT RECEIVED A COPY OF THE MANIFEST WITH THE HANDWRITTEN SIGNATURE OF THE OWNER OR OPERATOR OF THE DESIGNATED FACILITY WITHIN 45 DAYS OF THE DATE THE WASTE WAS ACCEPTED BY THE INITIAL TRANSPORTER.

2). A GENERATOR OF GREATER THAN 100 KILOGRAMS BUT LESS THAN 1000 KILOGRAMS OF HAZARDOUS WASTE IN A MONTH WHO DOES NOT RECEIVE A COPY OF THE MANIFEST WITH THE HANDWRITTEN SIGNATURE OF THE OWNER OR OPERATOR OF THE DESIGNATED FACILITY WITHIN 60 DAYS OF THE DATE THE WASTE WAS ACCEPTED BY THE INITIAL TRANSPORTER MUST SUBMIT A LEGIBLE COPY OF THE MANIFEST, WITH SOME INDICATION THAT THE GENERATOR HAS NOT RECEIVED CONFIRMATION OF DELIVERY, TO THE EPA REGIONAL ADMINISTRATOR FOR THE REGION IN WHICH THE GENERATOR IS LOCATED.

EFFECTIVE DATE: 3/23/88
(52FR35898 9/23/87)

CAS NUMBER
121-82-4

REGISTRY TOXIC CHEMICALS NUMBER
XY9450000

BULLETINS

SPECIAL INFORMATION

Occupational Health Guideline for Trinitrotoluene

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

SUBSTANCE IDENTIFICATION

- Formula: $CH_3C_6H_2(NO_2)_3$
- Synonyms: TNT; trinitrotoluol; 2,4,6-trinitrotoluene; sym-trinitrotoluene
- Appearance and odor: Colorless to pale yellow, odorless solid.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for trinitrotoluene is 1.5 milligrams of trinitrotoluene per cubic meter of air (mg/m^3) averaged over an eight-hour work shift. The American Conference of Governmental Industrial Hygienists has recommended for trinitrotoluene a Threshold Limit Value of 0.5 mg/m^3 with a skin notation.

HEALTH HAZARD INFORMATION

- **Routes of exposure**

Trinitrotoluene can affect the body if it is inhaled, if it comes in contact with the eyes or skin, or if it is swallowed. It may enter the body through the skin.

- **Effects of overexposure**

Exposure to trinitrotoluene can cause liver damage with yellow jaundice and anemia which may be fatal. It may also cause irritation of the eyes, nose, and throat with sneezing, cough, and sore throat. It may cause a skin rash and stain the skin, hair, and nails a yellowish color. It may affect the ability of the blood to carry oxygen. This may result in a bluish discoloration of the skin, weakness, drowsiness, shortness of breath and unconsciousness. In addition, it may cause muscular pains, heart irregularities, kidney irritation, cataracts of the eyes, menstrual irregularities, and nerve damage.

- **Reporting signs and symptoms**

A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to trinitrotoluene.

- **Recommended medical surveillance**

The following medical procedures should be made available to each employee who is exposed to trinitrotoluene at potentially hazardous levels:

1. Initial Medical Examination:

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Persons with a history of asthma, allergies, or known sensitization to trinitrotoluene would be expected to be at increased risk from exposure. Examination of the blood, liver, eyes, cardiovascular system, nervous system, and kidneys should be stressed. The skin should be examined for evidence of chronic disorders.

—A complete blood count: Trinitrotoluene has been shown to cause aplastic anemia in humans. A complete blood count should be performed including a red cell count, a white cell count, a differential count of a stained smear, as well as hemoglobin and hematocrit.

—Liver function tests: Since liver damage has been observed in humans exposed to trinitrotoluene, a profile of liver function should be obtained by using a medically acceptable array of biochemical tests.

—Urinalysis: Since kidney damage has been observed in humans exposed to trinitrotoluene, a urinalysis should be obtained to include at a minimum specific gravity, albumin, glucose, and a microscopic on centrifuged sediment.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on a semi-annual basis.

- **Summary of toxicology**

Trinitrotoluene (TNT) dust or fume causes liver

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service Centers for Disease Control
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

damage, aplastic anemia, cyanosis, and dermatitis. There have been numerous fatalities of workers exposed to TNT in munitions plants; in a series of 22 fatal cases, 8 died from toxic hepatitis, 13 from aplastic anemia, and 1 from a combination of both. The vapor or dust can cause irritation of mucous membranes, resulting in sneezing, cough, and sore throat. Although intense or prolonged exposure to TNT may cause some cyanosis, it is not regarded as a strong producer of methemoglobin. Other occasional effects are leukocytosis or leukopenia, peripheral neuritis, muscular pains, cardiac irregularities, and renal irritation. Cataracts have been observed in a considerable proportion of chronically exposed workers; one report indicates that 26 of 61 workers with an average exposure of 8.4 years had a characteristic peripheral cataract. TNT causes sensitization dermatitis; the hands, wrists, and forearms are most commonly affected, but skin at friction points such as the collar line, belt line, and ankles is also often involved; erythema, papules, and an itchy eczema can be severe. The skin, hair, and nails of exposed workers may be stained yellow.

CHEMICAL AND PHYSICAL PROPERTIES

- **Physical data**

1. Molecular weight: 227
2. Boiling point (760 mm Hg): 240 C (464 F) (explodes)
3. Specific gravity (water = 1): 1.65
4. Vapor density (air = 1 at boiling point of trinitrotoluene): Not applicable
5. Melting point: 81 C (178 F)
6. Vapor pressure at 85 C (185 F): 0.053 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): 0.013
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Reactivity**

1. Conditions contributing to instability: Slow decomposition occurs above 180 C (356 F). Exposure to light may increase impact sensitivity. Rapid heating may cause detonation.
2. Incompatibilities: Contact with strong oxidizers may cause fire. Contact with ammonia or with strong alkalies may increase sensitivity to shock. Can react vigorously with oxidizable materials.
3. Hazardous decomposition products: Toxic gases and vapors (such as oxides of nitrogen and carbon monoxide) may be released in a fire involving trinitrotoluene.
4. Special precautions: Protect from shock.

- **Flammability**

1. Flash point: Explodes
2. Impact sensitivity (minimum fall of a 2 kg weight to cause at least one explosion in ten trials): 100 cm
3. Explosion temperature (temperature required to cause explosion in five seconds): 475 C (887 F)
4. Extinguishant: Water may be used on small fires. Do not attempt to extinguish large fires.

- **Warning properties**

1. Odor Threshold: No quantitative information is available concerning the odor threshold of TNT.
2. Eye Irritation Level: Grant states that "irritation of the eyes and skin is not uncommon among munitions workers exposed to its dust and fumes." No quantitative information is available concerning the air concentrations which produce the eye irritation.
3. Evaluation of Warning Properties: Since no quantitative information is available relating warning properties to air concentrations of TNT, this substance is treated as a material with poor warning properties. The concentration in saturated air at 20 C might result in a significant exposure relative to the permissible exposure.

MONITORING AND MEASUREMENT PROCEDURES

- **General**

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

- **Method**

At the time of publication of this guideline, no measurement method for trinitrotoluene had been published by NIOSH.

RESPIRATORS

- Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.
- In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

• Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with solid trinitrotoluene or liquids containing trinitrotoluene.

• If employees' clothing may have become contaminated with solid trinitrotoluene, employees should change into uncontaminated clothing before leaving the work premises.

• Clothing which may have become contaminated with solid trinitrotoluene or liquids containing trinitrotoluene should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of trinitrotoluene from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the trinitrotoluene, the person performing the operation should be informed of trinitrotoluene's hazardous properties.

• Non-impervious clothing which becomes contaminated with trinitrotoluene should be removed promptly and not reworn until the trinitrotoluene is removed from the clothing.

• Employees should be provided with and required to use dust- and splash-proof safety goggles where solid trinitrotoluene or liquids containing trinitrotoluene may contact the eyes.

SANITATION

• Workers subject to skin contact with solid trinitrotoluene or liquids containing trinitrotoluene should wash with soap or mild detergent and water any areas of the body which may have contacted trinitrotoluene at the end of each work day.

• Skin that becomes contaminated with trinitrotoluene should be promptly washed or showered with soap or mild detergent and water to remove any trinitrotoluene.

• Eating and smoking should not be permitted in areas where solid trinitrotoluene or liquids containing trinitrotoluene are handled, processed, or stored.

• Employees who handle solid trinitrotoluene or liquids containing trinitrotoluene should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to trinitrotoluene may occur and control methods which may be effective in each case:

Operation	Controls
Use in the manufacture of shells, bombs, grenades, and mines; use in commercial explosives, and propellant compositions	Process enclosure; local exhaust ventilation; personal protective equipment
Use in the production of intermediates for synthesis of dyestuffs and photographic chemicals	Process enclosure; local exhaust ventilation; personal protective equipment

EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

• **Eye Exposure**

If trinitrotoluene or liquids containing trinitrotoluene get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.

• **Skin Exposure**

If trinitrotoluene or liquids containing trinitrotoluene get on the skin, promptly wash the contaminated skin using soap or mild detergent and water. If trinitrotoluene or liquids containing trinitrotoluene penetrate through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Get medical attention immediately.

• **Breathing**

If a person breathes in large amounts of trinitrotoluene, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

• **Swallowing**

When trinitrotoluene or liquids containing trinitrotoluene have been swallowed and the person is conscious, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having him touch the back of his throat with his finger. Do not make an unconscious person vomit. Get medical attention immediately.

• **Rescue**

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

SPILL AND DISPOSAL PROCEDURES

• Persons not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed.

• If trinitrotoluene is spilled, the following steps should be taken:

1. Ventilate area of spill.
2. Attempt to reclaim spilled material; however, do not sweep or burn unless this is supervised by explosives experts.

• Waste disposal method:

Trinitrotoluene may be disposed of only by explosives experts.

REFERENCES

• American Conference of Governmental Industrial Hygienists: "Trinitrotoluene," *Documentation of the Threshold Limit Values for Substances in Workroom Air* (3rd ed., 2nd printing), Cincinnati, 1974.

• American Industrial Hygiene Association: "Trinitrotoluene," *Hygienic Guide Series*, Detroit, Michigan, 1964.

• Crawford, M. A. D.: "Aplastic Anaemia due to Trinitrotoluene Intoxication," *British Medical Journal*, 2:430-437, 1954.

• Deichmann, W. B., and Gerarde, H. W.: *Toxicology of Drugs and Chemicals*, Academic Press, New York, 1969.

• Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P.: *Bulletin of Supplementary Material for Clinical Toxicology of Commercial Products*, University of Rochester, 1969-1975.

• Goodwin, J. W.: "Twenty Years Handling TNT in a Shell Loading Plant," *American Industrial Hygiene Association Journal*, 33:41-44, 1972.

• Grant, W. M.: *Toxicology of the Eye* (2nd ed.), C. C. Thomas, Springfield, Illinois, 1974.

• Hunter, D.: *Diseases of Occupations* (4th ed.), Little, Brown, Boston, 1969.

• International Labour Office: *Encyclopedia of Occupational Health and Safety*, McGraw-Hill, New York, 1971.

• Mangelsdorff, A. F.: "Treatment of Methemoglobinemia," *A.M.A. Archives of Industrial Health*, 14:148-153, 1956.

• Palmer, W. L., et al.: "Toxic Necrosis of the Liver from Trinitrotoluene," *Journal of the American Medical Association*, 123:1025-1027, 1943.

• Patty, F. A. (ed.): *Toxicology*, Vol. II of *Industrial Hygiene and Toxicology* (2nd ed. rev.), Interscience, New York, 1963.

• Sax, N. I.: *Dangerous Properties of Industrial Materials* (3rd ed.), Van Nostrand Reinhold, New York, 1968.

• Schwartz, L.: "Dermatitis from Explosives," *Journal of the American Medical Association*, 125:186-190, 1944.

• Stecher, P. G. (ed.): *The Merck Index* (8th ed.), Merck Co., Inc., Rahway, New Jersey, 1968.

RESPIRATORY PROTECTION FOR TRINITROTOLUENE

Condition	Minimum Respiratory Protection* Required Above 1.5 mg/m³
Particulate or Vapor Concentration	
15 mg/m³ or 1.5 ppm or less	Any supplied-air respirator. Any self-contained breathing apparatus.
75 mg/m³ or 7.5 ppm or less	Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
3000 mg/m³ or 300 ppm or less	A Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode.
Greater than 3000 mg/m³ or 300 ppm or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
Escape	Any gas mask providing protection against organic vapors and particulates. Any escape self-contained breathing apparatus.

*Only NIOSH-approved or MSHA-approved equipment should be used.

APPENDIX C

JOBSITE POSTINGS, PERMITS, AND FORMS

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

Nº- 561924

13202

PERMIT

Permit Issued To
(Insert Employer's Name, Address and Telephone No.)

IT Corporation
336 W. Anaheim Street
Wilmington, CA 90744
(310) (800) 262-1900

No. _____

Date December 12, 1994

Region 3

District 5

Tel. (310) 516-3734

Type of Permit ANNUAL TRENCH/EXCAVATION PERMIT

Pursuant to Labor Code Sections 6500 and 6502, this Permit is issued to the above-named employer for the projects described below.

State Contractor's License Number		Permit Valid through		
137422		December 31, 1995		
Description of Project	Location Address	City and County	Anticipated Dates	
			Starting	Completion
Excavation/Trench	Various	Statewide	1/1/95	12/31/95
THIS PERMIT IS ISSUED SUBJECT TO THE CONDITION THAT THE WORK IS PERFORMED BY THE SAME EMPLOYER. THE APPROPRIATE DISTRICT OFFICE SHALL BE NOTIFIED IN WRITING OF LOCATION OF JOB SITE PRIOR TO COMMENCEMENT. THE IIP PROGRAM SUBMITTED FOR THIS PERMIT IS ACCEPTED BY DOSH FOR PERMIT PURPOSES ONLY. ALTHOUGH IT ADDRESSES THE PRIMARY POINTS REQUIRED? FAILURE TO IMPLEMENT IT OR ASSURE ITS EFFECTIVENESS? MAY RESULT IN A CITATION."				

This Permit is issued upon the following conditions:

1. That the work is performed by the same employer. If this is an annual permit the appropriate District Office shall be notified, in writing, of dates and location of job site prior to commencement.
2. That employer will comply with all occupational safety and health standards or orders applicable to the above projects, and any other lawful orders of the Division.
3. That if any unforeseen condition causes deviation from the plans or statements contained in the Permit Application Form the employer will notify the Division immediately.
4. Any variation from the specification and assertions of the Permit Application Form or violation of safety orders may be cause to revoke the permit.
5. This permit shall be posted at or near each place of employment as provided in 8 CAC 341.4.

B of A 2045/11-35/1210 1233

Received From	Received By	
J. Stapleton	J. Jones	
☐ Cash / ☒ Check	Amount $100.00	Date 12-13-94

Investigated by [signature] Safety Engr. Date 12-13-94

Approved by B. E. McGhee Dist. Manager Date 12-13-94

EMPLOYER ORIGINAL—GREEN
ACCOUNTING COPY—CANARY
DISTRICT COPY—PINK
REGION COPY—WHITE
S-680 (Rev. 2-81)

ACTIVITY NOTIFICATION FORM FOR HOLDERS OF ANNUAL PERMITS

Scaffolding Falsework Trenches/Excavations

§ CCR 341. (f) requires holders of annual permits to provide notification to the DOSH office nearest the project prior to commencement of any work. This form in provided for you convenience to use for such notification.

This form may be faxed to the nearest DOSH office to comply with the above. Please do not mail duplicate notification to follow-up fax notification.

FAX DATA: Faxed to : _____ DOSH District Office on: _____
DOSH FAX NO.: _____ By: _____

Company Name: _____ Field Phone: _____
Annual Permit Number: _____ Office Phone: _____
Issuing Region: _____ Issuing District: _____
Specific Activity Location: _____ Number of Employees: _____
Nearest Major Cross Street: _____ Starting Date: _____
City: _____ Anticipated Completion Date: _____
County: _____ High Voltage Lines in Proximity? No ____ Yes _____

INSTRUCTIONS: The appropriate item(s) must be completed and signed by a person knowledgeable about the project for each activity covered by a permit. Please fill in or check off the blanks where appropriate.

Scaffolding: Height _____ Metal _____ Wood _____ Wood over 60 feet _____ Metal over 125 feet ____
Metal > 125 feet or Wood > 60 feet requires design by a California Registered Civil Engineer & plans at the site [See § CCR 1644(c)(7)]

Falsework/Vertical Shoring: Maximum Height _____ Maximum Span _____ Material _____
Description: _____

Trenches/Excavations: Depth Range (Min/Max)* _____ Width Range (Min/Max)* _____ Total Length __
Ground Protection Method: Shoring _____ Sloping _____ Trench Shield _____ Professional Engineer _____
Underground Services Alert (USA) Number _____(NORTH 1-800-842-2444/SOUTH 1-800-422-4133)
Soil Analysis to be done? Yes _____ No _____ If No, you must slope 1.5 to 1.
Competent Person: The holder of an Annual Permit who is notifying the District of the commencement of a Trench and/or Excavation project shall designate a competent person in accordance with the requirements of § CCR Section 1504, 1541, and 1541.1.

Description: _____

Ground protection methods for excavations deeper than 20 feet must be designed by a Registered Professional Engineer. See § CCR 1541.1, Appendix F.

I hereby certify that to the best of my knowledge, the above information and assertions are true and correct and that I/the applicant have knowledge of and will comply with the foregoing.

Signature: _____
Title: _____ Date: _____

IT CORPORATION

EXCAVATION/TRENCH NOTIFICATION WORKSHEET

Project Number: _____ Project Name: _____

Customer's Name: _____

Specific Jobsite Location: _____

Nearest Major Cross Street: _____

City: _____ County: _____

Name of Project Manager: _____

Starting Date: _____ Estimated Completion Date: _____

High Voltage Lines in Proximity: NO: _____ YES: _____ How Near: _____

Depth Range (ft.): _____ _____ (min / max) Width Range (ft.): _____ _____ (min / max) Length (ft.): _____

Project Description: _____

_____

Anticipated Soil Condition: Hard Compact: _____ Unstable: _____ Running: _____

Ground Protection Method: Shoring: _____ Sloping: _____ Trench Shield: _____ Alternate: _____

ALL METHODS MUST MEET ACCEPTED ENGINEERING REQUIREMENTS. PLANS MUST BE KEPT ON SITE.

Describe Chemical Hazards in Work Area: _____

_____

Subcontractor's Name: _____

Equipment to be Used: _____

Design Engineer: _____ Project Supervisor: _____

Phone: ( ) _____

Health & Safety Use Only

IT Permit Number: _____ Date Issued: _____ Expires: _____

Issued By: _____

CAL/OSHA Notification: Date: _____ By: _____

District Office: _____ Contact: _____

APPENDIX D - DOSH DIRECTORY

DISTRICT	ADDRESS	TEL. NO.	FAX NO.
.naheim	2100 E. Katella Ave., Suite 140, Anaheim 92806	(714)939-0145	(714)939-8518
Bakersfield	4800 Stockdale Hwy, Suite 212, Bakersfield 93309	(805)395-1718	(805)395-2841
Concord	1465 Enea Cir., Bldg E., Suite 900, Concord 94520	(510)676-5333	(510)676-0227
Covina	1123 So. Parkview, Suite 100, Covina 91724	(818)966-1166	(818)965-7041
Fresno	2550 Mariposa St., Rm. 4000, Fresno 93721	(209)445-5302	(209)445-5786
Los Angeles	3550 W. 6th St., Rm. 431, Los Angeles 90020	(213)736-3041	(213)736-4526
Oakland	7700 Edgewater Dr., Suite 125, Oakland 94621	(510)568-8602	(510)568-7092
Pico Rivera	9455 E. Slauson Ave., Pico Rivera 90660	(310)949-7827	(310)949-9880
Redding	381 Hemsted, Redding 96002	(916)224-4743	(916)224-4747
Sacramento	2424 Arden Way, Suite 165, Sacramento 95825	(916)263-2800	(916)263-2798
.n Bernardino	242 E. Airport Dr., Suite 103, San Bernardino 92408	(909)383-4321	(909)383-6789
San Diego	7807 Convoy Ct., Suite 140, San Diego 92111	(619)637-5534	(619)279-4658
San Francisco	1390 Market St., Suite 718, San Francisco 94102	(415)557-1677	(415)
San jose	2010 No. First St., Suite 401, San Jose 95131	(408)452-7288	(408)452-7287
San Mateo	1900 So. Norfolk St., Suite 215, San Mateo 94403	(415)573-3812	(415)573-3817
Santa Rosa	1221 Farmers Lane, Suite 300, Santa Rosa 95405	(707)576-2388	(707)576-2598
Torrance/Long Beach/South Bay	680 Knox St., Suite 100, Torrance 90502	(310)516-3734	(310)516-4253
Van Nuys	6150 Van Nuys Blvd., Suite 405, Van Nuys 91401	(818)901-5403	(818)901-5578
Ventura	1655 Mesa Verde, Rm. 150, Ventura 93003	(805)654-4581	(805)654-4852

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

№- 561923

13202

PERMIT

Permit Issued To
(Insert Employer's Name, Address and Telephone No.)

IT Corporation
336 West Anaheim Street
Wilmington, CA 90744
(800) 262-1900

No. _____

Date December 13, 1994

Region 3

District 5

Tel. (310) 516-3734

Type of Permit ANNUAL SCAFFOLDING PERMIT

Pursuant to Labor Code Sections 6500 and 6502, this Permit is issued to the above-named employer for the projects described below.

State Contractor's License Number		Permit Valid through		
37422		December 31, 1995		
Description of Project	Location Address	City and County	Anticipated Dates	
			Starting	Completion
Scaffolding	Various	Statewide	1-1-95	12-31-95
THIS PERMIT IS ISSUED SUBJECT TO THE CONDITION THAT THE WORK IS PERFORMED BY THE SAME EMPLOYER. THE APPROPRIATE DISTRICT OFFICE SHALL BE NOTIFIED IN WRITING OF LOCATION OF JOB SITE PRIOR TO COMMENCEMENT. THE IIP PROGRAM SUBMITTED FOR THIS PERMIT IS ACCEPTED BY DOSH FOR PERMIT PURPOSES ONLY. ALTHOUGH IT ADDRSSES THE PRIMARY POINTS REQUIRED? FAILURE TO IMPLEMENT IT OR ASSURE ITS EFFECTIVENESS? MAY RESULT IN A CITATION."				

This Permit is issued upon the following conditions:

1. That the work is performed by the same employer. If this is an annual permit the appropriate District Office shall be notified, in writing, of dates and location of job site prior to commencement.
2. That employer will comply with all occupational safety and health standards or orders applicable to the above projects, and any other lawful orders of the Division.
3. That if any unforeseen condition causes deviation from the plans or statements contained in the Permit Application Form the employer will notify the Division immediately.
4. Any variation from the specification and assertions of the Permit Application Form or violation of safety orders may be cause to revoke the permit.
5. This permit shall be posted at or near each place of employment as provided in 8 CAC 341.4.

2046/11-35/1210 1233

Received From	Received By	
J. Stapleton	J. Jones	
☐ Cash ☑ Check	Amount $100.00	Date 12-13-94

Investigated by [signature] Safety Engr. Date 12-13-94

Approved by [signature] Dist. Manager Date 12-13-94

EMPLOYER ORIGINAL—GREEN
ACCOUNTING COPY—CANARY
DISTRICT COPY—PINK
REGION COPY—WHITE
S-680 (Rev. 2-81)

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
Occupational Carcinogen Control Unit
455 Golden Gate Avenue, Room 5202
San Francisco, CA 94102

ADDRESS REPLY TO:
P.O. BOX 420603
San Francisco, CA 94142

October 28, 1994

IT CORPORATION
International Technology Corporation
2355 MAIN STREET, SUITE 100
IRVINE CA 92714

CONFIRMATION OF REGISTRATION

Your carcinogen 'Report of Use", or Cal/OSHA Form 183A, has been received and the cardinogen(s) checked has(have) been recorded with your assigned registration number and effective date below:

REGISTRATION NUMBER: 2077 **EFFECTIVE DATE: 9/23/77**

CODE	CARCINOGEN	SECTION	INDIVIDUAL
015	Asbestos	1529, 5208, 5208.1	September 23, 1977
002	4-aminodiphenyl	5209	November 6, 1985
003	Benzidine(and its salts)	5209	November 6, 1985
004	3,3-Dichlorobenzidine(and its salts)	5209	November 6, 1985
005	4-Dimethylaminoazobenzene	5209	November 6, 1985
006	alpha-Naphthylamine	5209	November 6, 1985
007	beta-Naphthylamine	5209	November 6, 1985
008	4-Nitrobiphenyl	5209	November 6, 1985
009	N-Nitrosodimethylamine	5209	November 6, 1985
010	beta-Propiolactone	5209	November 6, 1985
011	bis-Chloromethyl ether	5209	November 6, 1985
012	Methyl chloromethyl ether	5209	November 6, 1985
013	4,4'-Methylenebis(2-chloroaniline)MBOCA	5215	November 6, 1985
014	Ethyleneimine	5209	November 6, 1985
016	Vinyl Chloride	5210	November 6, 1985
018	1,2-Dibromo-3-chloropropane(DBCP)	5212	November 6, 1985
019	Acrylonitrile	5213	November 6, 1985

KEEP THIS DOCUMENT AS A RECORD OF YOUR REPORT. PLEASE ADVISE THIS OFFICE OF CHANGES TO YOUR REPORT OF USE WITHIN 15 CALENDAR DAYS PER THE CALIFORNIA CODE OF REGULATIONS, TITLE 8, SECTIONS AS LISTED.

FOR FURTHER ASSISTANCE CALL: (415) 703-5301, OCCUPATIONAL CARCINOGEN CONTROL UNIT.

CC: Frederick J. Miakar, CIH, Dir, H&S, Environ. Svcs Div, W
Ltr dtd 10/18/94 updated registrations for 7 active locations; advised of locations no longer occupied by IT Corp. Your registration number 2077 will represent all locations as you list - with 2355 Main St as the mailing address and corporate hqtrs.

Cal/OSHA 183C
May 1994

Pete Wilson, Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
Occupational Carcinogen Control Unit
455 Golden Gate Avenue, Room 5202
San Francisco, CA 94102

ADDRESS REPLY TO:
P.O. BOX 420603
San Francisco, CA 94142

October 28, 1994

IT CORPORATION
International Technology Corporation, Regional Office
2355 MAIN STREET, SUITE 100
IRVINE CA 92714

CONFIRMATION OF REGISTRATION

Your carcinogen 'Report of Use", or Cal/OSHA Form 183A, has been received and the cardinogen(s) checked has(have) been recorded with your assigned registration number and effective date below:

REGISTRATION NUMBER: 2077 **EFFECTIVE DATE: 9/23/77**

CODE	CARCINOGEN	SECTION	INDIVIDUAL
020	Inorganic Arsenic	5214	November 6, 1985
021	Ethylene Dibromide(EDB)	5219	November 6, 1985
022	Ethylene Oxide(EtO)	5220	November 6, 1985
023	Formaldehyde	5217	October 18, 1994
024	Benzene	5218	August 30, 1991
025	Methylenedianiline(MDA)	1535, 5200	October 18, 1994
026	Cadmium	1532, 5207	October 18, 1994
001	2-acetylaminofluorene	5209	November 6, 1985

KEEP THIS DOCUMENT AS A RECORD OF YOUR REPORT. PLEASE ADVISE THIS OFFICE OF CHANGES TO YOUR REPORT OF USE WITHIN 15 CALENDAR DAYS PER THE CALIFORNIA CODE OF REGULATIONS, TITLE 8, SECTIONS AS LISTED.

FOR FURTHER ASSISTANCE CALL: (415) 703-5301, OCCUPATIONAL CARCINOGEN CONTROL UNIT.

CC: **Frederick J. Miakar, CIH, Dir, H&S, Environ. Svcs Div, W**
Ltr dtd 10/18/94 updated registrations for 7 active locations; advised of locations no longer occupied by IT Corp. Your registration number 2077 will represent all locations as you list - with 2355 Main St as the mailing address and corporate hqtrs.

Cal/OSHA 183C
May 1994

UNDERGROUND/OVERHEAD UTILITY CHECKLIST

roject Name/Number _____ ***Date*** _____

Location _____

This checklist must be completed for any intrusive subsurface work such as excavating or drilling. It records the fact that all underground and overhead structures and utilities in the work area are identified and located. The Project Manager must request utility markouts before the start of field operations to allow the client and utility companies time to complete them. If complete information is not available, a magnetometer survey must be performed to locate obstacles prior to excavating or drilling.

PROCEDURE

A diagram of the project area depicting the proposed location of excavation or drilling sites must be attached to this Health and Safety Plan. The diagram must clearly indicate the areas checked for underground structures/utilities and overhead power lines. This form and the diagram must be signed by the Project Manager, the IT Field Supervisor, and the client representative (if applicable).

CHECKLIST

TYPE OF STRUCTURE	PRESENT	NOT PRESENT	METHOD OF MARKOUT
Electric Power Line			
Natural Gas Line			
Telephone Line			
Water Line			
Product Line			
Steam Line			
Sewer Line			
Drain Line			
Underground Tank			
Overhead Power Line			
Overhead Product Line			
Septic Tank/Drain			

Client Representative _____ _____

(If applicable) ***(Signature)*** ***(Date)***

IT Project Manager _____ _____

(Signature) ***(Date)***

.f Field Supervisor _____ _____

(Signature) ***(Date)***

INTERNATIONAL TECHNOLOGY CORPORATION

HOT WORK PERMIT

rating Area _____ Good for this date only _____ 19 ____

Specific vessel or equipment _____

Work to be done _____

TESTS

STATE EXACT LOCATION OF TEST	TIME	PERCENT LOWER EXPLOSION LIMIT	PERCENT OXYGEN	OTHERS _____	OTHERS _____	INITIAL

CHECK LIST

	Initial: Yes	Initial: Does Not Apply
O[illegible]ations/plant personnel have been informed of work to be performed _____		
A[illegible]ks/lines/valves are disconnected, blinded, or locked out. _____		
Equipment and all attached piping has been cleaned and purged with: (check blank) Water _____ Steam _____ Inert gas _____ Air _____		
Electrical service has been locked out and tagged. _____		
All grounding/bonding wire in place. _____		
Surrounding equipment and operations are safe for hot work. _____		
No open vessels or lines within 35 feet of hot work area. _____		
No combustible items within 35 feet of hot work area or covered with wetted tarpaulins. _____		
Fire Watch has been provided by Contractor. _____		
No flammable gases greater than 10% LEL in hot work area. _____		
All requirements of ITCPRO 9531 for Confined Space Entry have been met and ITC Form 9531-1 has been completed and posted.		
If vessel contains leaded product, all requirements of ITCPRO 9531.3 have been met.		

PERSONNEL PROTECTIVE EQUIPMENT

EYES
- ☐ Chemical Goggles
- ☐ Face Shield
- ☐ Safety Glasses
- ☐ Welders Mask

BODY
- ☐ Environmental Suit: ☐ PVC ☐ Butyl
- ☐ Heavy Suit: ☐ PVC ☐ Neoprene
- ☐ Light PVC Suit
- ☐ Yellow Tyvek Suit
- ☐ White Tyvek Suit

EXTREMITIES
- ☐ Hard Hat
- ☐ Gloves
- ☐ Boots ☐ PVC ☐ Neoprene
- ☐ Hoods ☐ PVC ☐ Neoprene
- ☐ Foot Coverings, Disposable

RESPIRATORY
- ☐ Self-Contained Respirator
- ☐ Hose Line Respirator
- ☐ Hose Line W/Egress
- ☐ Cartridge Respirator

Cartridge Type _____
- ☐ Dust Respirator

EQUIPMENT REQUIRED
- ☐ Fire Extinguisher
- ☐ Fire Blanket
- ☐ Charged Water Hose
- ☐ Combustible Gas Indicator

Special Instructions: _____

Completed by: _____ Name Printed _____ Signature _____ Date

_____ Manager

ITC FORM 9571-1

ENTRY PERMIT
PERMIT-REQUIRED CONFINED SPACE (PRCS)

Division/Location _____ Job No. _____
Customer _____ Address _____
Location of Job _____ Identity of PRCS _____
Describe Hazards of PRCS (Chemical, Physical) _____

Chemical Introduced Into Space _____

Purpose This Permit Authorized _____

CHECKLIST	*YES*	*DOES NOT APPLY*
All lines leading to and from confined space have been blinded or disconnected		
Electrical service disconnected or locked out		
All grounding and bonding cables in place		
All lighting, fittings, power equipment, and extension cords are explosion-proof		
Ground Fault Circuit Indicator (GFCI) checked and functioning		
All ignition sources have been isolated		
All respiratory equipment and alarms checked and functional		
All safety harnesses and life lines checked		
All required PPE checked and in use		
All entrants are confined space trained		
All entrants are trained in the use, care, and limitations of respirators and PPE		
Attendant trained in emergency procedures		
Attendant(s) trained in rescue procedures		
Outside rescue service will be used and they have been notified of this entry		
Appropriate rescue equipment available and checked		
Ventilation system in use and effective		
Entrant(s) can achieve a gas-tight seal with respirator		
Entrant(s) are not wearing contact lenses		
All tests have been completed and indicate that entrance requirements have been met		
Appropriate warning signs have been posted and unauthorized personnel have been excluded from the PRCS and area		

IF THE ANSWER TO ANY OF THE ABOVE QUESTIONS IS NO, ENTRY IS NOT PERMITTED.

PERSONAL PROTECTIVE EQUIPMENT
(Circle)

EYE/FACE
Chemical Goggles
Face Shield
Safety Glasses

EXTREMITIES
Hard Hat
Gloves (Material _____)
Hoods
Boots (Material _____)
Booties

BODY
Suit (Level ____, Material _____)

RESPIRATORY
SCBA
Air Line
Egress System
Air Purifying (Cartridge _____)
Powered Air Purifying
(Cartridge _____)

OTHER
Hearing Protection
Harness & Lifeline
Chest or Parachute

RESCUE EQUIPMENT

Mechanical Extraction Device
First Aid Kit
SCBA
Other (Specify) _____

NON-IT RESCUE TEAM

Instructions to Summon Rescue _____

COMMUNICATION

Lifeline "Tug" Signals (See HASP)

Air Powered Horn Signals (See HASP)

Other _____

OTHER PERMITS ISSUED FOR WORK IN PRCS: _____

OTHER HAZARD CONTROL PROCEDURES OR INSTRUCTIONS: _____

TEST DATA
Oxygen, Flammability and Toxic Contaminants)

Time	*Percent Oxygen*	*Percent LEL*	____ *PEG*	____ *PEG*	____ *PEG*	____ *PEG*	____ *PEG*	*Initials*	*Comments*

AUTHORIZED ENTRANTS

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

AUTHORIZED ATTENDANTS

_____
_____
_____

RESCUE PERSONNEL

_____
_____
_____

Diagram the confined space, indicate location of manways and ventilators. Indicate location(s) where tests conducted.

) (- Manway

∞ - Ventilator

X - Test Location

ACCEPTABLE ENTRY CONDITIONS

1) Entry Permit Completely Filled Out
2) Oxygen between 20-23.5%
3) Combustible Gases Below 10% LEL
4) Permissible Levels of Toxic Gases (List)

_____ _____ _____
_____ _____ _____

5) Other _____
_____
_____
_____
_____
_____
_____

PRCS SAFE FOR ENTRY

DATE/TIME _____/____ NAME ENTRY SUPERVISOR _____ SIGNATURE _____

CURRENT ENTRY SUPERVISOR (IF DIFFERENT) _____

ENTRY PERMIT EXPIRES DATE/TIME _____/_____ (No longer than 1 shift)

ENTRY PERMIT CANCELLED

DATE/TIME _____/_____ SIGNATURE _____

REASON (✓) _____ Work Complete _____ Authorized Conditions not met _____ Incident

DESCRIBE PROBLEMS DURING ENTRY AND RESOLUTION

_____
_____

RECLASSIFICATION TO NON-PERMIT-REQUIRED CONFINED SPACE
Describe hazard removal methods, without use of ventilation. _____
_____

TESTING VERIFICATION SHOWN AT TIME _____ ON TEST DATA CHART ABOVE.

DATE/TIME ____/____ ENTRY SUPERVISOR SIGNATURE _____

REVIEWED BY _____ DATE _____

INTERNATIONAL TECHNOLOGY CORPORATION

SUPERVISOR'S EMPLOYEE INJURY REPORT

This is an official document to be initiated by the employee's supervisor. Please answer all questions completely. This report must be forwarded to the employee's Regional Health and Safety office within 24 hours of the injury.

Injured's Name _____ Sex ____ S.S. No. _____ Birthdate _____

Home Address _____ City _____ State _____ Zip _____ Phone _____

Job title _____ Employee's P.C. _____ Hire date _____ Hourly wage _____

SUPERVISOR

Date of incident _____ Time _____ Time reported _____ To whom? _____

Client name _____ Client address _____ Time shift began _____

Exact location of incident _____ Did employee leave work? ☐ No ☐ Yes When _____

Has employee returned to work? ☐ No ☐ Yes When _____ Did employee miss a regularly scheduled shift? ☐ No ☐ Yes

Doctor/Hospital name _____ Address _____

Witness name(s) _____ Statements attached? ☐ No ☐ Yes

Nature of injury _____ Exact body part _____

Medical attention: ☐ None ☐ First aid on site ☐ Doctor's office ☐ Hospital ER ☐ Hospitalized

Job assignment at time of incident _____ Job: _____ Phase: _____ Task: _____ Subtask: _____

Describe incident _____

What unsafe physical condition or unsafe act caused the incident? _____

What corrective action has been taken to prevent recurrence? _____

Supervisor/Foreman _____ (Print) _____ Signature _____ Date

MANAGER

Comments on incident and corrective action _____

Manager's name _____ (Print) _____ Signature _____ Date

HEALTH AND SAFETY

Concur with action taken? ☐ No ☐ Yes Remarks _____

OSHA Classification:

☐ Incident only ☐ First aid ☐ No lost workdays ☐ Lost workdays ☐ Restricted activity ☐ Fatality

Days away from work _____ Days restricted work _____ Total days charged _____

☐ State jurisdiction ☐ Federal L&H ☐ Date ER submitted _____ Which claims office _____

Coding: A. Injury type or illness _____ B. Injured body parts _____ C. Activity at time of accident _____ D. Injury cause code _____

E. Agent code _____ F. Safety rule violated code _____ G. Accident prevention code _____

Name _____ (Print) _____ Signature _____ Date

ITC FORM HSO20A (10/90)

White: Corporate Health and Safety Yellow: Regional Health and Safety Pink: Profit/Cost Center

IT CORPORATION WORKERS COMPENSATION ACCIDENT CODING

A. TYPE OF INJURY OR ILLNESS

10 Laceration
12 Puncture
Contusion
Abrasion
Crushing Injury
20 Foreign Body
22 Burn-Thermal
24 Burn-Chemical
26 Fracture
28 Amputation
30 Hernia/Inguinal
31 Hernia/Other
32 Strain
34 Sprain
36 Dislocation
38 Heat Exhaustion/Heat Stress
40 Drowning
42 Asphyxiation
44 Systemic Poisoning
46 Dermatitis
48 Inflammation/Irritation
49 Pneumoconiosis
50 Respiratory Condition Due to Toxic Agents
51 Radiation
52 Heart Disease
54 Liver Damage
56 Kidney Damage
58 Mental Stress/Psychiatric
60 Repeated Trauma
62 Hearing Loss
64 Cancer
66 Other Occupational Disease
68 Fatality
70 Infectious Respiratory Disease
72 Miscellaneous-Not Otherwise Coded
Not Work Related

B. INJURED BODY PARTS

10 Head
12 Face
14 Ear
16 Eye
17 Nose
18 Teeth/Mouth
20 Neck
22 Shoulder
24 Chest
26 Abdomen
28 Upper Arm
30 Elbow
32 Lower Arm
34 Wrist
36 Hand
38 Thumb
40 Fingers
42 Back/Spine
44 Hip/Pelvis
46 Thigh
48 Knee
50 Lower Leg
52 Ankle
54 Heel
56 Metatarsal
58 Toes
60 Lungs
62 Heart
63 Liver
Other Internal Organs
Psyche
Not Otherwise Coded

C. ACTIVITY AT TIME OF ACCIDENT

10 Driving
14 Operating Heavy Equipment
16 Hot Work
18 Hydroblasting
19 Washing
20 Cutting
22 Lifting Or Manual Carrying
24 Walking
26 Running
28 Jumping
30 Hammering
32 Sampling
34 Loading/Unloading Vacuum Trucks
36 Pulling Vacuum Hoses
38 Climbing
40 Shoveling
41 Sweeping
42 Pulling
44 Pushing
46 Opening Or Closing
48 Reaching Or Stretching
50 Standing, Observing Or Inspecting
52 Piling Or Stacking
54 Maintenance
56 Training
58 Chemical Packaging
60 Laboratory Analysis
62 Washing Glassware
64 Tank Cleaning
66 Asbestos Removal
68 Nuclear Decontamination
70 Drilling
72 Pond Maintenance
74 Using Hand Tools
76 Not Otherwise Classified

D. INJURY CAUSE CODE

STRUCK BY

01 Falling Object
02 Flying Object
03 Swinging Object
04 Tipping, Sliding Or Rolling Object
05 Motor Vehicle
06 Altercation
07 All Other Moving Objects

STRAIN OR OVEREXERTION

10 Lifting (Back)
11 Lifting (Other Than Back)
12 Pulling Or Pushing
13 Reaching, Twisting Or Over Extending
14 Cumulative Trauma

FALL FROM ELEVATION

20 Manway Opening
21 Ladder Or Scaffold
22 Machinery Or Stationary Equipment
23 Piled Materials
24 Stairs
25 Heavy Equipment
26 Vacuum Trucks
27 Other Trucks

FALL FROM SAME LEVEL

30 Slip
31 Trip

STRUCK AGAINST

40 Moving Object
41 Stationary Object
42 Sharp Object

CAUGHT IN, UNDER OR BETWEEN

50 Running Or Meshing Objects
51 Point Of Operation (Machinery Or Equipment)
52 Other Than Point Of Operation
53 Moving And Stationary Objects
54 Two Moving Objects

EXPOSURE TO

60 Cold
61 Heat
62 Electric Current
63 Chemicals
64 Radiation
65 Noise
66 Dust
68 Poison Oak/Ivy

MISCELLANEOUS

70 Inhalation
71 Ingestion
72 Absorption
73 Job Stress
74 Insect Or Animal Bites

E. AGENT CODE

10 Grading/Compacting Equipment
11 Excavating/Drilling Equipment
12 Crane
14 Vacuum Truck
16 End Dump Truck
18 Automobile
19 All Other Motor Vehicles
20 Hand Tools
22 Power Tools
24 Laboratory Glassware
26 Laboratory Equipment
28 Sampling Equipment
30 Hoses
32 Hydroblaster
34 High Pressure Washing
36 Hand Truck
38 Ladder
40 Scaffold
42 Stairs
44 Slippery Surface
45 Ice Or Snow
46 Uneven Surface
48 Hot Liquid/Gases
50 Toxic Material
52 Oxygen Deficient Atmosphere
54 Flammable Materials
56 Electric Current
58 Radiation
60 Door
62 Compressed Gas
64 Gas Cylinder
66 Respirator/Breathing Apparatus
68 Protective Clothing
70 Other Clothing/Jewelry
72 Mobile Treatment Equipment
73 Fixed Treatment Facility

F. SAFETY RULE VIOLATED CODE

01 IT Safety Rule
02 Client Safety Rule
03 Compressed Air
05 Wire Rope, Clips And Slings
06 Locking Out Equipment
07 Piling And Blocking Of Materials
08 High Voltage Rules
09 Eye And Face Protection
10 Portable Ladders
11 Underground Construction
12 Cold Weather Hazards
13 Loading Unloading
14 Hand Tools
15 Cleaning And Repair To Tools
16 Protective Clothing And Apparel
17 Flammable And Combustible Liquids
18 Job Procedure
19 Portable Electrical Tools
21 Flammable Gases
22 Fall Protection
23 Grinding Wheel
24 Machine Guarding
25 Scaffolding
26 Handling Materials
27 Horse Play And Fighting
28 Housekeeping
29 Unauthorized Walkways
30 Welding Equipment
31 Machine Operations
32 Hand Tools
35 Crane Rules
37 Acids And Caustics
38 Tripping And Slipping Hazards
42 Respirator Protection
43 Hearing Protection
44 Confined Space
45 Late Report of Minor Accident
46 Temporary Cords And Lamps
47 Improper Operation Of Equipment
48 Hydroblast
50 Motor Vehicle
51 Driving Under the Influence (DUI)
52 Fork Lifts
54 Air Compressors And Receivers
60 No Safety Rule Violation
62 Did Not Review Job With Health and Safety

G. ACCIDENT PREVENTION CODE

02 Install Guards Or Safety Device
04 Install Warning System
06 Store Flammables And Combustibles In Approved Manner
08 Block Or Secure Material On Machinery Against Unexpected Movement
10 Additional Housekeeping Needed
12 Remove Protruding Objects
14 Maintain Necessary Clearance
16 Control Or Remove Atmospheric Conditions
18 Maintain Proper Piling of Storage
20 Install Additional Illumination
22 Personal Protective Equipment
24 Review Project with Health & Safety

INSTRUCTION/RE-INSTRUCTION ON:

50 Use Of Equipment
52 Proper Operation Or Working Speed
54 Use Of Warning Devices
56 Proper Use Of Safety Devices
58 Use Of Tools In Good Repair
60 Proper Lifting Practices
62 De-Energizing Equipment Before Adjusting Or Repairing
64 Stay Off Moving Equipment
66 Horse Play
68 Wearing Of Personal Protective Equipment
70 Proper Chemical Handling Procedure
72 Safety Work Rules
74 IT Training Class

MUST BE COMPLETED WITHIN 72 HOURS

ACCIDENT/INJURY INVESTIGATION

Date _____ Profit/Cost Center _____ Date of Accident/Injury _____

Employee Name _____

Supervisor Name _____

Job Number/Name _____ / _____

Location of Accident/Injury _____

- Accident/Injury Classification

Injury	Vehicle	DOT
☐ Near Miss	☐ Chargeable	☐ DOT Vehicle
☐ First Aid	☐ Non-Chargeable	☐ DOT Reportable
☐ OSHA Recordable	☐ Not at Fault	
☐ Lost Workday		General Liability ☐

- Description (Provide facts, describe how incident occurred, provide diagram (on back) or photos)

- Analysis 1 (What unsafe acts or conditions contributed to the incident?)

- Analysis 2 (What systematic or management deficiencies contributed to incident?)

- Corrective Action(s) (List corrective action items, responsible person, scheduled completion date)

- Witnesses (Attach statements or indicate why unavailable)

Investigated By _____ _____ _____

Print Name Signature Date

Manager _____ _____ _____

Print Name Signature Date

(Attach Additional pages if needed)

ITC Form H8020E 8/13/93

ACCIDENT REVIEW BOARD REPORT

DATE: _____ LOCATION: _____

BOARD MEMBERS _____

_____

ACCIDENT DATE: _____ TYPE _____

INVESTIGATION COMPLETE? YES _____ NO _____

EMPLOYEE(S) _____ _____
PRINT NAME SIGNATURE

_____ _____
PRINT NAME SIGNATURE

SUPERVISOR(S) _____ _____
PRINT NAME SIGNATURE

CAUSE OF ACCIDENT _____

ACTION BY BOARD _____

ACCEPTED: ACCEPTED:

_____ _____
EMPLOYEE MANAGER

APPROVED REJECTED FOR:

_____ _____
(HS MANAGER) _____

APPROVED REJECTED FOR:

_____ _____
(REGIONAL GENERAL MANAGER) _____

APPROVED REJECTED FOR:

_____ _____
(DIVISION DIRECTOR) _____

INTERNATIONAL TECHNOLOGY CORPORATION

VEHICLE ACCIDENT REPORT

IT Vehicle

DRIVER _____ ACCIDENT DATE _____ DRIVERS LICENSE _____ STATE _____

ADDRESS _____

CITY _____ STATE _____ STATE _____ ZIP _____

WORK PHONE #( ) _____ SS# _____ PC# _____

VEHICLE # _____ YEAR _____ MAKE _____ MODEL _____ LICENSE PLATE # _____

STATE _____ VEHICLE OWNER: ☐ IT CORP. ☐ LEASED/RENTED ☐ PRIVATE VEHICLE

VEHICLE TYPE: ☐ COMMERCIAL MOTOR VEHICLE ☐ NON-COMMERCIAL

IF NOT OWNED: OWNER _____ PHONE ( ) _____

ADDRESS _____ STATE _____ ZIP _____

VEHICLE DAMAGE _____

OF VEHICLES TOWED FROM SCENE _____ NUMBER OF INJURIES _____ NUMBER OF FATALITIES _____

WERE HAZARDOUS MATERIALS RELEASED? ☐ YES ☐ NO IF YES, DESCRIBE MATERIALS _____

O /ehicle(s)

Use separate sheet if more than one

DRIVER _____ DRIVERS LICENSE _____ STATE _____

ADDRESS _____

CITY _____ STATE _____ STATE _____ ZIP _____

PHONE #( ) _____ SS# _____

OWNERS NAME (CHECK IF SAME AS DRIVER ☐) _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

INSURANCE COMPANY _____ POLICY # _____

AGENT'S NAME _____ PHONE # ( ) _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

VEHICLE: YEAR _____ MAKE _____ MODEL _____ PLATE # _____ STATE _____

VEHICLE DAMAGE _____

PASSENGERS: ☐ YES (List on reverse) ☐ NO INJURIES: ☐ YES (List names & addresses on reverse) ☐ NO

Accident Description

DATE _____ TIME _____ A.M. or P.M.

LOCATION (CITY,STATE) _____

DESCRIPTION OF ACCIDENT _____

_____

_____

WITNESS _____ PHONE # ( ) _____

ADDRESS _____

POLICE OFFICER'S NAME _____ DEPARTMENT _____

EMPLOYEE _____ (PRINT) _____ (SIGNATURE) DATE _____

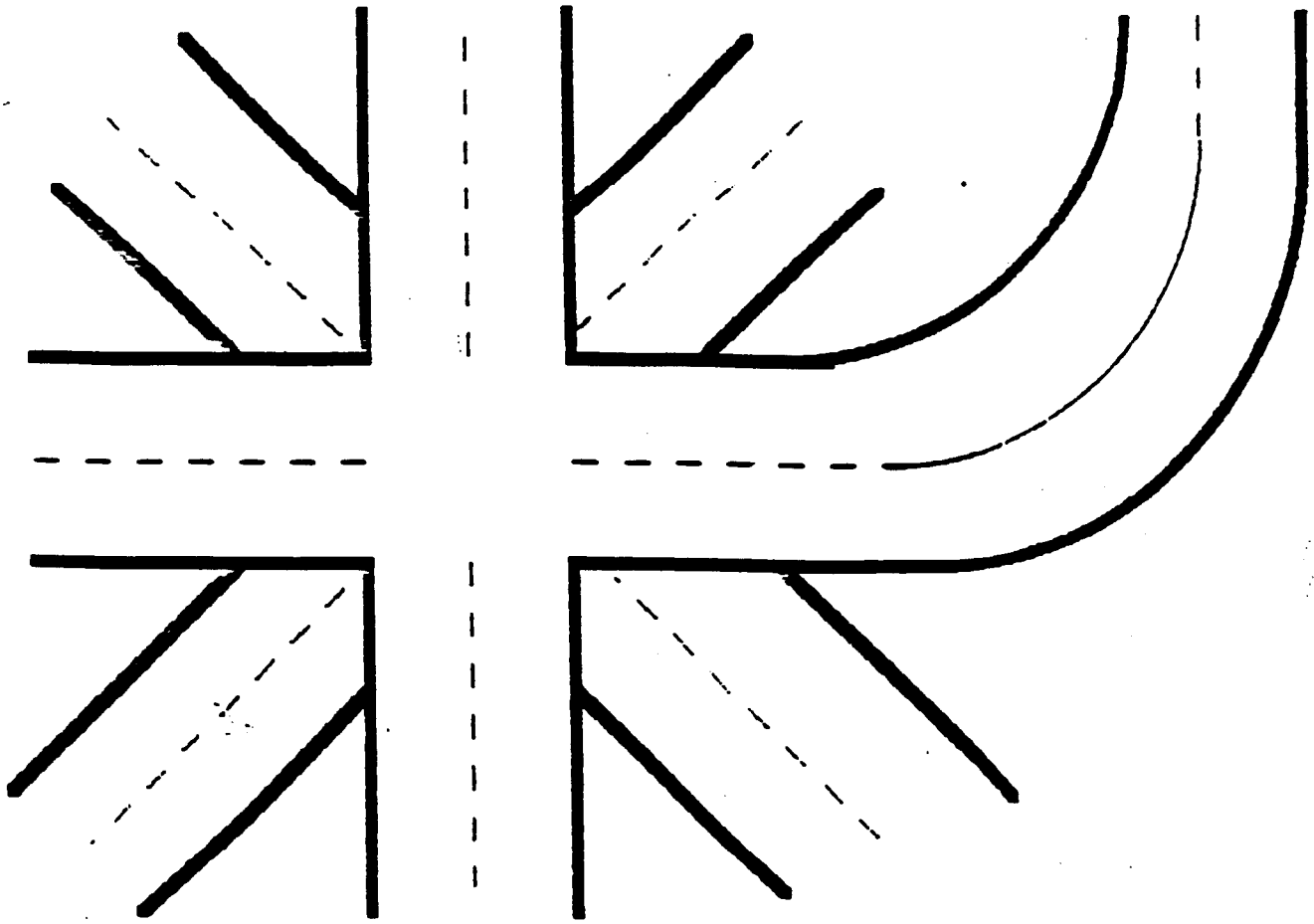
SUPERVISOR _____ (PRINT) _____ (SIGNATURE) DATE _____

PHONE OR FAX TO CORPORATE HEALTH & SAFETY AND JOHN McCARTHY WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY.

IT PHONE: (310) 378-9933 — IT FAX: (310) 791-2587

HS020B/10-7-93

VEHICLE ACCIDENT REPORT
ACCIDENT DIAGRAM



INSTRUCTIONS

1. USE SECTION OF DIAGRAM WHICH MOST CLOSELY RESEMBLES ACCIDENT SETTING.
2. LABEL ALL STREETS. USE AN ARROW TO INDICATE NORTH. USE ARROWS TO INDICATE TRAFFIC FLOW. NOTE SPEED LIMIT.
3. INDICATE POSITION OF VEHICLES JUST PRIOR TO ACCIDENT AND INDICATE POINT OF COLLISION OR ACCIDENT.
4. INDICATE ANY OBSTACLES, OBSTRUCTIONS OR OTHER ITEMS WHICH MIGHT HAVE INFLUENCED ACCIDENT. FOR EXAMPLE INDICATE CONSTRUCTION, OBSTRUCTIONS TO VIEW, ICY OR WET PATCHES, ETC.

DATE:	SKETCH BY:

LOCATION:

IT CORPORATION

GENERAL LIABILITY, PROPERTY DAMAGE, AND LOSS REPORT

Date Claim Submitted _____

Agent _____

DIVISION/SUBSIDIARY _____ DATE / /

ADDRESS _____

HOW DID DAMAGE OR LOSS OCCUR: _____

DESCRIPTION OF DAMAGE OR LOSS: _____

IDENTIFICATION OF DAMAGED OR LOST PROPERTY: _____

LOCATION OF DAMAGED OR LOST PROPERTY (Before Loss): _____

DATE AND TIME OF DAMAGE OR LOSS: Date / / Time _____ AM PM

OWNER OF DAMAGED OR LOST PROPERTY:

Name _____ Phone No. _____

Address _____ City _____

Employer _____

INJURED PARTIES (Complete also a Supervisors Employee Injury Report if an IT Employee):

1. Name _____ Phone No. _____
   Address _____ City _____
   Employer's Name & Address _____
   Nature Of Injury _____
2. Name _____ Phone No. _____
   Address _____ City _____
   Employer's Name & Address _____
   Nature Of Injury _____

WITNESSES:

1. Name _____ Phone No. _____
   Address _____ City _____
   Employer's Name & Address _____
2. Name _____ Phone No. _____
   Address _____ City _____
   Employer's Name & Address _____

WERE PICTURES TAKEN ☐ YES ☐ NO

WERE POLICE NOTIFIED ☐ YES ☐ NO DEPT. _____

COMPLETED BY: _____ (Name Printed) _____ (Signature) Date / /

Manager _____ (Signature) Date / /

ITC FORM 9300.1-3 (May 1984)

USE BACK SIDE IF NECESSARY

TAILGATE SAFETY MEETING

ion/Subsidiary _____ Facility _____

Date _____ Time _____ Job Number _____

Customer _____ Address: _____

Specific Location _____

Type of Work _____

Chemicals Used _____

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment _____

_____

Chemical Hazards _____

_____

Physical Hazards _____

_____

Emergency Procedures _____

_____

H[illegible]pital / Clinic _____ Phone ( ) _____ Paramedic Phone ( ) _____

H[illegible]ital Address _____

Special Equipment _____

_____

Other _____

_____

ATTENDEES

NAME PRINTED	SIGNATURE

Meeting conducted by:

_____ _____

NAME PRINTED SIGNATURE

Supervisor _____ Manager _____

36-8-85

EMERGENCY

AMBULANCE _____

FIRE - RESCUE _____

HOSPITAL _____

PHYSICIAN _____

ALTERNATE _____

POLICE _____

CAL/OSHA _____

[POSTING IS REQUIRED BY TITLE 8 SECTION 1512(e)]

STATE OF CALIFORNIA
CAL OSHA
DEPARTMENT OF INDUSTRIAL RELATIONS

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
P.O. Box 603, San Francisco CA 94142-0603
420603

S-500
3/90

FREQUENTED BY EMPLOYEES

WORKERS' COMPENSATION NOTICE

INTERNATIONAL TECHNOLOGY CORPORATION
(EMPLOYER)

Notice is hereby given that this employer is insured with

NATIONAL UNION FIRE INSURANCE COMPANY
(NAME OF INSURANCE COMPANY)

for Workers' Compensation, in compliance with the laws of the state of California

Address of nearest claims office and telephone number CONSTITUTION STATE SERVICE COMPANY 215 LENNON LANE / P.O. BOX 8112 / WALNUT CREEK, CA (510) 945-4299

Under the California Labor Code, in the event of injury, you have the right to request a change of treating physician if the original treating physician is selected initially by the employer. Thirty (30) days after reporting an injury you can be treated by a physician of your own choice. Upon selecting a physician thirty (30) days after reporting the injury, you should immediately notify your employer of the name and address of the physician selected.

If you wish direct initial medical treatment, other than appropriate emergency or first aid treatment, by your own designated physician in the event of injury, you must notify your employer of your choice in writing prior to injury.

If you are unable to return to work due to the injury, you have the right to receive temporary or permanent disability income and, if eligible, vocational rehabilitation services.

ditional benefits are available if the injury results in death.

Report any work-related injury or illness to your supervisor or employer as soon as possible. Provide all necessary information regarding injury or illness.

For further information, please contact your supervisor or employer. You may also contact an Information and Assistance Officer at the Office of Benefit Assistance and Enforcement located at

CSSC / 215 LENNON LANE / P.O. BOX 8112 / WALNUT CREEK, CA (800) 832-7839

EMERGENCY TELEPHONE NUMBERS

Doctor DR. ROSS MYERSON (WASHINGTON OCCUPATIONAL HEALTH ASSOC.) (800) 777-9642

Hospital ( )

Ambulance ( )

Fire Department ( ) Police Department ( )

OFF-DUTY ACTIVITIES OF EMPLOYEE(S)

Your employer or its insurance company may not be responsible for compensation because of an injury due to the employee's ntary participation in any off-duty recreational, social, or athletic activity that is not part of the employee's work-related es.

ACCESS TO MEDICAL AND EXPOSURE RECORDS

BY CAL/OSHA REGULATION
- GENERAL INDUSTRY SAFETY ORDER 3204 -
YOU HAVE THE RIGHT TO SEE AND COPY:

- **Your medical records and records of exposure to toxic substances or harmful physical agents.**
- **Records of exposure to toxic substances or harmful physical agents of other employees with work conditions similar to yours.**
- **Material Safety Data Sheets or other information that exists for chemicals or substances used in the workplace, or to which employees may be exposed.**

THESE RECORDS ARE AVAILABLE AT: IT Corporation
(Location)
4585 Pacheco Blvd., Martinez, CA 94553

FROM: H&S Dept.
(Person Responsible)

A COPY OF GENERAL INDUSTRY SAFETY ORDER 3204 IS AVAILABLE FROM: (Same)

Posting the above information is required by GISO 3204. This posting may be done by use of this placard or any similar method the employer chooses.

STATE OF CALIFORNIA
CAL OSHA
DEPARTMENT OF INDUSTRIAL RELATIONS

December 1989
S-11

State of California
Department of Industrial Relations
Cal/OSHA Communications
P.O. Box 603
San Francisco, CA 94101

Wage and Hour Division
Washington, D.C. 20210

NOTICE

EMPLOYEE POLYGRAPH PROTECTION ACT

The Employee Polygraph Protection Act prohibits most private employers from using lie detector tests either for pre-employment screening or during the course of employment.

PROHIBITIONS

Employers are generally prohibited from requiring or requesting any employee or job applicant to take a lie detector test, and from discharging, disciplining, or discriminating against an employee or prospective employee for refusing to take a test or for exercising other rights under the Act.

EXEMPTIONS*

Federal, State and local governments are not affected by the law. Also, the law does not apply to tests given by the Federal Government to certain private individuals engaged in national security-related activities.

The Act permits *polygraph* (a kind of lie detector) tests to be administered in the private sector, subject to restrictions, to certain prospective employees of security service firms (armored car, alarm, and guard), and of pharmaceutical manufacturers, distributors and dispensers.

The Act also permits polygraph testing, subject to restrictions, of certain employees of private firms who are reasonably suspected of involvement in a workplace incident (theft, embezzlement, etc.) that resulted in economic loss to the employer.

EXAMINEE RIGHTS

Where polygraph tests are permitted, they are subject to numerous strict standards concerning the conduct and length of the test. Examinees have a number of specific rights, including the right to a written notice before testing, the right to refuse or discontinue a test, and the right not to have test results disclosed to unauthorized persons.

ENFORCEMENT

The Secretary of Labor may bring court actions to restrain violations and assess civil penalties up to $10,000 against violators. Employees or job applicants may also bring their own court actions.

ADDITIONAL INFORMATION

Additional information may be obtained, and complaints of violations may be filed, at local offices of the Wage and Hour Division, which are listed in the telephone directory under U.S. Government, Department of Labor, Employment Standards Administration.

THE LAW REQUIRES EMPLOYERS TO DISPLAY THIS POSTER WHERE EMPLOYEES AND JOB APPLICANTS CAN READILY SEE IT.

**The law does not preempt any provision of any State or local law or any collective bargaining agreement which is more restrictive with respect to lie detector tests.*

U.S. DEPARTMENT OF LABOR
EMPLOYMENT STANDARDS ADMINISTRATION
Wage and Hour Division
Washington, D.C. 20210

* U.S. GPO: 1988 — 223-014

WH Publication 1462
September 1988

NOTICE TO ALL EMPLOYEES

Working on Federal or Federally Financed Construction Projects

MINIMUM WAGES

You must be paid not less than the wage rate in the schedule posted with this Notice for the kind of work you perform.

OVERTIME

You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 8 a day or 40 a week—whichever is greater. There are some exceptions.

APPRENTICES

Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY

If you do not receive proper pay, contact the Contracting Officer listed below:

or you may contact the nearest office of the Wage and Hour Division, U.S. Department of Labor. The Wage and Hour Division has offices in several hundred communities throughout the country. They are listed in the U.S. Government section of most telephone directories under:
U.S. Department of Labor
Employment Standards Administration

WH Publication 1321
Revised November 1983

U.S. Department of Labor
Employment Standards Administration
Wage and Hour Division

Notice To Employees Working on Government Contracts

This establishment is performing Government contract work subject to the—

Service Contract Act
or
Public Contracts Act

During the period of performance on the contract the following requirements must be observed:

Minimum Wages

Your rate must be at least $3.35 an hour.

A higher rate may be required for *Service* contracts if a wage determination applies or if a predecessor contractor has paid a higher rate for your classification pursuant to a collective bargaining agreement. Such higher rates for *Service* contracts will be posted as an attachment to this Notice.

Fringe Benefits

Service contract wage determinations may require fringe benefit payments (or a cash equivalent). *Supply* contracts do not require fringe benefits.

Overtime Pay

You must be paid 1½ times your basic rate of pay for all hours worked over 40 in a week. There are some exceptions.

Safety and Health

The work must be performed under conditions that are sanitary, and not hazardous or dangerous to the employees' health and safety.

No person under 16 years of age may be employed on a *Supply* Contract.

Information

Further information on the wage provisions of the Service Contract Act or the Walsh-Healey Public Contracts Act may be obtained from the Wage and Hour Division. Information relating to the safety and health provisions may be obtained from the Occupational Safety and Health Administration. Offices are located in principal cities. Check your telephone directory under U.S. Government, Department of Labor, Wage and Hour Division or the Occupational Safety and Health Administration.

U.S. Department of Labor
Employment Standards Administration
Wage and Hour Division
Washington, D.C. 20210

WH Publication 1313 (Revised January 1996)

been awarded a contract which is subject to the Walsh-Healey Public Contracts Act or the Service Contract Act. The purpose of the discussion below is to advise contractors of the principal provisions of these acts.

Walsh-Healey Public Contracts Act

General Provisions—This act applies to contracts which exceed or may exceed $10,000 entered into by any agency or instrumentality of the United States for the manufacture or furnishing of materials, supplies, articles, or equipment. The act requires the contractor to be qualified as a manufacturer or regular dealer, establishes minimum wage, maximum hours, and safety and health standards for work on such contracts, and prohibits the employment on contract work of convict labor (unless certain conditions are met) and children under 16 years of age. The employment of homeworkers (except handicapped clients of bona fide sheltered workshops) on a covered contract is not permitted. The act also requires the keeping of certain records.

In addition to its coverage of prime contractors, the act under certain circumstances applies to secondary contractors performing work under contracts awarded by the Government prime contractor.

All provisions of the act except the safety and health requirements are administered by the Wage and Hour Division.

Minimum Wage—Covered employees must currently be paid not less than $3.35 an hour.

Overtime—Covered workers must be paid at least one and one-half times their basic rate of pay for all hours worked in excess of 40 a week. Overtime is due on the basis of the total hours spent in all work Government and non-Government, performed by the employee in any week in which covered work is performed.

Child Labor—Employers may protect themselves against unintentional child labor violations by obtaining certificates of age. State employment or age certificates are acceptable.

Safety and Health—No covered work may be performed in plants, factories, buildings, or surroundings or under work conditions that are unsanitary or hazardous or dangerous to the health and safety of the employees engaged in the performance of the contract. The safety and health provisions of the Walsh-Healey Public Contracts Act are administered by the Occupational Safety and Health Administration.

Posting—During the period that covered work is being performed on a contract subject to the act, the contractor must post copies of Notice to Employees Working on Government Contracts in a sufficient number of places to permit employees to observe a copy on the way to or from their place of employment.

Responsibility for Secondary Contractors—Prime contractors are liable for violations of the act committed by their covered secondary contractors.

Service Contract Act

General Provisions—The Service Contract Act applies to every contract entered into by the United States or the District of Columbia, the principal purpose of which is to furnish services in the United States through the use of service employees. Contractors and subcontractors performing on such Federal contracts must observe minimum wage and safety and health standards, and must maintain certain records, unless a specific exemption applies.

Wages and Fringe Benefits—Every service employee performing any of the Government contract work under a service contract in excess of $2,500 must be paid not less than the monetary wages, and must be furnished the fringe benefits, which the Secretary of Labor has determined to be prevailing in the locality for the classification in which the employee is working or the wage rates and fringe benefits (including any accrued or prospective wage rates and fringe benefits) contained in a predecessor contractor's collective bargaining agreement. The wage rates and fringe benefits required are usually specified in the contract. If no wage determination has been made applicable to the contract, employees performing work under the contract must be paid not less than the minimum wage provided in section 6(a)(1) of the Fair Labor Standards Act, currently $3.35 an hour.

All employees doing work necessary to the performance of the contract must also be paid not less than the minimum wage provided in section 6(a)(1) of the Fair Labor Standards Act.

Service contracts which do not exceed $2,500 are not subject to prevailing rate determinations or to the safety and health requirements of the act. However, the act does require that employees performing work on such contracts be paid not less than the above minimum wage rate provided by section 6(a)(1) of the Fair Labor Standards Act.

All provisions of the act except the safety and health requirements are administered by the Wage and Hour Division.

Overtime—Service contracts in excess of $2,500 which may require or involve the use of laborers or mechanics require the payment of overtime under the Contract Work Hours and Safety Standards Act at time and one-half the basic rate for all hours worked on the contract in excess of 40 a week.

Safety and Health—The act provides that no part of the services in contracts in excess of $2,500 may be performed in buildings or surroundings or under working conditions, provided by or under the control or supervision of the contractor or subcontractor, which are unsanitary or hazardous or dangerous to the health or safety of service employees engaged to furnish the services. The safety and health provisions of the Service Contract Act are administered by the Occupational Safety and Health Administration.

Notice to Employees—On the date a service employee commences work on a contract in excess of $2,500, the contractor (or subcontractor) must provide the employee with a notice of the compensation required by the act. The posting of the notice (including any applicable wage determination) contained on the reverse in a location where it may be seen by all employees performing on the contract will satisfy this requirement.

Notice in Subcontracts—The contractor is required to insert in all subcontracts the labor standards clauses specified by the regulations in 29 CFR 4 for Federal service contracts exceeding $2,500.

Other Obligations—*Observance of the labor standards of these acts does not relieve the employer of any obligation he may have under any other laws or agreements providing for higher labor standards.*

U.S. Department of Labor
Employment Standards Administration
Wage and Hour Division
Occupational Safety and Health Administration

Additional Information—*Additional information and copies of the acts and applicable regulations and interpretations may be obtained from the nearest office of the Wage and Hour Division or the National Office in Washington, D.C. Information pertaining to safety and health standards may be obtained from the nearest office of the Occupational Safety and Health Administration or the National Office in Washington, D.C.*

IT CORPORATION

NOTICE

YOU HAVE THE RIGHT TO REVIEW:

- RECORDS OF WORKPLACE TESTS FOR TOXIC SUBSTANCES OR HARMFUL PHYSICAL AGENTS
- YOUR MEDICAL RECORDS
- MATERIAL SAFETY DATA SHEETS OR OTHER INFORMATION THAT EXISTS FOR CHEMICALS OR SUBSTANCES USED IN YOUR WORK
- OSHA HEALTH & SAFETY REGULATIONS

THIS INFORMATION IS AVAILABLE THROUGH YOUR REGIONAL HEALTH AND SAFETY OFFICE.

CONTACT Health & Safety Department
(510) 372-9100

ITC FORM 9420.1 (8/20/84)

We hereby pledge our full support to IT Corporation's Affirmative Action Program and policy of nondiscrimination and equal opportunity, in compliance with Executive Order 11246, as amended. IT Corporation will recruit, hire, train and promote persons in all job titles without regard to race, creed, color, religion, age, marital status, sexual orientation, disability or national origin, except where sex is a bona-fide occupational qualification. We will insure that hiring and promotion decisions are in accord with equal employment opportunity principles by imposing only requirements which are job-related and do not have an adverse impact, and that other employment decisions further the principle of equal employment opportunity. IT Corporation will insure that all personnel actions such as compensation, benefits, Company sponsored training, education, tuition assistance, transfer, demotion, termination, layoff, return from layoff, and social and recreation programs will be administered without regard to race, creed, color, religion, age, sex, marital status, sexual orientation, disability or national origin.

Equal opportunity can only be achieved through demonstrated leadership and aggressive implementation of a viable Affirmative Action Program. Our Affirmative Action Program sets forth specific affirmative action and equal employment opportunity responsibilities of managers, supervisors, and all employees. It is incumbent that employees not discriminate in any policy, practice or procedure on the basis of race, creed, color, religion, age, sex, marital status, sexual orientation, disability or national origin.

All employees are expected to make every reasonable effort to carry out their Affirmative Action Program responsibilities in spirit as well as in letter to assure that equal opportunity is available to all. We further expect all employees to demonstrate sensitivity to and respect for all other employees and to demonstrate commitment to the Company's equal employment opportunity and affirmative action objectives.

Murray H. Hutchison
Chairperson of the Board

E. Brian Smith 1/10/80
E. Brian Smith
President

EEO-AAP

FREQUENTED BY EMPLOYEES

WORKERS' COMPENSATION NOTICE

INTERNATIONAL TECHNOLOGY CORPORATION
(EMPLOYER)

Notice is hereby given that this employer is insured with.....

.....
(NAME OF INSURANCE COMPANY)

for Workers' Compensation, in compliance with the laws of the state of California.....

Address of nearest claims office and telephone number.....

.....( )....

Under the California Labor Code, in the event of injury, you have the right to request a change of treating physician if the original treating physician is selected initially by the employer. Thirty (30) days after reporting an injury you can be treated by a physician of your own choice. Upon selecting a physician thirty (30) days after reporting the injury, you should immediately notify your employer of the name and address of the physician selected.

If you wish direct initial medical treatment, other than appropriate emergency or first aid treatment, by your own designated physician in the event of injury, you must notify your employer of your choice in writing prior to injury.

If you are unable to return to work due to the injury, you have the right to receive temporary or permanent disability income and, if eligible, vocational rehabilitation services.

Additional benefits are available if the injury results in death.

Report any work-related injury or illness to your supervisor or employer as soon as possible. Provide all necessary information regarding injury or illness.

For further information, please contact your supervisor or employer. You may also contact an Information and Assistance Officer at the Office of Benefit Assistance and Enforcement located at.....

.....( )....

EMERGENCY TELEPHONE NUMBERS

Doctor.....( )....

Hospital.....( )....

Ambulance.....( )....

Fire Department ( )....

Police Department ( )....

OFF-DUTY ACTIVITIES OF EMPLOYEE(S)

Your employer or its insurance company may not be responsible for compensation because of an injury due to the employee's voluntary participation in any off-duty recreational, social, or athletic activity that is not part of the employee's work-related duties.

WC 8357e (Ed. 1-90) UNIFORM PRINTING & SUPPLY, INC.

YOUR RIGHTS
UNDER THE
FAMILY AND MEDICAL LEAVE ACT OF 1993

FMLA requires covered employers to provide up to 12 weeks of unpaid, job-protected leave to "eligible" employees for certain family and medical reasons. Employees are eligible if they have worked for a covered employer for at least one year, and for 1,250 hours over the previous 12 months, and if there are at least 50 employees within 75 miles.

REASONS FOR TAKING LEAVE:

Unpaid leave must be granted for any of the following reasons:

- to care for the employee's child after birth, or placement for adoption or foster care;
- to care for the employee's spouse, son or daughter, or parent, who has a serious health condition; or
- for a serious health condition that makes the employee unable to perform the employee's job.

At the employee's or employer's option, certain kinds of paid leave may be substituted for unpaid leave.

ADVANCE NOTICE AND MEDICAL CERTIFICATION:

The employee may be required to provide advance leave notice and medical certification. Taking of leave may be denied if requirements are not met.

- The employee ordinarily must provide 30 days advance notice when the leave is "foreseeable."
- An employer may require medical certification to support a request for leave because of a serious health condition, and may require second or third opinions (at the employer's expense) and a fitness for duty report to return to work.

JOB BENEFITS AND PROTECTION:

- For the duration of FMLA leave, the employer must maintain the employee's health coverage under any "group health plan."
- Upon return from FMLA leave, most employees must be restored to their original or equivalent positions with equivalent pay, benefits, and other employment terms.
- The use of FMLA leave cannot result in the loss of any employment benefit that accrued prior to the start of an employee's leave.

UNLAWFUL ACTS BY EMPLOYERS:

FMLA makes it unlawful for any employer to:

- interfere with, restrain, or deny the exercise of any right provided under FMLA;
- discharge or discriminate against any person for opposing any practice made unlawful by FMLA or for involvement in any proceeding under or relating to FMLA.

ENFORCEMENT:

- The U.S. Department of Labor is authorized to investigate and resolve complaints of violations.
- An eligible employee may bring a civil action against an employer for violations.

FMLA does not affect any Federal or State law prohibiting discrimination, or supersede any State or local law or collective bargaining agreement which provides greater family or medical leave rights.

FOR ADDITIONAL INFORMATION:

Contact the nearest office of the Wage and Hour Division, listed in most telephone directories under U.S. Government, Department of Labor.

U. S. Department of Labor,
Employment Standards Administration
Wage and Hour Division,
Washington, D.C. 20210

This poster may be ordered pursuant to revisions of final Family and Medical Leave Act regulations by the Department of Labor.

State and Federal Employment Posters available directly from G. Hall Companies, P.O. Box [illegible], Sarasota, FL [illegible] (813)
Call toll free 1-[illegible]-[illegible]-0111 to monitor (Laminated English) [illegible], (Framed English) [illegible], (Laminated Spanish) [illegible], (Framed Spanish) [illegible]
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For environmentally
Sensitive

EDD Serving the People of California

NOTICE TO EMPLOYEES

THIS EMPLOYER IS REGISTERED UNDER THE CALIFORNIA UNEMPLOYMENT INSURANCE CODE, AND IS REPORTING WAGE CREDITS THAT ARE BEING ACCUMULATED FOR YOU TO BE USED AS A BASIS FOR

UNEMPLOYMENT INSURANCE

(Paid for entirely by EMPLOYERS' taxes)

and

DISABILITY INSURANCE

(Paid for entirely by WAGE EARNERS' taxes)

- **WHEN YOU ARE UNEMPLOYED AND READY, WILLING AND ABLE TO WORK, YOU MAY BE ELIGIBLE TO RECEIVE UNEMPLOYMENT INSURANCE.**

  You must file a claim for Unemployment Insurance at the nearest Employment Development Department Office, and register for work.

- **IF YOU WORK LESS THAN YOUR NORMAL FULL-TIME HOURS, YOU MAY ALSO BE ELIGIBLE TO RECEIVE BENEFITS.**

  You must file a claim for Unemployment Insurance at the nearest Employment Development Department Office.

- **WHEN YOU ARE UNABLE TO WORK BECAUSE OF SICKNESS OR INJURY, YOU MAY BE ELIGIBLE TO RECEIVE DISABILITY INSURANCE BENEFITS.**

  1. **If this firm operates under an approved Voluntary Plan of Disability Insurance and you have chosen to be covered by it, claim forms should be obtained from your employer.**
  2. **For State Disability Insurance, claim forms may be obtained from your doctor, hospital, or any Employment Development Department Office. The "First Claim" must be mailed not later than the 41st day after the first day for which benefits are payable if you are to receive credit from the time you first became disabled. Earlier filing will speed your payment.**

- **GET FULL INFORMATION AT YOUR LOCAL EMPLOYMENT DEVELOPMENT DEPARTMENT OFFICE.**

CLAIMS SHOULD BE FILED PROMPTLY. YOU MAY LOSE BENEFITS TO WHICH YOU WOULD OTHERWISE BE ENTITLED IF YOU DELAY FILING OF YOUR CLAIM.

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF LABOR STANDARDS ENFORCEMENT

PAY DAY NOTICE

(IT CORPORATION)

REGULAR PAY DAYS FOR EMPLOYEES OF International Technology (FIRM NAME)

Corporation SHALL BE AS FOLLOWS:

Salaried Employees	Bi-weekly
Hourly Employees	Weekly

THIS IS IN ACCORDANCE WITH SECTIONS 204. 204A. 204B. AND 205 OF THE CALIFORNIA LABOR CODE.

BY C. L. Perrignon

TITLE Human Resources

C.L.PERRIGNON
MANAGER, HUMAN RESOURCES

DLSE 8 (REV. 12-69)
◇ OSP

PLEASE POST

If A Work Injury Occurs...

...you're automatically protected by workers' compensation insurance. California law provides certain benefits to employees who are injured or become ill because of the job.

Workers' Compensation Benefits Include...

- **Medical Care.** All medical treatment required to cure the injury or illness—without deductible or dollar limit. You should never see a bill, since all costs are paid directly by your employer's insurance company.

  Your employer will arrange for medical care, usually by a specialist for the particular injury. If you want to change doctors, please ask your supervisor. (In addition, 30 days after reporting the injury you can be treated by a doctor of your choice. Or you can be treated by your own personal physician if you've notified your employer in writing *before* the injury. For further information, please contact your supervisor.)
- **Rehabilitation.** If the injury or illness prevents returning to your usual job, you may be eligible for vocational rehabilitation. If so, all costs are paid by your employer's insurance company.
- **Payment for Lost Wages.** Employees disabled by job injuries or illnesses receive tax-free income while unable to work. The payments are two-thirds of your average weekly pay, up to a maximum set by State law. (Payments are not made for the first three days, however, unless you're hospitalized or unable to work more than 21 days.)

  Additional payments also will be made after recovery if the injury or illness results in a permanent handicap. If the injury or illness results in death, benefits will be paid to surviving dependents.

In The Event Of A Work Injury...

1. Be sure first aid is given.
2. See that the injured employee is taken to a doctor or hospital, if necessary.
3. Report *every* injury IMMEDIATELY to your supervisor. Any delay in reporting an accident may delay workers' compensation benefits.
4. If you have any questions about workers' compensation, please see your supervisor.

Emergency Telephone Numbers

Doctor _____ Police _____

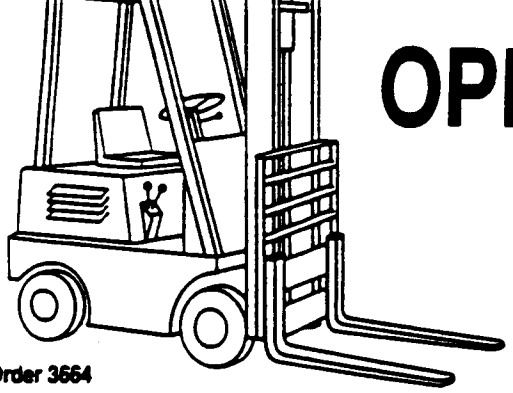
Hospital _____ Fire _____

Ambulance _____

Workers' Compensation Is Provided By

NATIONAL UNION FIRE INSURANCE COMPANY OF PITTSBURGH, PENNSYLVANIA
3699 Wilshire Boulevard
Los Angeles, California 90010
(213) 480-3400

REV



OPERATING RULES FO

Operating rules for industrial tru through Register 85, No.18–5- Other rules may also apply. Par trial trucks and industrial tow t office of the Division of Occupat Cal/OSHA Communications. P

STATE OF CALIFORNIA
CAL OSHA
DEPARTMENT OF INDUSTRIAL RELATIONS

General Industry Safety Order 3664

Operating Rules

(a) Every employer using industrial trucks or industrial tow tractors, shall post and enforce a set of operating rules including the appropriate rules listed below:

(1) Only drivers authorized by the employer and trained in the safe operations of industrial trucks or industrial tow tractors shall be permitted to operate such vehicles. Methods shall be devised to train operators in safe operation of powered industrial trucks.

(2) Stunt driving and horseplay are prohibited.

(3) No riders shall be permitted on vehicles unless provided with adequate riding facilities.

(4) Employees shall not ride on the forks of lift trucks.

(5) Employees shall not place any part of their bodies outside the running lines of an industrial truck or between mast uprights or other parts of the truck where shear or crushing hazards exist.

(6) Employees shall not be allowed to stand, pass, or work under the elevated portion of any industrial truck, loaded or empty, unless it is effectively blocked to prevent it from falling.

(7) Drivers shall check the vehicle at least once per shift, and if it is found to be unsafe, the matter shall be reported immediately to a foreman or mechanic, and the vehicle shall not be put in service again until it has been made safe. Attention shall be given to the proper functioning of tires, horn, lights, battery, controller, brakes, steering mechanism, cooling system, and the lift system of fork lifts (forks, chains, cable, and nit switches).

(8) No truck shall be operated with a leak in the fuel system.

(9) Vehicles shall not exceed the authorized or safe speed, always maintaining a safe distance from other vehicles, keeping the truck under positive control at all times and all established traffic regulations shall be observed. For trucks traveling in the same direction, a safe distance may be considered to be approximately 3 truck lengths or preferably a time lapse—3 seconds—passing the same point.

(10) Trucks traveling in the same direction shall not be passed at intersections, blind spots, or dangerous locations.

(11) The driver shall slow down and sound the horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view, the driver shall be required to travel with the load trailing.

(12) Operators shall look in the direction of travel and shall not move a vehicle until certain that all persons are in the clear.

(13) Trucks shall not be driven up to anyone standing in front of a bench or other fixed object of such size that the person could be caught between the truck and object.

(14) Grades shall be ascended or descended slowly.

(A) When ascending or descending grades in excess of 10 percent, loaded trucks shall be driven with the load upgrade.

(B) On all grades the load and load engaging means shall be tilted back if applicable, and raised only as far as necessary to clear the road surface.

(C) Motorized hand and hand/rider trucks shall be operated on all grades with the load-engaging means downgrade.

(15) The forks shall always be carried as low as possible, consistent with safe operations.

(16) When leaving a vehicle unattended, either:

(A) The power shall be shut off, brakes set, the mast brought to the vertical position, and forks left in the down position. When left on an incline, the wheels shall be blocked; or

(B) The power may remain on provided the brakes are set, the mast brought to the vertical position, forks are left in the down position, and the wheels shall be blocked, front and rear.

Note: When the operator is over 25 feet (7.6 meters) from or out of sight of the industrial truck, the vehicle is "unattended."

(17) When the operator of an industrial truck is dismounted an within 25 feet (7.6 meters) of the truck which remains in the operator view, the load engaging means shall be fully lowered, controls neutra ized, and the brakes set to prevent movement.

(18) Vehicles shall not be run onto any elevator unless the drive is specifically authorized to do so. Before entering an elevator, the drive shall determine that the capacity of the elevator will not be exceedec Once on an elevator, the power shall be shut off and the brakes set.

(19) Motorized hand trucks shall enter elevators or other confine areas with the load end forward.

(20) Vehicles shall not be operated on floors, sidewalk doors, c platforms that will not safely support the loaded vehicle.

(21) Prior to driving onto trucks, trailers and railroad cars, the flooring shall be checked for breaks and other structural weaknesses

(22) Vehicles shall not be driven in and out of highway trucks anc trailers at loading docks until such trucks or trailers are securely blocke or restrained and the brakes set.

(23) To prevent railroad cars from moving during loading o unloading operations, the car brakes shall be set, wheel chocks or othe recognized positive stops used, and blue flags or lights displayed in accordance with applicable regulations promulgated by the Public Utilities Commission.

(24) The width of one tire on the powered industrial truck shall be the minimum distance maintained from the edge by the truck while it is on any elevated dock, platform, freight car or truck.

(25) Railroad tracks shall be crossed diagonally, wherever possible. Parking closer than 8-1/2 feet from the centerline of railroad tracks is prohibited.

(26) Trucks shall not be loaded in excess of their rated capacity.

(27) A loaded vehicle shall not be moved until the load is safe and secure.

(28) Extreme care shall be taken when tilting loads. Tilting forward with the load engaging means elevated shall be prohibited except when picking up a load. Elevated loads shall not be tilted forward except when the load is being deposited onto a storage rack or equivalent. When stacking or tiering, backward tilt shall be limited to that necessary to stabilize the load.

(29) The load engaging device shall be placed in such a manner that the load will be securely held or supported.

(30) Special precautions shall be taken in the securing and handling of loads by trucks equipped with attachments, and during the operation of these trucks after the loads have been removed.

(31) When powered industrial trucks are used to open and close doors, the following provisions shall be complied with:

(A) A device specifically designed for opening or closing doors shall be attached to the truck.

(B) The force applied by the device to the door shall be applied parallel to the direction of travel of the door.

(C) The entire door opening operation shall be in full view of the operator.

(D) The truck operator and other employees shall be clear of the area where the door might fall while being opened.

(32) If loads are lifted by two or more trucks working in unison, the total weight of the load shall not exceed the combined rated lifting capacity of all trucks involved.

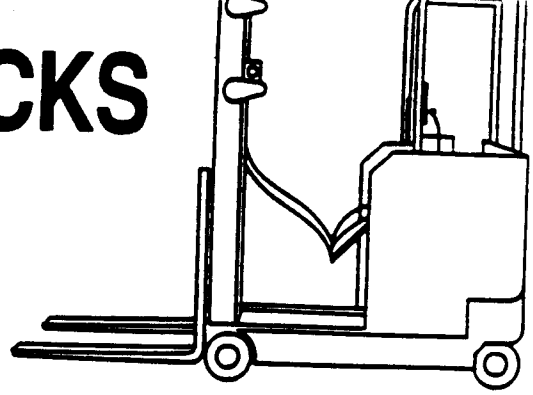
General Industry Safety Order 3657

Elevating Employees With Lift Trucks

(a) When it is necessary to elevate employees using an industrial truck, the following shall be accomplished:

(1) The platform shall be of sufficient size, but not less than 24" x 24" (.61 meters x .61 meters) to accommodate the employee and the material being elevated.

R INDUSTRIAL TRUCKS



s contained on this poster are current
85 lifornia Code of Regulations.
h ntaining rules covering indus-
ct are available from the nearest
nal Safety and Health or by writing to
Box 603, San Francisco, CA 94101.

(2) The platform shall be secured to the forks or mast to prevent tipping, slipping or falling.

(3) The platform shall meet the guardrail and toeboard requirements of Section 3210.

(4) The platform floor shall have no spaces or holes greater than one inch; and

(5) The platform floor shall have a slip resistant surface.

(b) Where a clearance restriction or the nature of the work prohibits the use of guardrails, a safety belt or harness with lanyard shall be used as described in Section 3656(e).

(c) Wherever the truck is operated under conditions which expose the operator to danger from falling objects, the truck shall be equipped with overhead protection.

(d) There shall be an operator in the control position on the truck while employees are on the elevated platform.

(e) Whenever a truck is equipped with vertical only, or vertical and horizontal controls elevatable with the lifting carriage or forks, means shall be provided whereby personnel on the platform can shut off the motive power of the truck.

(f) Means shall be provided to render inoperative all operating controls other than those on the elevatable platform when the controls on the elevatable platform have been selected for use. Only one location of controls shall be capable of being operated at one time.

(g) All bridge cranes or other moving or motorized equipment which could overrun or otherwise injure the elevated worker shall be shut n or locked out.

(h) Operating Rules Whenever Elevating Personnel. Before ele- ng personnel, employees shall be instructed to:

(1) Use a securely attached safety platform.

(2) Make sure the lifting mechanism is operating smoothly.

(3) Make sure that the mast is vertical. The mast shall not be tilted forward or rearward while persons are elevated.

(4) Place truck in neutral and set parking brake.

(5) Lift and lower smoothly and with caution.

(6) Watch for overhead obstructions.

(7) Keep hands and feet clear of controls other than those in use.

(8) Never travel with personnel on the work platform other than to make minor movements for final positioning of the platform.

General Industry Safety Order 3658

Operator Platforms

(a) Every end control, reach, narrow aisle and motorized hand/rider truck shall be equipped with an operator platform of sufficient size to contain the operator's feet within its periphery and strong enough to withstand a compression load equal to the weight of the loaded truck applied longitudinally against a flat vertical surface.

(b) When installed, operator enclosures shall not restrict movement to and from the operating position.

General Industry Safety Order 3659

Back Guards

(a) The side of the platform nearest the mast frame truss shall be guarded on every high-lift industrial truck where employees ride up or down. This guard shall consist of a substantial frame covered with 1/2 inch expanded metal, laminated safety glass, or equivalent providing effective guarding to a height of 7 feet.

(b) If the type of load presents a hazard, high-lift industrial trucks e equipped with a load backrest extension high enough to reach the center of the top row of the maximum height load handled or other positive means acceptable to the Division shall be used to prevent parts of the load falling onto the operator or into the operator's compartment. The openings shall not be greater than the smallest parcel carried.

General Industry Safety Order 3660

Rated Capacity

(a) The rated capacity of all industrial lift trucks and industria tractors shall be displayed at all times on the vehicle in such a manne that it is readily visible to the operator.

(b) Industrial lift trucks and industrial tractors equipped with forks shall not be loaded beyond their designated capacity.

General Industry Safety Order 3661

Brakes and Warning Devices

(a) Every industrial truck and tractor shall be equipped with brakes or other effective devices adequate to bring the vehicle to a complete safe stop while fully loaded.

(b) Every industrial truck and tractor shall be equipped with a parking brake or other effective device to prevent the vehicle moving when unattended.

(c) Every industrial truck and industrial tow tractor, except those guided or controlled by a walking operator, shall be equipped with a warning horn, whistle, gong, or other device which can be heard clearly above the normal industrial noises in the places of employment.

General Industry Safety Order 3662

Internal Combustion Engines

Internal combustion engine-driven equipment shall be operated inside of buildings or enclosed structures, only when such operation does not result in harmful exposure to concentrations of dangerous gases or fumes. (See Section 5146.)

General Industry Safety Order 3663

Maintenance of Industrial Trucks

(a) Industrial truck repair operations involving open flames or which may produce sparks or other sources of ignition shall not be performed in Class I, II and III locations, unless and until tests show that atmospheric concentrations of flammable or combustible vapors do not exceed 20 percent L.E.L. of such flammable or combustible materials and until precautions are taken to maintain the atmosphere at or below 20 percent L.E.L. Such precautions could include, but not be limited to removal of flammable material, provision for adequate ventilation, etc.

(b) Water mufflers shall be filled daily or as frequently as is necessary to prevent depletion of the supply of water below 75 percent of the filled capacity. Vehicles with mufflers having screens or other parts that may become clogged shall not be operated while such screens or parts are clogged. Any vehicle that emits hazardous sparks or flames from the exhaust system shall immediately be removed from service, and not returned to service until the cause for the emission of such sparks and flames has been eliminated.

(c) Industrial trucks shall be kept in a clean condition free of debris, oil, and grease.

(d) Batteries on all powered trucks shall be disconnected during repairs to the primary electrical system unless power is necessary for testing and repair. On trucks equipped with systems capable of storing residual energy, that energy shall be safely discharged before work on the primary electrical system begins.

(e) Replacement parts for industrial trucks shall be equivalent in safety to the original parts.

(f) Those repairs to the fuel and ignition systems of industrial trucks which involve fire hazards shall be conducted only in locations designated as safe for such repairs.

AFFIRMATIVE ACTION PROGRAM
HANDICAPPED INDIVIDUALS AND
VETERANS OF THE VIETNAM ERA

IT Corporation complies with Section 503 of the Rehabilitation Act of 1973, which requires affirmative action to employ and advance in employment qualified handicapped individuals. IT Corporation also complies with Section 402 of the Vietnam Era Veterans Readjustment Assistance Act of 1974, which requires affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam Era. If you have a handicap, or are disabled veteran covered by this Program, and would like to be considered under our Affirmative Action Program, please tell us. Submission of this information is voluntary and your refusal to provide it will not cause you to be subjected to discharge or other disciplinary treatment. Information obtained concerning your handicap or status as a disabled veteran will be kept confidential, except that: (i) supervisors and managers may be informed regarding necessary restrictions on your work or duties as a result of your handicap or disabled status, and regarding necessary accommodations; (ii) first aid personnel may be informed, when and to the extent appropriate, if your condition might require emergency treatment; and (iii) government officials investigating compliance with either of the above-mentioned Acts shall be informed. If you are a disabled veteran or are otherwise handicapped, we would like to include you under our Affirmative Action Program. It would assist us if you would tell us about (1) any special methods, skills and procedures which qualify you for positions which you might otherwise not be able to do because of your handicap or disability, and (2) any accommodations that we could make to enable you to perform any job properly and safely, including special equipment, changes in the physical layout of the job, elimination of certain duties relating to the job, or other accommodations. Any employee or applicant upon request may review our Affirmative Action Program during business hours in the Human Resources Department.

If you are a handicapped person, disabled veteran, or veteran of the Vietnam Era, you should know that, whether an employee or applicant for employment, you are protected from coercion, intimidation, interference, or discrimination for filing any complaint or assisting in any investigation under the Rehabilitation Act of 1973 or the Vietnam Era Veterans Readjustment and Assistance Act.

Human Resources Department
March 1993

NOTICE

ON THE JOB INJURIES

Report all injuries immediately to your foreman or supervisor.

Authorization for medical treatment must be obtained from your employer.

ORDER 4-89
Title 8, California
Code of Regulations
Section 11040
Replaces former Order 4-80;
Incorporates changes contained
in IWC Order MW-88
Effective July 1, 1989

● Please Post With This Side Showing ●

OFFICIAL NOTICE

INDUSTRIAL WELFARE COMMISSION ORDER NO. 4-89, REGULATING

WAGES, HOURS, AND WORKING CONDITIONS IN PROFESSIONAL, TECHNICAL, CLERICAL, MECHANICAL, AND SIMILAR OCCUPATIONS

TAKE NOTICE: The Industrial Welfare Commission (IWC) of the State of California, having proceeded in accord with the authority vested in it by Labor Code Sections 1171 through 1204 and Article 14, Section 1 of the Constitution of the State of California, reviewed certain sections of Order 4-80 for the Professional, Technical, Clerical, Mechanical, and Similar Occupations for the purpose of amending Section 1, Applicability, and Section 3, Hours and Days of Work. The IWC held investigative hearings, called a wage board, held public hearings on proposed language to amend these sections, and considered all written materials and information submitted prior to adopting its amendments to Sections 1 and 3 of Order 4-80. In printing this order, the IWC incorporated the amendments made by IWC Order No. MW-88 to Section 4, Minimum Wages, and Section 10, Meals and Lodging.

This order also incorporates the nonsubstantive revisions previously made in accord with the statewide review mandated by Government Code Section 11349 and reflected in the provisions of Title 8 of the California Code of Regulations, Section 11040. Because of the amendments and changes to Order 4-80 described above and for purposes of clarity in this printing, the IWC renumbered Order 4-80 to Order 4-89.

1. APPLICABILITY OF ORDER

This Order shall apply to all persons employed in professional, technical, clerical, mechanical, and similar occupations whether paid on a time, piece rate, commission, or other basis, unless such occupation is performed in an industry covered by an industry order of this Commission, except that:

(A) Provisions of Sections 3 through 12 shall not apply to persons employed in administrative, executive, or professional capacities. No person shall be considered to be employed in an administrative, executive, or professional capacity unless one of the following conditions prevails:

(1) The employee is engaged in work which is primarily intellectual, managerial, or creative, and which requires exercise of discretion

ployee is suffered or permitted to work, whether or not required to do so.

(I) "Minor" means, for the purpose of this Order, any person under the age of eighteen (18) years.

(J) "Outside Salesperson" means any person, 18 years of age or over, who customarily and regularly works more than half the working time away from the employer's place of business selling tangible or intangible items or obtaining orders or contracts for products, services or use of facilities.

(K) "Primarily" as used in Section 1, Applicability, means more than one-half the employee's work time.

(L) "Split shift" means a work schedule which is interrupted by non-paid non-working periods established by the employer, other than bona fide rest or meal periods.

(M) "Teaching" means, for the purpose of Section 1 of this Order, the profession of teaching under a certificate from the Commission for Teacher Preparation and Licensing or teaching in an accredited college or university.

(N) "Wages" (See California Labor Code, Section 200)

(O) "Workday" means any consecutive 24 hours beginning at the same time each calendar day.

(P) "Workweek" means any seven (7) consecutive days, starting with the same calendar day each week. "Workweek" is a fixed and regularly recurring period of 168 hours, seven (7) consecutive 24-hour periods.

3. HOURS AND DAYS OF WORK

(A) The following overtime provisions are applicable to employees eighteen (18) years of age or over and to employees sixteen (16) or seventeen (17) years of age who are not required by law to attend school. such employees shall not be employed more than eight (8) hours in any workday or more than forty (40) hours in any workweek unless the em-

may consist of an individual employee as long as the criteria for an identifiable work unit in this subsection are met.

(C) Provisions of subsections (A) and (B) above shall not apply to any employee whose earnings exceed one and one-half (1 1/2) times the minimum wage if more than half (1/2) of that employee's compensation represents commissions.

(D) One and one-half (1 1/2) times a minor's regular rate of pay shall be paid for all work over forty (40) hours in any workweek except that minors sixteen (16) and seventeen (17) years old who are not required by law to attend school and may therefore be employed for the same hours as an adult are subject to subsection (A) or (B) above.

(VIOLATIONS OF CHILD LABOR LAWS are subject to civil penalties of from $100 to $5,000 as well as to criminal penalties provided herein. Refer to California Labor Code Sections 1285 to 1311 and 1390 to 1398 for additional restrictions on the employment of minors. Employers should ask school districts about required work permits.)

(E) An employee may be employed on seven (7) workdays in one workweek with no overtime pay required when the total hours of employment during such workweek do not exceed thirty (30) and the total hours of employment in any one workday thereof do not exceed six (6).

(F) If a meal period occurs on a shift beginning or ending at or between the hours of 10 p.m. and 6 a.m., facilities shall be available for securing hot food or drink or for heating food or drink, and a suitable sheltered place shall be provided in which to consume such food or drink.

(G) Except as provided in subsections (D), (F) and (I), this section shall not apply to any employee covered by a collective bargaining agreement if said agreement provides premium wage rates for overtime work and a cash wage rate for such employee of not less than one dollar ($1.00) per hour more than the minimum wage.

(H) The provisions of this section are not applicable to employees whose hours of service are regulated by (1) the United States Department

and independent judgment, and for which the remuneration is not less than $1150.00 per month; or

(2) The employee is licensed or certified by the State of California and is engaged in the practice of one of the following recognized professions: law, medicine, dentistry, pharmacy, optometry, architecture, engineering, teaching, or accounting, or is engaged in an occupation commonly recognized as a learned or artistic profession; provided, however, that registered nurses shall not be considered to be exempt professional employees for the purposes of this subsection (2) of this order, unless they individually meet the administrative, executive, or professional criteria described in subsection (A) (1) above.

(B) The provisions of this Order shall not apply to employees directly employed by the State or any county, incorporated city or town or other municipal corporation, or to outside salespersons.

(C) Provisions of this Order shall not apply to any individual who is the parent, spouse, child, or legally adopted child of the employer.

2. DEFINITIONS

(A) "Commission" means the Industrial Welfare Commission of the State of California.

(B) "Division" means the Division of Labor Standards Enforcement of the State of California.

(C) "Professional, Technical, Clerical, Mechanical, and Similar Occupations" includes professional, semiprofessional, managerial, supervisorial, laboratory, research, technical, clerical, office work, and mechanical occupations. Said occupations shall include, but not be limited to the following: accountants; agents; appraisers; artists; attendants; audio-visual technicians; bookkeepers; bundlers; billposters; canvassers; carriers; cashiers; checkers; clerks; collectors; communications and sound technicians; compilers; copy holders; copy readers; copy writers; computer programmers and operators; demonstrators and display representatives; dispatchers; distributors; door-keepers; drafters; elevator operators; estimators; editors; graphic arts technicians; guards; guides; hosts; inspectors; installers; instructors; interviewers; investigators; librarians; laboratory workers; machine operators; mechanics; mailers; messengers; medical and dental technicians and technologists; models; nurses; packagers; photographers; porters and cleaners; process servers; printers; proof readers; salespersons and sales agents; secretaries; sign erectors; sign painters; social workers; solicitors; statisticians; stenographers; teachers; telephone, radio-telephone, telegraph and call-out operators; tellers; ticket agents; tracers; typists; vehicle operators; x-ray technicians; their assistants and other related occcupations listed as professional, semiprofessional, technicial, clerical, mechanical, and kindred occupations.

(D) "Emergency" means an unpredictable or unavoidable occurrence at unscheduled intervals requiring immediate action.

(E) "Employ" means to engage, suffer, or permit to work.

(F) "Employee" means any person employed by an employer.

(G) "Employer" means any person as defined in Section 18 of the Labor Code, who directly or indirectly, or through an agent or any other person, employs or exercises control over the wages, hours, or working conditions of any person.

(H) "Hours worked" means the time during which an employee is subject to the control of an employer, and includes all the time the employee receives one and one-half (1 1/2) times such employee's regular rate of pay for all hours worked over forty (40) hours in the workweek. Employment beyond eight (8) hours in any workday or more than six (6) days in any workweek is permissible provided the employee is compensated for such overtime at not less than:

(1) One and one-half (1 1/2) times the employee's regular rate of pay for all hours worked in excess of eight (8) hours up to and including twelve (12) hours in any workday, and for the first eight (8) hours worked on the seventh (7th) day of work; and

(2) Double the employee's regular rate of pay for all hours worked in excess of twelve (12) hours in any workday and for all hours worked in excess of eight (8) hours on the seventh (7th) day of work in any workweek.

(B) No employer shall be deemed to have violated the provisions of this Section 3, Hours and Days of Work, by instituting, pursuant to a written agreement voluntarily executed by the employer and by at least two-thirds (2/3) of the employees in the affected work unit following a secret ballot and before the performance of the work, a regularly scheduled week of work consisting of such hours and days as shall be agreed upon consistent with both of the following provisions: the premium wage rate provisions of one and one-half (1 1/2) times the employee's regular rate of pay shall apply to all hours worked in any workday in excess of the regularly scheduled hours established by the agreement for that workday up to twelve (12) hours a workday, or to all hours worked in excess of 40 hours per week; and the premium wage rate provisions of double the employee's regular rate of pay shall apply to all hours worked in excess of twelve (12) hours per day and to all hours worked in excess of eight (8) hours on those days worked beyond the regularly scheduled number of workdays in the written agreement.

(1) Prior to the secret ballot vote, any employer who proposes to institute an alternative schedule shall make a disclosure in writing to the affected employees, including the effects of the proposed schedule on the employees' wages, hours, and benefits. Such a disclosure shall include meetings duly noticed, for the specific purpose of discussing the effects of alternative scheduling. Failure to comply with this section shall make the election null and void.

(2) Any employer who institutes a regularly scheduled week of work pursuant to this subsection shall make a reasonable effort to find an alternative work assignment for any employee who participated in the vote which authorized the schedule and is unable or unwilling to work it. An employer shall not be required to offer an alternative work assignment to an employee if an alternative work assignment is not available or if the employee was hired after the adoption of the alternative schedule.

(3) After a lapse of twelve (12) months and upon petition of one-third (1/3) of the affected employees, a new vote by secret ballot shall be held and a two-thirds (2/3) vote of the affected employees will be required to reverse the agreement above. If such agreement is revoked the employer shall comply within 60 days. Upon a proper showing by the employer of undue hardship, the Division may grant an extension of time for compliance.

(4) For purposes of Section 3(B), affected employees may include all employees in a readily identifiable work unit, such as a division, a department, a job classification, a shift, a separate physical location, or a recognized subdivision of any such work unit. A work unit

ment of Transportation Code of Federal Regulations, Title 49, sections 395.1 to 395.13, Hours of Service of Drivers, or (2) Title 13 of the California Code of Regulations, Subchapter 6.5, section 1200 and following sections, regulating hours of drivers.

(I) No employee shall be terminated or otherwise disciplined for refusing to work more than 72 hours in any workweek, except in an emergency as defined in Section 2(D).

4. MINIMUM WAGES

(A) Every employer shall pay to each employee wages not less than four dollars and twenty-five cents ($4.25) per hour for all hours worked, effective July 1, 1988, except:

(1) LEARNERS. Employees 18 years of age or over, during their first one hundred and sixty (160) hours of employment in occupations in which they have no previous similar or related experience, may be paid not less than eighty-five percent (85%) of the minimum wage rounded to the nearest nickel.

(2) MINORS may be paid not less than eighty-five percent (85%) of the minimum wage rounded to the nearest nickel provided that the number of minors employed at said lesser rate shall not exceed twenty-five percent (25%) of the persons regularly employed in the establishment. An employer of less than ten (10) persons may employ three (3) minors at said lesser rate. The twenty-five percent (25%) limitation on the employment of minors shall not apply during school vacations.

NOTE: Under certain conditions, the full minimum wage may be required for minors. See Labor Code Section 1391.2 (b).

(B) Every employer shall pay to each employee, on the established payday for the period involved, not less than the applicable minimum wage for all hours worked in the payroll period, whether the remuneration is measured by time, piece, commission, or otherwise.

(C) When an employee works a split shift, one hour's pay at the minimum wage shall be paid in addition to the minimum wage for that work day, except when the employee resides at the place of employment.

(D) The provisions of this section shall not apply to apprentices regularly indentured under the State Division of Apprenticeship Standards.

5. REPORTING TIME PAY

(A) Each workday an employee is required to report for work and does report, but is not put to work or is furnished less than half said employee's usual or scheduled day's work, the employee shall be paid for half the usual or scheduled day's work, but in no event for less than two (2) hours nor more than four (4) hours, at the employee's regular rate of pay, which shall not be less than the minimum wage.

(B) If an employee is required to report for work a second time in any one workday and is furnished less than two hours of work on the second reporting, said employee shall be paid for two hours at the employee's regular rate of pay, which shall not be less than the minimum wage.

(C) The foregoing reporting time pay provisions are not applicable when:

(1) Operations cannot commence or continue due to threats to employees or property; or when recommended by civil authorities, or

(2) Public utilities fail to supply electricity, water, or gas, or there is a failure in the public utilities, or sewer system, or

(3) The interruption of work is caused by an Act of God or other

cause not within the employer's control.

(D) This section shall not apply to an employee on paid standby status who is called to perform assigned work at a time other than the employee's scheduled reporting time.

6. LICENSES FOR HANDICAPPED WORKERS

A license may be issued by the Division authorizing employment of a person whose earning capacity is impaired by physical disability or mental deficiency at less than the minimum wage. Such licenses shall be granted only upon joint application of employer and employee and employee's representative if any.

A special license may be issued to a nonprofit organization such as a sheltered workshop or rehabilitation facility fixing special minimum rates to enable the employment of such persons without requiring individual licenses of such employees.

All such licenses and special licenses shall be renewed on a yearly basis or more frequently at the discretion of the Division.

(See California Labor Code, Sections 1191 and 1191.5.)

7. RECORDS

(A) Every employer shall keep accurate information with respect to each employee including the following:

(1) Full name, home address, occupation and social security number.

(2) Birthdate, if under 18 years, and designation as a minor.

(3) Time records showing when the employee begins and ends each work period. Meal periods, split shift intervals and total daily hours worked shall also be recorded. Meal periods during which operations cease and authorized rest periods need not be recorded.

(4) Total wages paid each payroll period, including value of board, lodging, or other compensation actually furnished to the employee.

(5) Total hours worked in the payroll period and applicable rates of pay. This information shall be made readily available to the employee upon reasonable request.

(6) When a piece rate or incentive plan is in operation, piece rates or an explanation of the incentive plan formula shall be provided to employees. An accurate production record shall be maintained by the employer.

(B) Every employer shall semimonthly or at the time of each payment of wages furnish each employee, either as a detachable part of the check, draft, or voucher paying the employee's wages, or separately, an itemized statement in writing showing: (1) all deductions; (2) the inclusive dates of the period for which the employee is paid; (3) the name of the employee or the employee's social security number; and (4) the name of the employer, provided all deductions made on written orders of the employee may be aggregated and shown as one item.

(C) All required records shall be in the English language and in ink or other indelible form, properly dated, showing month, day and year, and shall be kept on file by the employer for at least three years at the place of employment or at a central location within the State of California. An employee's records shall be available for inspection by the employee upon reasonable request.

(D) Clocks shall be provided in all major work areas or within reasonable distance thereto insofar as practicable.

Room shared	$ 16.50 per week
Apartment— two-thirds (2/3) of the ordinary rental value, and in no event more than	$ 240.00 per month
Where a couple are both employed by the employer, two-thirds (2/3) of the ordinary rental value, and in no event more than	$ 355.00 per month
Meals:	
Breakfast	$ 1.50
Lunch	$ 2.10
Dinner	$ 2.80

(C) Meals evaluated as part of the minimum wage must be bona fide meals consistent with the employee's work shift. Deductions shall not be made for meals not received nor lodging not used.

(D) If, as a condition of employment, the employee must live at the place of employment or occupy quarters owned or under the control of the employer, then the employer may not charge rent in excess of the values listed herein.

11. MEAL PERIODS

(A) No employer shall employ any person for a work period of more than five (5) hours without a meal period of not less than thirty (30) minutes, except that when a work period of not more than six (6) hours will complete the day's work the meal period may be waived by mutual consent of employer and employee. Unless the employee is relieved of all duty during a thirty (30) minute meal period, the meal period shall be considered an "on duty" meal period and counted as time worked. An "on duty" meal period shall be permitted only when the nature of the work prevents an employee from being relieved of all duty and when by written agreement between the parties an on-the-job paid meal period is agreed to.

(B) In all places of employment where employees are required to eat on the premises, a suitable place for that purpose shall be designated.

12. REST PERIODS

Every employer shall authorize and permit all employees to take rest periods, which insofar as practicable shall be in the middle of each work period. The authorized rest period time shall be based on the total hours worked daily at the rate of ten (10) minutes net rest time per four (4) hours or major fraction thereof.

However, a rest period need not be authorized for employees whose total daily work time is less than three and one-half (3 1/2) hours. Authorized rest period time shall be counted as hours worked for which there shall be no deduction from wages.

13. CHANGE ROOMS AND RESTING FACILITIES

(A) Employers shall provide suitable lockers, closets, or equivalent for the safekeeping of employees' outer clothing during working hours, and when required, for their work clothing during nonworking hours. When the occupation requires a change of clothing, change rooms or equivalent space shall be provided in order that employees may change their clothing in reasonable privacy and comfort. These rooms or spaces may be adjacent to but shall be separate from toilet rooms and shall be kept clean.

NOTE: This section shall not apply to change rooms and storage facilities regulated by the Occupational Safety and Health Standards Board.

21. SEPARABILITY

If the application of any provision of this Order, or any section, subsection, subdivision, sentence, clause, phrase, word, or portion of this Order should be held invalid or unconstitutional or unauthorized or prohibited by statute, the remaining provisions thereof shall not be affected thereby, but shall continue to be given full force and effect as if the part so held invalid or unconstitutional had not been included herein.

22. POSTING OF ORDER

Every employer shall keep a copy of this Order posted in an area frequented by employees where it may be easily read during the work day. Where the location of work or other conditions make this impractical, every employer shall keep a copy of this Order and make it available to every employee upon request.

Order 4-89 becomes effective on July 1, 1989. The provisions of Order 4-80 remain in full force and effect until the date this order becomes effective. IWC Order MW-88 remains in full force and effect and its amendments to Order 4-80 will be incorporated in this Order 4-89 on July 1, 1989. The provisions of Order 4-80 which were not amended are carried forward as part of Order 4-89.

Dated: September 23, 1988, at San Francisco, California

INDUSTRIAL WELFARE COMMISSION
STATE OF CALIFORNIA

Lynnel Pollock, Chairperson
Muriel Morse — David Pedilla
Michael Callahan — James Rude

QUESTIONS ABOUT ENFORCEMENT of the Industrial Welfare Commission orders and reports of violations should be directed to the Division of Labor Standards Enforcement. Consult the white pages of your telephone directory under CALIFORNIA, State of, Industrial Relations for the address and telephone number of the office nearest you. The Division has offices in the following cities: Bakersfield, El Centro, Eureka, Fresno, Hollywood, Inglewood, Long Beach, Los Angeles, Marysville, Napa, Oakland, Pomona, Redding, Sacramento, Salinas, San Bernardino, San Diego, San Francisco, San Jose, San Mateo, San Rafael, Santa Ana, Santa Barbara, Santa Monica, Santa Rosa, Stockton, Van Nuys, Ventura, Whether

SUMMARIES IN OTHER LANGUAGES

The Department of Industrial Relations will make summaries of wage and hour requirements in this Order available in Spanish, Chinese and certain other languages when it is feasible to do so. Mail your request for such summaries to the Department at P.O. Box 603, San Francisco, CA 94101.

RESUMEN EN OTROS IDIOMAS

El Departamento de Relaciones Industriales confeccionará un resumen sobre los requisitos de salario y horario de este Decreto en español, chino y algunos otros idiomas cuando sea posible hacerlo. Envíe por correo su pedido por dichos resumenes al Departamento a P.O. Box 603, San Francisco, CA 94101.

[illegible]

8. CASH SHORTAGE AND BREAKAGE

No employer shall make any deduction from the wage or require any reimbursement from an employee for any cash shortage, breakage, or loss of equipment, unless it can be shown that the shortage, breakage, or loss is caused by a dishonest or willful act, or by the gross negligence of the employee.

[The former second sentence which was part of this section, effective January 1, 1986, was removed, effective April 24, 1989, based on a judicial determination that it was inconsistent with California law and, therefore, invalid and unenforceable. *People v. Industrial Welfare Commission et. al.*, Santa Cruz Superior Court No. 65071.]

9. UNIFORMS AND EQUIPMENT

(A) When uniforms are required by the employer to be worn by the employee as a condition of employment, such uniforms shall be provided and maintained by the employer. The term "uniform" includes wearing apparel and accessories of distinctive design or color.

NOTE: This section shall not apply to protective apparel regulated by the Occupational Safety and Health Standards Board.

(B) When tools or equipment are required by the employer or are necessary to the performance of a job, such tools and equipment shall be provided and maintained by the employer, except that an employee whose wages are at least two (2) times the minimum wage provided herein may be required to provide and maintain hand tools and equipment customarily required by the trade or craft. This subsection (B) shall not apply to apprentices regularly indentured under the State Division of Apprenticeship Standards.

NOTE: This section shall not apply to protective equipment and safety devices on tools regulated by the Occupational Safety and Health Standards Board.

(C) A reasonable deposit may be required as security for the return of the items furnished by the employer under provisions of subsections (A) and (B) of this section upon issuance of a receipt to the employee for such deposit. Such deposits shall be made pursuant to Section 400 and following of the Labor Code or an employer with the prior written authorization of the employee may deduct from the employee's last check the cost of an item furnished pursuant to (A) and (B) above in the event said item is not returned. No deduction shall be made at any time for normal wear and tear. All items furnished by the employer shall be returned by the employee upon completion of the job.

10. MEALS AND LODGING

(A) "**Meal**" means an adequate, well-balanced serving of a variety of wholesome, nutritious foods.

"**Lodging**" means living accommodations available to the employee for full-time occupancy which are adequate, decent, and sanitary according to usual and customary standards. Employees shall not be required to share a bed.

(B) Meals or lodging may not be credited against the minimum wage without a voluntary written agreement between the employer and the employee. When credit for meals or lodging is used to meet part of the employer's minimum wage obligation, the amounts so credited may not be more than the following:

	Effective July 1, 1988
Room occupied alone	$ 20.00 per week

(B) Suitable resting facilities shall be provided in an area separate from the toilet rooms and shall be available to employees during work hours.

14. SEATS

(A) All working employees shall be provided with suitable seats when the nature of the work reasonably permits the use of seats.

(B) When employees are not engaged in the active duties of their employment and the nature of the work requires standing, an adequate number of suitable seats shall be placed in reasonable proximity to the work area and employees shall be permitted to use such seats when it does not interfere with the performance of their duties.

15. TEMPERATURE

(A) The temperature maintained in each work area shall provide reasonable comfort consistent with industry-wide standards for the nature of the process and the work performed.

(B) If excessive heat or humidity is created by the work process, the employer shall take all feasible means to reduce such excessive heat or humidity to a degree providing reasonable comfort. Where the nature of the employment requires a temperature of less than 60° F., a heated room shall be provided to which employees may retire for warmth and such room shall be maintained at not less than 68°.

(C) A temperature of not less than 68° shall be maintained in the toilet rooms, resting rooms, and change rooms during hours of use.

(D) Federal and State energy guidelines shall prevail over any conflicting provision of this section.

16. ELEVATORS

Adequate elevators, escalator or similar service consistent with industry-wide standards for the nature of the process and the work performed shall be provided when employees are employed four floors or more above or below ground level.

17. EXEMPTIONS

If, in the opinion of the Division after due investigation, it is found that the enforcement of any provision contained in Section 7, Records; Section 11, Meal Periods; Section 12, Rest Periods; Section 13, Change Rooms and Resting Facilities; Section 14, Seats; Section 15, Temperature; or Section 16, Elevators, would not materially affect the welfare or comfort of employees and would work an undue hardship on the employer, exemption may be made at the discretion of the Division. Such exemptions shall be in writing to be effective and may be revoked after reasonable notice is given in writing. Application for exemption shall be made by the employer or by the employee and/or the employee's representative to the Division in writing. A copy of the application shall be posted at the place of employment at the time the application is filed with the Division.

18. FILING REPORTS (See California Labor Code, Section 1174(a))

19. INSPECTION (See California Labor Code, Section 1174)

20. PENALTIES (See California Labor Code, Section 1199)

EXCERPTS FROM THE LABOR CODE

Section 200. As used in this article: (a) "Wages" includes all amounts for labor performed by employees of every description, whether the amount is fixed or ascertained by the standard of time, task, piece, commission basis, or other method of calculation.

Section 201. If an employer discharges an employee, the wages earned and unpaid at the time of discharge are due and payable immediately.

Section 202. If an employee not having a written contract for a definite period quits his employment, his wages shall become due and payable not later than 72 hours thereafter, unless the employee has given 72 hours previous notice of his intention to quit, in which case the employee is entitled to his wages at the time of quitting.

Section 226. (a) Every employer shall semimonthly, or at the time of each payment of wages, furnish each of his or her employees either as a detachable part of the check, draft or voucher paying the employee's wages, or separately when wages are paid by personal check or cash, an itemized statement in writing showing: (1) gross wages earned, (2) total hours worked by each employee whose compensation is based on an hourly wage, (3) all deductions; provided, that all deductions made on written orders of the employee may be aggregated and shown as one item, (4) net wages earned, (5) the inclusive dates of the period for which the employee is paid, (6) the name of the employee and his or her social security number; and (7) the name and address of the legal entity which is the employer.

Section 1174. Every person employing labor in this state shall:

(a) Furnish to the commission, at its request, reports or information which the commission requires to carry out this chapter. Such reports and information shall be verified if required by the commission or any member thereof.

(b) Allow any member of the commission or the employees of the Division of Labor Standards Enforcement free access to the place of business or employment of such person to secure any information or make any investigation which they are authorized by this chapter to ascertain or make. The commission may inspect or make excerpts, relating to the employment of employees, from the books, reports, contracts, payrolls, documents, or papers of such person.

Section 1191. For any occupation in which a minimum wage has been established, the commission may issue to an employee who is mentally or physically handicapped, or both, a special license authorizing the employment of the licensee for a period not to exceed one year from date of issue, at a wage less than the legal minimum wage. The commission shall fix a special minimum wage for the licensee. Such license may be renewed on a yearly basis.

Section 1191.5. Notwithstanding the provisions of Section 1191, the commission may issue a special license to a nonprofit organization such as a sheltered workshop or rehabilitation facility to permit the employment of employees who have been determined by the commission to meet the requirements in Section 1191 without requiring individual licenses of such employees. The commission shall fix a special minimum wage for such employees. The special license for the nonprofit corporation shall be renewed on a yearly basis, or more frequently as determined by the commission.

Section 1199. Every employer or other person acting either individually or as an officer, agent, or employee of another person is guilty of a misdemeanor and is punishable by a fine of not less than one hundred dollars ($100) or by imprisonment for not less than 10 days, or by both, who does any of the following:

(a) Requires or causes any employee to work for longer hours than those fixed or under conditions of labor prohibited by an order of the commission.

(b) Pays or causes to be paid to any employee a wage less than the minimum fixed by an order of the commission.

(c) Violates or refuses or neglects to comply with any provision of this chapter or any order or ruling of the commission.

Section 1391.2. (a) Notwithstanding Sections 1391 and 1391.1, any minor under 18 years of age who has been graduated from a high school, completing a four year course above the eighth grade of the elementary schools, or who has had an equal amount of education in a private school or by private tuition, or who has been awarded a certificate of proficiency pursuant to Section 48412 of the Education Code, may be employed for the same hours as an adult may be employed in performing the same work. (b) Notwithstanding the provisions of the orders of the Industrial Welfare Commission, no employer shall pay any minor described in this section in his employ at wage rates less than the rates paid to adult employees in the same establishment for the same quantity and quality of the same class of work, provided, however, that nothing herein shall prohibit a variation of rates of pay for such minors and adult employees engaged in the same classification of work based upon a difference in seniority, length of service, ability, skill, difference in duties or services performed, whether regularly or occasionally, difference in the shift or time of day worked, hours of work, or other reasonable differentiation when exercised in good faith.

STATEMENT AS TO THE BASIS UPON WHICH INDUSTRIAL WELFARE COMMISSION ORDER NO. 4-89 REGULATING WAGES, HOURS, AND WORKING CONDITIONS IN PROFESSIONAL, TECHNICAL, CLERICAL, MECHANICAL, AND SIMILAR OCCUPATIONS IS PREDICATED

The Industrial Welfare Commission's (IWC) legal authority for promulgating and amending this order are set forth under the heading "Take Notice." The IWC offers the following statement as to the basis for the various sections of this order:

1. APPLICABILITY

This section provides, in part, that employees employed in executive and administrative capacities are exempt from Sections 3 through 12 of this order if they meet two tests: (1) duties appropriate to such capacity, and (2) a specified remuneration. These are appropriate and well-established criteria for determining whether a person designated as an executive or administrator should be protected by the minimum standards in the order, most significantly by the requirement for premium pay for overtime work. For this reason, when the IWC began its investigation of overtime issues, it included Section 1, Applicability, in that review.

The IWC rejected the California Hospital Association's (CHA) petition to amend all of the IWC Orders by adopting new standards that more closely resemble the federal rule for the executive and administrative exemption, including a standard for "primary" duties. The IWC reasserted its historical position that it preferred the term "primarily" to "primary" because the former afforded employees greater protections. Additionally, "primarily" was defined in a way to assist enforcement, and changing to the federal standard would create more problems for enforcement staff. The IWC also rejected CHA's request to adopt a "high salary proviso" which would exempt certain employees paid very high salaries regardless of duties or responsibilities. The salary levels suggested by CHA would automatically exempt from overtime certain employees, such as nurses, and the IWC wanted to continue protecting such employees unless duties or responsibilities clearly indicated that an exemption was in order.

While employer representatives on three wage boards were unsuccessful in their attempts to convince their colleagues to recommend adoption of language similar to that requested by CHA, the majority of one wage board recommended that the IWC adopt a proposal to increase the specified remuneration amount by the same percentage as any minimum wage increase. The IWC recognized that this recommendation was reasonable and proposed language which would apply to employees covered by all the orders under review, including this one. The IWC received testimony during the public hearing process which led it to conclude that the arithmetical relationship between the amount of minimum wage and the amount of the compensation contained in Section 1, which existed upon the promulgation of the 1980 Orders, was proper and should be maintained. On September 23, 1988, the IWC adopted a proposal to increase the remuneration amount for persons employed in executive and administrative capacities to

but was not limited to, a critical nursing shortage that placed more demands than ever on nurses, the IWC concluded that registered nurses still needed its protections and adopted language which clearly did not include nurses in a categorical professional exemption under subsection (2), but allowed nurses to be exempt as administrators, executives, or professionals if they individually met the criteria for an exemption under subsection (1).

This section of the statement as to the basis addresses those revisions or changes adopted on September 23, 1988. The statements as to the basis for the remaining parts of this section are contained in prior printings of the order. Those parts have not changed, and there is no need for an explanation because the IWC is continuing in effect regulations that have previously become a part of the standard working conditions for employees in the state. The IWC received no compelling evidence and concluded that there was no rationale to warrant making any other changes in this section.

2. DEFINITIONS

The wage board for this industry generally accepted definitions as they stood in the 1976 order. Several wage boards asked the IWC to insert the definition for "primarily". The IWC found that the substance of the definition proposed was in accord with the Division's established administrative policy that an employee who spends as much as half his or her work time performing the tasks of non-exempt employees is covered by this order.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any other change in the provisions of this section, except in the list of occupations covered in subsection (C). This list was revised when the IWC defined the scope of the occupations to be considered by the wage board to reflect technological changes since it was first compiled, and it was approved unanimously by the wage board.

Subsection (D), defining "emergency", was inserted because the word is used in a subsection (I) in the section on Hours and Days of Work. It is the same definition that has been used in IWC Order 15, and the IWC had no compelling evidence to justify changing it.

3. HOURS AND DAYS OF WORK

During the investigative phase of its overtime review, the IWC heard and read testimony which suggested that some employees and employers wanted the opportunity to implement work schedules which could be used as alternatives to the 8-hour day within a 40-hour week. This testimony indicated that the IWC regulations requiring premium pay after eight hours a day did not provide enough flexibility, and that the "four-ten" work schedule, permitted since 1976, while offering some relief did not allow other desirable options such as longer but fewer workdays within workweeks. Additionally, the IWC received a petition from the California Newspaper Publishers Association requesting an or-

ders 1-80, 4-80, 5-80, and 10-80, a representative from the California Labor Federation defended the 8-hour day as the "cornerstone of the embryonic labor movement" and noted that the 8-hour day had been a standard in California since 1866. Other representatives from organized labor testified that the proposal to allow 12-hour days was an attack on the welfare of employees and would subject them to pressure from their employers to work longer hours without overtime pay. Employee representatives argued that many employees are unable or unwilling to work 12-hour shifts, that 12-hour shifts decrease the quality of life, and that securing child care for the time necessary to work a 12-hour shift would be difficult. Employer representatives and some employees, including those who worked 12-hour schedules already permitted under Order 5-80 for licensed hospitals, testified that they preferred shifts up to 12 hours without overtime. These persons stated that flexible scheduling improved morale, attracted and retained staff, increased communication and camaraderie among workers, and decreased commuting time. The same persons asserted that alternative work schedules offered employees a choice, and were completely voluntary. They added that from their own experience, 12-hour shifts posed few problems, and parents on a 12-hour schedule could provide child care within the family unit because each parent could stay home for longer blocks of time.

The IWC considered all of the information it received during the entire course of its overtime review and indicated that although it was not yet ready to embrace the straight 40-hour workweek contained in the Fair Labor Standards Act, it did recognize that societal changes demanded greater scheduling flexibility than currently permitted under the IWC orders so that employers and employees could work together for the benefit of both. The IWC acknowledged that the 8-hour day was no longer the only acceptable standard in California as shown by the acceptance of the "four-ten" workweek, the language recommended by the wage board for Order 1-80, the provision contained in Order 5 to allow persons working in licensed hospitals to work up to 12 hours a day at straight time pay, the "nine-eighty" plan in place for Los Angeles city employees, and various other alternative workweeks available to employees in the public sector.

On September 23, 1988, the IWC concluded its overtime review, as it pertained to this section of the order, by adopting the language contained in its original proposal with minor modifications. The modified language contained built-in protections, including but not limited to a regularly scheduled week of work, a two-thirds vote by affected employees, a secret ballot election, a written disclosure requirement, and a reasonable accommodation clause to protect employees unwilling or unable to work alternative schedules. In an effort to promote clarity, consistency, continuity, and ease of enforcement, the IWC adopted the same language for Section 3 in three of the orders under review, including

schedule. "A regularly scheduled week of work" should exist over a period of time, and the language permitting a new secret ballot vote to be held only after one year confirmed this. The IWC intended that alternative schedules could include different predetermined alternating schedules during designated periods, for example, peak periods of work due to seasonal or holiday schedules or regular alternating schedules, as long as these schedules were included as part of the original agreement executed by two-thirds of the employees in the affected work unit following a secret ballot and before the performance of work. Finally, the IWC stated it intended for alternative schedules to be defined in terms of a certain number of hours and days in a week of work, but persons on alternative schedules did not necessarily have to work on the same specific day during each week of work.

The section of the statement as to the basis addresses those revisions or changes adopted on September 23, 1988. The statements as to the basis for the remaining parts of this section are contained in prior printings of this order. Those parts have not changed, and there is no need for an explanation because the IWC is continuing in effect regulations that have previously become a part of the standard working conditions for employees in this state. The IWC received no compelling evidence and concluded that there was no rationale to warrant making any other changes in this section.

4. MINIMUM WAGES

The IWC examined the minimum wage in the context of a wage adequate to supply the necessary cost of proper living to, and maintain the health and welfare of, an employee in California, while considering the legislative intent expressed in the Cal State 1973, Ch 1087, sec 11, which provides "It is the intent of the Legislature in enacting this act that the Industrial Welfare Commission interpret these provisions (amendments to the Labor Code, including but not limited to secs 1173, 1178, and 1178.5) in a manner which does not cause undue hardship and loss of employment opportunities in any segment of industry in California."

During the early stages of its minimum wage review, the IWC studied historic, demographic, statistical, and economic data, and testimony and reports presented prior to and in conjunction with four investigative hearings. Testimony and data from employee representatives, including the California Labor Federation, advocated that an increase was necessary to adjust for the decline in purchasing power since the last increase in 1981 and to adjust for overall increased inflation. These advocates stated that an increase in the minimum wage of over $5.00 per hour was needed to reflect increases in the Consumer Price Index, or increases in the average hourly manufacturing wage (a standard advocated by some economists), or to maintain the same relationship to the poverty level that the min-

factors which suggested that some increase in the minimum wage was certainly in order with the belief that too significant an increase could harm employees by contributing to a decrease in their employment opportunities. On September 11, 1987, the IWC proposed to increase the minimum wage to $4.00 per hour, an amount which falls well within the upper and lower limits of the range of suggested rates, as well as an amount considered reasonable, relative to all of the evidence before the IWC.

The IWC cited its authority to reexamine the minimum wage after enough time passed to measure the economic effects of any increase and then evaluate the need for any further change at that time.

The IWC held three public hearings on its minimum wage proposals. Advocates representing unions, neighborhood organizations, and other groups of mainly urban workers urged a "moral minimum wage" of at least $5.00 an hour. These groups also expressed concern for families of minimum wage earners and pointed out that $4.00 per hour, or $8000 per year, was still below the poverty level for a family of three. Employers contended that the minimum wage was established to support an individual, not an entire household. The IWC also studied additional information which indicated that some econometric models may have overstated the negative effects attributed to an increase in the minimum wage and that previous projections of job losses resulting from an increase may have been too high. The IWC also received an analysis from the Industrial Areas Foundation Network of Southern California which showed that while some businesses opposed any increase in the minimum wage, others now supported a "substantial" increase.

The IWC reconsidered all of the information it received during the entire course of its minimum wage review. It re-evaluated the reasons for its original $4.00 proposal and concluded that those reasons were still valid, but decided that an increase to $4.25 per hour was warranted. This modification took into consideration new evidence which suggested that an increase would not have as great an impact on unemployment as previously assumed by employers, and that some employers now supported an increase above $4.00 per hour. In arriving at its final decision, the IWC reaffirmed the fact that, historically, it had always focused on a single individual, as opposed to a family unit, to determine the adequacy of the minimum wage and concluded that the minimum wage is the wage necessary to support the cost of proper living for a single worker, and is not intended to support a family, nor supplant public assistance programs. The IWC discounted arguments in favor of a "moral minimum wage" of over $5.00 per hour because they appeared to be based, in part, on a subjective philosophical standard and related in part upon certain cost indices and comparisons to public assistance programs. Additionally, the IWC

$1159 per month, proportionate to the most recent increase in the minimum wage, as well as proportionate to other recent increases made by the IWC with respect to the meals and lodging credits.

During its overtime investigation the IWC learned that the professional exemption, as distinct from the administrative or executive exemption contained in the IWC Orders, was too restrictive insofar as it did not recognize the societal and technological changes that have occurred and will occur in years to come. Emerging occupations, such as those in the fields of science and high technology, and other occupations requiring advanced knowledge, the exercise of discretion and independent judgment and/or invention, imagination or talent in a recognized field of artistic endeavor, while exempt under federal law, rarely, if ever, qualified for a professional exemption under the IWC Orders. Testimony indicated that this differentiation generated confusion and resulted in disadvantages both to employees and employers. The IWC also received information about enforcement problems due to the fact that there was very little flexibility to interpret and/or enforce individual professional exemptions based on actual duties and responsibilities. In response to these concerns, and based upon evidence received in the CHA petition, written materials, and oral and written public testimony, the IWC decided that the professional exemption relied too much on credentialism. Consequently, the IWC proposed language which would add persons engaged in an occupation commonly recognized as a "learned or artistic" profession to the licensed professions already listed in the order. This broad language would eliminate the need for the IWC to modify the list (as it did to add pharmacists in 1979) each time it wished to recognize a new group as professionals, because it would allow enforcement staff to consider individual situations and actual duties when applying the exemption. The language also would permit, but would not be limited to, use of the federal guidelines for purposes of interpretation.

With respect to an exception for nurses as professionals, the IWC received testimony from the California Association of Hospitals and Health Systems (formerly the California Hospital Association) and individual nurses who urged the IWC to recognize nurses as professionals because they are considered professionals under the FLSA and professional status is consistent with the true nature of nurses' duties and responsibilities. On the other hand, the California Nurses Association (CNA) strongly opposed any modification of the applicability section which would exempt nurses "as a class" of professionals or which would preclude nurses from an exemption based on the other factors in subsection (1). Instead, CNA argued, each professional exemption should be examined individually, and decisions regarding professional status for registered nurses should depend on actual duties and responsibilities. The IWC heard and read testimony which indicated that professional recognition and a professional exemption under the IWC Orders were not synonymous. CNA testified that as long as employers fail to provide registered nurses with the rights and privileges generally conferred on a professional, i.e., consistent exercise of discretion and independent judgment, control over one's practice, and full integration in the decision making process, professional recognition and a professional exemption will remain mutually exclusive. Based on the evidence presented which also included, caption from daily overtime up to 12 hours a workday within a 40-hour workweek. The North American Association of Inventory Services petitioned for an exemption for persons working less than 40 hours per payroll week, with overtime pay after 40 hours at either the state or federal premium rate, whichever is higher. The California Teamsters Public Affairs Council (Teamsters) submitted a petition requesting amendment of all the IWC Orders by providing certain additional protective conditions whenever an alternative workweek arrangement is allowed.

The wage board for Order 4-80 discussed amending Section 3 to delete the requirement that premium overtime compensation be paid for hours worked in excess of eight but less than 12 in any workday. A simple majority of the wage board suggested that the IWC modify the "four-ten" workweek to allow employees to work four 9-hour days and one 4-hour day a week as long as certain protections were provided. Since this recommendation was not supported by at least two-thirds of the members of the wage board, the IWC was not required under Labor Code Section 1182 to adopt it, and chose not to. The IWC noted, however, the wage board's discussions suggested that flexibility under protective conditions was desirable for persons covered by Order 4, and both employers and employees could benefit from alternative scheduling.

After considering all of the evidence and testimony received during its investigation, and after deliberating on the wage board report, the IWC concluded that employees should have more choices with respect to their hours and days of work and proposed an amendment to Section 3 which offered employees the option of entering into a "regularly scheduled workweek consisting of such hours and days as shall be agreed upon" up to 12 hours a day within a 40-hour week. According to the provisions contained in the proposal, the employer and two-thirds of the employees in the affected work unit must voluntarily execute a written agreement before implementing the new schedule. The proposal provided premium pay for hours worked in excess of the regular schedule, or for all hours in excess of 12 per day or 40 per week. The proposal also included some of the protective conditions suggested in the Teamsters' petition, such as a secret ballot, as well as additional protections including a written disclosure by the employer of the effects of the proposed schedule on the employee's hours and pay, a reasonable accommodation clause, and a mechanism for reversing the agreement after one year. In addition the proposal listed some appropriate examples of work units, as well as provided for two consecutive days off within a workweek.

The IWC did not propose or adopt the language suggested in the Teamsters' petition which would require employers to file alternative work schedules with the Division of Labor Standards Enforcement. The IWC determined that the burden of a filing requirement would outweigh any significant benefit for employees, and create additional paperwork for employers as well as enforcement staff. The IWC also declined to propose or adopt the Teamsters' language which stipulated that alternative schedules be valid for no longer than three years. The IWC concluded that the reversal provision which permitted employees to petition for a new secret ballot vote after one year provided adequate protection for employees.

During the public comment period on the proposals to amend the overtime provisions contained in IWC Order this one.

The IWC retained the language which provided that weeks of work be "regularly scheduled." The IWC was not persuaded by testimony which suggested that employees' interests could best be met by allowing employees to work different hours every week within a 40-hour weekly limitation. The IWC agreed that if employees wanted to take advantage of an alternative schedule, they should have the built-in protection of limiting that schedule to a certain number of hours and number of days in a week. This would allow employees to plan for their transportation and child care needs, educational pursuits, family and recreation time, and other personal activities.

The IWC also retained the language requiring a "secret ballot" in order to assure freedom of choice for the employee. The IWC reasoned that only a secret ballot would remove the threat of employer coercion and/or retribution by allowing employees to anonymously vote on an alternative schedule without regard to the outcome of the vote or the time delay between the vote and the signing of the written agreement. Anonymity is particularly important to the employee during this period because it allows the employee the freedom to reflect on the effects of the alternative schedule without undue influence or pressure from the employer.

The IWC also retained the language which cited examples of a "readily identifiable work unit," including language which said a work unit may consist of an individual employee "as long as the criteria of an identifiable work unit in this subsection are met," because it recognized that one person could constitute a work unit and a single employee should have the option of working longer than eight hours a day without overtime pay. The IWC also retained the language which allowed reasonable accommodation for employees who were unwilling or unable to work the new schedule. The IWC concluded that employees should have a choice with regard to their hours of work, and that employers shall make a reasonable effort to find an alternative work assignment for persons who are unable or unwilling to work the new schedule.

The IWC made minor amendments to its original proposal, including changes in wording from "workweek" to "week of work" and "day" to "workday"; these changes insured clarity and were consistent with similar language contained in the IWC Orders. "Hours of pay" was changed to "wages, hours, and benefits" for purposes of clarity and consistency with language contained in the Labor Code.

The original language proposed by the IWC included provisions "for not less than two consecutive days off within a workweek." The IWC ultimately rejected this language because many employees would automatically receive two consecutive days off by virtue of working longer but fewer days within the 40 hour week of work. The IWC also recognized that some employees had personal obligations, such as educational pursuits, which may warrant schedules with specified nonconsecutive days off as opposed to two consecutive days off. Finally, based upon testimony heard at public hearings the IWC determined that this provision would inhibit and might prevent trading shifts, a frequent and desirable practice advocated by some employees.

Upon adopting its final language, the IWC made clear its intent the IWC did not intend to invalidate any "four-ten" workweek agreements entered into prior to the effective date of the order, nor did the IWC intend for employees to vote frequently on a new alternative hold his (or her) head considerably above the official poverty level." Advocates also pointed out that the Governor and the Legislature had recognized the inadequacy of the minimum wage by establishing $5.14 as the base hourly wage in the "GAIN" or "Workfare" program. The California Retailers Association and other employer groups opposed any minimum wage increase until such an increase occurred at the federal level. These groups testified to the adverse consequences of an increase, including but not limited to unemployment, disemployment and reduced hours of employment, and said that an increase would have a detrimental impact on employees, particularly youth and minorities, whom they identified as most vulnerable to these adverse effects. In addition, employers pointed out that jobs would be lost to California employees because employers would tend to establish new businesses or relocate present businesses in other states with more favorable minimum wage rates.

With respect to the Report of the 1987 Minimum Wage Board, the IWC noted that although the report contained no recommendation on a minimum wage adequate to supply the cost of proper living, it did include a motion that the minimum wage remain at $3.35 per hour until the federal minimum wage changed. Other motions made by members of the wage board were to increase the minimum wage to $4.50 or $5.52 per hour, tied to certain indices. The IWC decided not to tie the minimum wage to the Consumer Price Index, the California Necessities Index, the Employment Cost Index, or any other index, including the average hourly manufacturing wage, because of complex interacting economic forces such as inflation, deflation, recession, unemployment, and uncertain fiscal/monetary policies which affect those indices, and because of the imperfect relationship between such indices and the factors underlying the adequacy of the minimum wage. The IWC also decided that tying the minimum wage to "Minnie's Budget," a budget last reformulated in 1981 for a self-supporting women, was no longer appropriate because such a budget could not meet the needs of every person within the standard and would not accurately reflect the current needs of working people, including men.

With respect to the $5.14 base hourly wage used in the GAIN program, the IWC concluded that $5.14 is not a wage but rather the figure used to calculate the number of hours of service owed to receive an AFDC check and related to jobs requiring skilled training rather than entry level jobs requiring little or no skills such as minimum wage jobs.

The IWC also considered state and federal actions with respect to the minimum wage. It studied the "Senate Office Research Issue Brief" which explored the consequences of increasing California's minimum wage, and it made note of the fact that members of the Legislature voted to increase the minimum wage to $4.75 per hour. The IWC also considered federal legislation proposing a nationwide increase in the minimum wage to between $3.85 to $4.75 per hour. Finally, the IWC studied minimum wage rates in other states and noted that at the time of its deliberations, only seven states had rates over $3.35 per hour, and the rates ranged from $3.37 to $3.85. Only one state, Connecticut, planned to exceed $4.00 per hour.

In considering all of the rates advocated during its minimum wage review, rates ranging from $3.35 per hour to over $5.00 per hour, the IWC balanced these living in urban areas, for example, were subject to a di ferent cost of living than those residing in remote or ru ral parts of the state. The IWC weighed these an other factors, including the fact that the Legislatu had independently proposed a minimum wage of $4.7 On December 18, 1987, the IWC concluded that a ne minimum wage of $4.25 per hour was appropriate t maintain the health and welfare of a single individu and not cause undue hardship and loss of employmen opportunities.

[On October 31, 1988, the California Supreme Cou in *Henning v. Industrial Welfare Com.* (1988) 46 Cal.3 1262 held that portion of the minimum wage order pro viding for an alternative minimum wage for tipped em ployees to be invalid. Therefore, all references to an al ternative minimum wage for tipped employees hav been deleted from IWC Order No. MW-88, includin references contained in Section 5 of that order whi referred to minimum wage sections contained in othe IWC orders. Additionally, all references in the IWC considerations and adoption of an alternative minimu wage for tipped employees were deleted from th statement as to the basis.]

With respect to establishing alternative minimu wages for certain employees. After its initial investiga tion, the IWC found that the minimum wage may be in adequate to supply the proper cost of living and calle a wage board. The IWC agreed it would consider equ from the public regarding the minimum wage board charge, and upon the suggestion of the California Ho tel & Motel Association, decided that in addition to making a general recommendation on the adequacy of the minimum wage, that wage board should also con sider an alternative minimum wage for full time stu dents under 21. The California Hotel & Motel Associa tion argued that by establishing this alternative the IWC would "remove the economic disincentive that currently exists to the employment of students." The IWC requested the wage board to consider and make recommendations on whether or not full time students under the age of 21 should receive an alternative min imum wage.

The official report of the minimum wage board was inconclusive with respect to any recommendations on alternative minimum wage rates. With respect to an al ternative wage for students, employer representatives noted that an alternative wage would mitigate the ad verse employment effects associated with a minimum wage that disproportionately impacts teenagers and young adults who are generally not self supporting. Employee representatives stated that this alternative would encourage the displacement of other workers and exploit students who worked for a living.

On September 11, 1987, the IWC voted to submit to public hearings a proposal establishing an alternative minimum wage rate for full time students under 21. Stu dents throughout California protested against an alter native wage rate for full time students under 21. Many students testified that they were self supporting and a lower student wage rate would force them to drop out of school. Others stated the proposal was discrimina tory, conflicted in part with Labor Code Section 1191 and would result in less jobs for adult and full time workers. After evaluating all of the written and oral tes timony, including reports from staff and testimony from the Division of Labor Standards Enforcement that the

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language in the proposal was both unclear and probably inherently difficult to enforce, the IWC decided to withdraw its proposed alternative minimum wage for full-time students under 21.

[This section of the statement as to the basis addresses those revisions or changes adopted on December 18, 1987. The statements as to the basis for the remaining parts of this section are contained in prior printings of this order. Those parts have not changed, and there is no need for an explanation because the IWC is continuing in effect regulations that have previously become a part of the standard working conditions for employees in this state.]

5. REPORTING TIME PAY

The requirement for reporting time pay historically has been included in the IWC's orders on the basis that it is necessary to employees' welfare that they be notified in advance when changes in their starting time must be made. It has deemed a maximum of four hours' pay adequate to encourage proper notice and scheduling.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any change in the provisions of this section, which date back to 1942. Exceptions to the requirement date to 1974.

6. LICENSES FOR HANDICAPPED WORKERS

This section, long a part of the order, is intended to allow a lesser rate only for those so seriously incapacitated that they cannot approach normal productivity. It is a restatement of Labor Code Sections 1191 and 1191.5. The word "permit" was changed to "license" to conform more closely to the statute.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any other change in the provisions of this section.

7. RECORDS

Employee welfare requires that data on wages and hours of work be furnished to employees, in order to assist in the resolution of disputes and in the employee's dealings with taxing agencies.

In response to employee demands for more information on checkstubs, the IWC concluded that it is not feasible at this time to require employers to provide such written information. It did find it appropriate and reasonable to require that employers keep information on applicable rates of pay and hours worked and make it available to the employee on reasonable request, as specified in (A) (9).

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any other change in the provisions of this section.

8. CASH SHORTAGE AND BREAKAGE

Some prohibition against deductions from pay for shortage or breakage has existed in IWC Orders since 1989. It is apparent that the employee's welfare financially would be involved and his or her employment possibly would be at stake if the employee could be charged for shortages without the protection of this section.

It is the IWC's intent that the employer can only deduct for cash shortages or breakages if they are caused by the dishonest or willful act or gross negligence of the employee. No compelling reason was demonstrated for changing the word "shown" to "proven" because the IWC intends that the burden of proof rests with the employer in all cases.

The IWC felt it was not necessary to refer to Labor Code Sections 400-410 and deleted that reference.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any other change in the provisions of this section.

9. UNIFORMS AND EQUIPMENT

The IWC historically has required employers to pay for uniforms, tools and equipment as basically provided in the section, because such standard conditions of labor are necessary to the welfare of employees. There was no compelling evidence before the IWC to warrant a change in the basic provisions of Subsection (A), but clarification of the IWC's intent is appropriate here. The definition and enforcement policy is sufficiently flexible to allow the employer to specify basic wardrobe items which are usual and generally usable in the occupation, such as white shirts, dark pants and black shoes and belts, all of unspecified design, without requiring the employer to furnish such items. If a required black or white uniform or accessory does not meet the test of being generally usable in the occupation the employee may not be required to pay for it. The IWC also concluded that present provisions in the order adequately protect the employee against bearing the cost of maintenance.

The IWC did have evidence to justify amending (B) to allow employers to require regularly indentured apprentices to provide their own tools; such apprentices customarily have a career investment in their tools and usually are assured of an ultimate wage exceeding two times the minimum wage; and in addition their working conditions are monitored by the Division of Apprenticeship Standards.

Notes were inserted to clarify the boundaries of the respective jurisdictions of the IWC and the Occupational Safety and Health Standards Board in the course of consultation with the OSHA Standards Board.

In some cases, the procedures for establishing funds in which to hold deposits in accord with Labor Code Sections 400-410, as provided in this section, are too cumbersome to be practical and an alternative is needed. There was considerable sentiment in wage boards for deleting the provision for a deposit, which could be a substantial burden on a starting employee. The IWC found that employers were reasonable in their insistence that employees have an obligation to either return items belonging to the employer or pay for the cost of them. The IWC's intent is that only the actual cost of the item may be withheld from the final check, pending return of the item within a reasonable time after the employment terminates. The balance of the check must be paid promptly as required by the Labor Code.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any other change in the provisions of this section.

10. MEALS AND LODGING

Historically, the IWC has limited the amount of credit for meals and lodging that could be used as an offset against the employer's minimum wage obligations. The IWC asked the 1987 Minimum Wage Board to make recommendations on this provision consistent with the health and welfare of employees. Although that board was unable to agree on any recommendation, it did discuss a motion calling for credit increases which would proportionately equal any increase in the minimum wage. Employer representatives argued that such "increases would potentially benefit employees by increasing the probability of being offered meals and lodging associated with a job" and pointed out that employees could "choose to reject such offers as part of their employment package." They also noted that "the meals and lodging received are substantially below fair market value." Employee representatives disputed whether "employees have the unrestricted option of a full minimum wage or a reduced wage with meals and/or lodging."

The IWC proposed that the level of the amounts credited for meals or lodging be proportionate with the proposed increase in the minimum wage, and although no one testified in support of this specific proposal, several persons indicated support of all the proposals. Others suggested, however, that an increase in the meals and lodging credits would merely offset any increase in the minimum wage. The IWC decided that the relationship between the minimum wage and meals and lodging credits which existed upon the promulgation of the 1980 orders was proper and concluded that the same relationship should be maintained. On December 18, 1987, the IWC adopted a proposal to increase the meals and lodging credits 26.9 percent, proportionate to the increase in the minimum wage.

[This section of the statement as to the basis addresses those revisions or changes adopted on December 18, 1987. The statements as to the basis for the remaining parts of this section are contained in prior printings of this order. These parts have not changed, and there is no need for an explanation because the IWC is continuing in effect regulations that have previously become a part of the standard working conditions for employees in this state.]

11. MEAL PERIODS

A "duty free" meal period is necessary for the welfare of employees. The section is sufficiently flexible to allow for situations where that is not possible.

The IWC received no compelling evidence and concluded that there was no rationale to warrant any change in this section, the basic provisions of which date back more than 30 years. Administrative exemptions are available if warranted under provisions of Section 17 of this order.

12. REST PERIODS

The IWC received no compelling evidence and concluded that there was no rationale to warrant any change in this section, the basic provisions of which date back to 1932. It also noted that administrative exemptions are available if warranted under provisions of Section 17 of this order.

With regard to substantial testimony from employees that their health and welfare was being adversely affected by continuous use of video display terminals, the IWC does not have sufficient information at this time to warrant modifying the rest period requirement for such employees. It further notes that employees are petitioning NIOSH (National Institute for Occupational Safety and Health) for action on this matter.

13. CHANGE ROOMS AND RESTING FACILITIES

The IWC's intent historically has been that employers take ordinary care to provide for the safekeeping of employees' outer clothing and street clothes. This does not always mean that lockable closets or lockers are required. It has sometimes meant, for example, the provision of coat racks open to the view of the employees, drawers or bins in some employee's custody, or supervised check rooms. Over the years the number of problems in this area has been minimal. (See also Labor Code Section 2800.)

The word "sanitary", previously used in connection with change rooms, was dropped to reinforce the IWC's intent that there be no overlap with the jurisdiction of the Occupational Safety and Health Standards Board.

The IWC inserted a note to clarify the boundaries of the respective jurisdictions of the IWC and the Occupational Safety and Health Standards Board in the course of consultation with the OSHA Standards Board.

No compelling evidence was received, and the IWC concluded there was no rationale, to warrant any other change in the provisions of this section.

14. SEATS

The basic requirement for seats has been in IWC orders since the earliest "Sanitary Regulations", and in 1913 the Legislature made a similar provision in statute. The IWC added the words "when it does not interfere with the performance of their duties" because of evidence that such clarification of this section was necessary.

The IWC received no compelling evidence and concluded that there was no rationale to warrant any other change in this section.

15. TEMPERATURE

In view of the promulgation of Federal and State energy guidelines the IWC has conformed its order to those guidelines.

The IWC received no compelling evidence and concluded there was no rationale to warrant any other change in this section, the basic provisions of which date back more than 30 years.

16. ELEVATORS

To require employees to walk three flights of stairs up and down each workday is detrimental to their comfort and welfare. This section is not intended to apply to the area of safety of elevators, which is regulated by the Occupational Safety and Health Standards Board.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any change in the provisions of this section, which date back more than 30 years.

LIFTING

The former section regulating lifting was deleted inasmuch as the State Occupational Safety and Health Standards Board asserted exclusive jurisdiction in this area during joint consultation held by the two agencies pursuant to Section 1173 of the Labor Code.

17. EXEMPTIONS

Although the IWC has attempted to foresee as many circumstances as it could in drafting its regulations, unforeseen circumstances occasionally justify exemptions after careful investigation and in the exercise of the best judgment of the Division.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any change in this section, the basic provisions of which date back more than 30 years.

18. FILING REPORTS

The IWC does not regularly require employers to file reports but is authorized by statute to gather information to carry out the purpose of the order.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any change in the provisions of this section.

19. INSPECTION

Labor Code Section 1173 charges the IWC with a "continuing duty ... to ascertain the wages paid to all employees in this state, and to ascertain the hours and conditions of labor in and employment in the various occupations, trades and industries ..." Section 19 makes it possible for the IWC to fulfill this duty and to carry out the purpose of the order.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any change in the provisions of this section.

20. PENALTIES

This section refers on the face of the order to Labor Code Sections which specify penalties for violation.

The IWC received no compelling evidence, and concluded there was no rationale, to warrant making any change in the provisions of this section.

21. SEPARABILITY

This section is intended to preserve the integrity of the orders in the face of any legal challenge.

The IWC received no compelling evidence and concluded there was no rationale, to warrant making any change in the provisions of this section.

22. POSTING

The basic requirement for posting a copy of the order in the building in which employees are employed is stated in Labor Code Section 1183, and the IWC received no compelling evidence to warrant a change in the provisions of this section. Considerable concern was expressed in wage boards over the need for providing information about the basic standards contained in the order in the language understood by workers who do not speak English. The IWC has requested the Department of Industrial Relations to make such summaries available. To the extent feasible, in Spanish and Chinese and other languages ... [illegible] ... the orders.

Sections 1 and 3 of the Statement as to the Basis were adopted on October 21, 1988. Sections 4 and 10 were adopted on January 22, 1988 and amended on December 16, 1988. The remaining sections of the Statement as to the Basis were adopted ... [illegible]

7 13.9

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Provisions of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discriminatory action.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for optional penalties of up to $1,000 for each nonserious violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $10,000 for each such violation.

There are also provisions for criminal penalties. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of up to $250,000 (or $500,000 if the employer is a corporation), or by imprisonment for up to six months, or both. A second conviction of an employer doubles the possible term of imprisonment.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State Labor or Health department or a State university.

Posting Instructions

Employers in States operating OSHA approved State Plans should obtain and post the State's equivalent poster.

Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or facsimile) in a conspicuous place where notices to employees are customarily posted.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

Atlanta	(404) 347-3573
Boston	(617) 565-7164
Chicago	(312) 353-2220
Dallas	(214) 767-4731
Denver	(303) 844-3061
Kansas	(816) 426-5861
New York	(212) 337-2325
Philadelphia	(215) 596-1201
San Francisco	(415) 995-5672
Seattle	(206) 442-5930

Elizabeth Dole

Elizabeth Dole, Secretary of Labor

Washington, D.C.
1989 (Revised)
OSHA 2203

U.S. Department of Labor

Occupational Safety and Health Administration

SAFETY AND HEALTH PROTECTION ON THE JOB

State of California
Department of Industrial Relations

California law provides job safety and health protection for workers under the Cal/OSHA program. This poster explains the basic requirements and procedures for compliance with the state's job safety and health laws and regulations. The law requires that this poster be displayed. (Failure to do so could result in a penalty of up to $7,000.)

WHAT AN EMPLOYER MUST DO:

All employers must provide work and workplaces that are safe and healthful. In other words, as an employer, you must follow state laws governing job safety and health. Failure to do so can result in a threat to the life or health of workers, and substantial monetary penalties.

You must display this poster so everyone on the job can be aware of basic rights and responsibilities.

You must have a written and effective injury and illness prevention program for your employees to follow.

You must be aware of hazards your employees face on the job and keep records showing that each employee has been trained in the hazards unique to each job assignment.

You must correct any hazardous condition that you know may result in serious injury to employees. Failure to do so could result in criminal charges, monetary penalties, and even incarceration.

You must notify the nearest Cal/OSHA office of any serious injury or fatality occurring on the job. Be sure to do this immediately after calling for emergency help to assist the injured employee.

WHAT AN EMPLOYER MUST NEVER DO:

Never permit an employee to do work that violates Cal/OSHA law.

Never permit an employee to be exposed to harmful substances without providing adequate protection.

Never allow an untrained employee to perform hazardous work.

EMPLOYEES HAVE CERTAIN RIGHTS IN WORKPLACE SAFETY & HEALTH:

As an employee, you (or someone acting for you) have the right to file a complaint and request an inspection of your workplace if conditions there are unsafe or unhealthful. This is done by contacting the local district office of the Division of Occupational Safety and Health (see list of offices). Your name is not revealed by Cal/OSHA, unless you request otherwise.

You also have the right to bring unsafe or unhealthful conditions to the attention of the Cal/OSHA investigator making an inspection of your workplace. Upon request, Cal/OSHA will withhold the names of employees who submit or make statements during an inspection or investigation.

Any employee has the right to refuse to perform work that would violate a Cal/OSHA or any occupational safety or health standard or order where such violation would create a real and apparent hazard to the employee or other employees.

You may not be fired or punished in any way for filing a complaint about unsafe or unhealthful working conditions, or using any other right given to you by Cal/OSHA law. If you feel that you have been fired or punished for exercising your rights, you may file a complaint about this type of discrimination by contacting the nearest office of the Department of Industrial Relations, Division of Labor Standards Enforcement (State Labor Commissioner) or the San Francisco office of the U.S. Department of Labor, Occupational Safety and Health Administration. (Employees of state or local government agencies may only file these complaints with the State Labor Commissioner.) Consult your local telephone directory for the office nearest you.

EMPLOYEES ALSO HAVE RESPONSIBILITIES:

To keep the workplace and your co-workers safe, you should tell your employer about any hazard that could result in an injury or illness to people on the job.

While working, you must always obey state job safety and health laws.

SPECIAL RULES APPLY IN WORK AROUND HAZARDOUS SUBSTANCES:

Employers who use any substance listed as a hazardous substance in Section 339 of Title 8 of the California Code of Regulations, or subject to the Federal Hazard Communications Standard (29 CFR 1910.1200), must provide employees with information on the contents on Material Safety Data Sheets (MSDS), or equivalent information about the substances that trains employees to use the substances safely.

Employers shall make available on a timely and reasonable basis a Material Safety Data Sheet on each hazardous substance in the workplace upon request of an employee, an employee collective bargaining representative, or an employee's physician.

Employees have the right to see and copy their medical records and records of exposure to potentially toxic materials or harmful physical agents.

Employers must allow access by employees or their representatives to accurate records of employee exposures to potentially toxic materials or harmful physical agents, and notify employees of any exposures in concentrations or levels exceeding the exposure limits allowed by Cal/OSHA standards.

Any employee has the right to observe monitoring or measuring of employee exposure to hazards conducted pursuant to Cal/OSHA regulations.

WHEN CAL/OSHA COMES TO THE WORKPLACE:

A trained Cal/OSHA safety engineer or industrial hygienist may periodically visit the workplace to make sure your company is obeying job safety and health laws.

An inspection will also be conducted when a legitimate complaint is filed by an employee with the Division of Occupational Safety and Health.

Cal/OSHA also goes to the workplace to investigate a serious injury or fatality.

When an inspection begins, the Cal/OSHA investigator will show official identification from the Division of Occupational Safety and Health.

The employer, or someone the employer chooses, will be given an opportunity to accompany the investigator during the inspection. A representative of the employees will be given the same opportunity. Where there is no authorized employee representative, the investigator will talk to a reasonable number of employees about safety and health conditions at the workplace.

VIOLATIONS, CITATIONS & PENALTIES:

If the investigation shows that the employer has violated a safety and health standard or order, then the Division of Occupational Safety and Health issues a citation. Each citation specifies a date by which the violation must be abated. A notice, which carries no monetary penalty, may be issued in lieu of a citation for certain non-serious violations.

Citations carry penalties of up to $7,000 for each regulatory, general or serious violation. Additional penalties of up to $7,000 per day may be proposed for each failure to correct a violation by the abatement date shown on the citation. A penalty of not less than $5,000 nor more than $70,000 may be assessed an employer who willfully violates any occupational safety and health standard or order. The maximum civil penalty that can be assessed for each repeat violation is $70,000. A willful violation that causes death or permanent impairment of the body of any employee results, upon conviction, in a fine of not more than $70,000, or imprisonment of not more than six months, or both.

While governmental entities may be cited on the same basis as other employers, and abatement dates set, civil penalties will not be assessed.

The law provides that employers may appeal citations within 15 working days of receipt to the Occupational Safety and Health Appeals Board.

An employer who receives a citation, Order to Take Special Action, or Special Order must post it prominently at or near the place of the violation for three working days, or until the unsafe condition is corrected, whichever is longer, to warn employees of danger that may exist there. Any employee may protest the time allowed for correction of the violation to the Division of Occupational Safety and Health or the Occupational Safety and Health Appeals Board.

HELP IS AVAILABLE:

To learn more about job safety rules you may contact the Cal/OSHA Consultation Service for free information, required forms and publications. You can also contact a local district office of the Division of Occupational Safety and Health. If you prefer, you may retain a competent private consultant, or ask your workers' compensation insurance carrier for guidance in obtaining information.

OFFICES OF THE DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

HEADQUARTERS: 455 Golden Gate Ave.—Room 5202, San Francisco CA 94102 — Telephone (415) 703-4341

District & Field Offices

Anaheim	2100 East Katella Ave.—Room 140, 92806	(714) 939-8145
Bakersfield	4800 Stockdale Highway—Suite 212, 93309	(805) 395-2718
Chico	555 Rio Lindo—Suite A, 95926	(916) 895-4761
Concord	1465 Enea Circle—Bldg. E Suite 900, 94520	(510) 676-8333
Covina	1123 South [illegible]—Suite 100, 91724	(818) 966-1166
Eureka	619 Second St.—Room 109, 95501	(707) 445-6611
Fresno	2550 Mariposa St.—Room 4000, 93721	(209) 445-5302
Los Angeles	3550 West Sixth St.—Room 431, 90020	(213) 736-3041
Modesto	1209 Woodrow Ave.—Suite C-4, 95350	(209) 576-6260
Oakland	7700 Edgewater Dr.—Suite 125, 94621	(510) 569-6802
Pico Rivera	9455 East Slauson Ave., 90660	(310) 949-7827
Redding	381 Hemsted Dr., 96002	(916) 224-4743
Sacramento	2424 Arden Way—Suite 165, 95825	(916) 920-6123
Salinas	1104 [illegible] St.—Suite 1, 93906	(408) 443-3050
San Bernardino	242 East Airport Dr.—Suite 103, 92408	(714) 383-4321
San Diego	7807 Convoy Court—Suite 140, 92111	(619) 237-7325
San Francisco	1390 Market St.—Suite 718, 94102	(415) 557-1677
San Jose	2010 North First St.—Suite 401, 95131	(408) 452-7288
San Mateo	1900 South Norfolk St.—Suite 215, 94403	(415) 573-3812
Santa Rosa	1221 Farmers Lane—Suite 300, 95405	(707) 576-2388
Torrance	680 Knox St.—Suite 100, 90502	(310) 516-3734
Ukiah	630 Kings Court—Suite 5, 95482	(707) 463-4763
Van Nuys	6150 Van Nuys Blvd.—Suite 405, 91401	(818) 901-5403
Ventura	1655 Mesa Verde—Room 150, 93003	(805) 654-4581

Regional Offices

Anaheim	2100 East Katella Ave.—Room 125, 92806	(714) 939-8611
Los Angeles	3550 West Sixth St.—Suite 413, 90020	(213) 736-4911
Sacramento	2424 Arden Way—Suite 125, 95825	(916) 920-6127
San Francisco	1390 Market St.—Suite 822, 94102	(415) 557-8640

CAL/OSHA CONSULTATION SERVICE

Headquarters:
455 Golden Gate Ave.—Room 5246, San Francisco CA 94102 — (415) 703-4050

Area Offices:

Fresno	1901 North Gateway—Suite 102, 93727-1605	(209) 454-1295
Sacramento	2424 Arden Way—Suite 410, 95825	(916) 920-6131
San Diego	7827 Convoy Court—Suite 406, 92111	(619) 279-3771
San Mateo	3 Waters Park Dr.—Suite 230, 94403	(415) 573-3864
Santa Fe Springs	10350 Heritage Park Dr.—Suite 201, 90670	(310) 944-9366

Enforcement of Cal/OSHA job safety and health standards is carried out by the Division of Occupational Safety and Health, under the California Department of Industrial Relations, which has primary responsibility for administering the Cal/OSHA program. Safety and health standards are promulgated by the Occupational Safety and Health Standards Board. Anyone desiring to register a complaint alleging inadequacy in the administration of the California Occupational Safety and Health Plan may do so by contacting the San Francisco Regional Office of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (Tel: 415/744-6670). OSHA monitors the operation of state plans to ensure that continued approval is merited.

SEPTEMBER [illegible]

State of California

Department of Fair Employment and Housing

DISCRIMINATION IN EMPLOYMENT

Because of

- Race
- Color
- Ancestry
- Religious Creed
- National Origin
- Physical Handicap (Including AIDS)
- Medical Condition (Cancer)
- Sex
- Age
- Marital Status

IS PROHIBITED BY LAW

The California Fair Employment and Housing Act

(Part 2.8 (commencing with Section 12900) of Div. 3 of Title 2 of the Government Code)

- permits job applicants to file complaints with the Department of Fair Employment and Housing (DFEH) against an employer, employment agency, or labor union which fails to grant equal employment as required by law.
- requires employers not to discriminate against any job applicant or worker in hiring, promotions, assignments, or discharge. On-the-job segregation is also prohibited, and employers may file complaints against workers who refuse to cooperate in compliance.
- requires employers, employment agencies, and unions to preserve applications, personnel and employment referral records for a minimum of two years.
- requires employers to provide leaves of up to four months to employees disabled because of pregnancy, maternity, or childbirth.
- requires employment agencies to serve all applicants equally; to refuse discriminatory job orders; to refrain from prohibited pre-hiring inquiries or help-wanted advertising.
- requires unions not to discriminate in member admissions or dispatching to jobs.
- forbids any person to interfere with efforts to comply with the act. Authorizes the DFEH to work affirmatively with cooperating employers to review hiring and recruiting practices in order to expand equal opportunity.
- prohibits harassment of employees or applicants and requires employers to take all reasonable steps to prevent harassment.

REMEDIES TO INDIVIDUALS, OR PENALTIES FOR VIOLATION MAY INCLUDE: hiring, back pay, promotion, reinstatement, cease-and-desist order.

JOB APPLICANTS AND EMPLOYEES: If you believe you have experienced discrimination, DFEH will investigate without cost to you.

For Information contact the nearest office of the Department of Fair Employment and Housing:

BAKERSFIELD
1001 Tower Way, #250
Bakersfield, CA 93309
(805) 395-2728

EL CENTRO AREA
(619) 353-3420
Write or Visit
San Diego District Office
110 West C Street, #1702
San Diego, CA 92101

FRESNO
1900 Mariposa Mall, #130
Fresno, CA 93721
(209) 445-5373

LOS ANGELES
322 West First Street, #2126
Los Angeles, CA 90012-3112
(213) 620-2610
TDD (213) 620-3109

OAKLAND
1330 Broadway, #1326
Oakland, CA 94612
(415) 464-4095

SACRAMENTO
2000 "O" Street, #120
Sacramento, CA 95814
(916) 445-9918
TDD (916) 324-1678

SAN BERNARDINO
1845 S. Business Center Drive, Suite 127
San Bernardino, CA 92408
(714) 383-4711

SAN DIEGO
110 West C Street, #1702
San Diego, CA 92101
(619) 237-7405

SAN FRANCISCO
30 Va[illegible]s Avenue, #3000
San Francisco, CA 94102
(415) 557-2005

SAN JOSE
111 N. Market Street, #810
San Jose, CA 95113
(408) 277-1264

SANTA ANA
28 Civic Center Plaza, #538
Santa Ana, CA 92701
(714) 558-4159

VENTURA
5720 Ralston Street, #302
Ventura, CA 93003
(805) 654-4513

This notice must be conspicuously posted in hiring offices, on employee bulletin boards, in employment agency waiting rooms, union halls, etc. For copies contact the nearest DFEH office.

DFEH 162 (Rev. 10/90)

APPENDIX D

ACTIVITY HAZARD ANALYSIS

NOTE: EACH ACTIVITY MUST BE REANALYZED FOR EACH DELIVERY ORDER

- **Mobilization/demobilization**
- **Site preparation**
- **Removal of Liquids/Sediments**
- **UXO Operations**
- **Trenching**
- **Excavation of Contaminated Materials**
- **Equipment Decontamination**
- **Soil/Water Sampling**

ACTIVITY HAZARD ANALYSIS
MOBILIZATION/DEMOBILIZATION

ANALYZED BY/DATE_____ REVIEWED BY/DATE_____

Principal Steps	Potential Hazards	Recommended Controls
Installation of office and support structures	Heavy lifting	Use proper lifting techniques. Lifts greater than 60 lbs. require assistance or mechanical equipment; size-up the load. Recommend wearing a back support if possible.
	Noise	Hearing protection is mandatory above 85 dBA.
	Falling objects	Hardhat, stay alert and clear of materials suspended overhead, steel-toed boots.
	Flying debris, dirt, dust etc.	~~Safety glasses/eye wash.~~ Wear eye protection.
	Pinch points	Keep hands and feet clear of moving/suspended materials and equipment.
		Stay alert at all times!
		Beware of contact points.
	Fire	Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition. (Size Specification.)
		Fire lanes providing access to all areas shall be established and maintained free of obstruction (the minimum space between one-story non-fire-resistant buildings shall be 20 feet). Initial survey of the suitability and effectiveness of fire prevention and protection measures and facilities at each installation shall be made by competent persons.
	High winds	Mobile/portable facilities shall be anchored to withstand high winds.
	Hot work	Refer to H&S Policy HS 314.
	Vehicle traffic	Pay attention at all times.
		Make sure that operators of vehicles know that you are near their equipment.
		A spotter will aid in the backing of all vehicles with poor rear visibility.

Principal Steps	Potential Hazards	Recommended Controls
Installation of office and support structures	Contact With Utilities	Above and underground utilities shall be located. A qualified person shall install required utilities in compliance with national, state, and local codes.
	Slip, trip, and fall hazards	Determine best access route before transporting equipment.
		Good housekeeping, keep work area picked up and clean as feasible. Continually inspect the work area for slip, trip, and fall hazards.
		Look before you step, ensure safe and secure footing.
	Cut hazards	Wear adequate hand protection.
	Biological hazards	Inspect work area carefully and avoid placing hands or feet into concealed areas.
		Be alert for bees, spiders, ticks, and snakes.
	Hazardous plants (poison oak prevalent), insects, snakes, etc. (biological)	Remove vegetation, identify hazardous plants, insects, etc.
	Flood potentials	Check meteorology/climatology of area; history of flooding
	Toilets (sanitary)	Chemical toilets provided in accordance with SHSP. (Section)
	Heat stress	Refer to SHSP. (Section)
	Fire	Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
		Fuel will be transported and stored in approved containers/cabinets.
	Contact with moving equipment/vehicles	Work area will be barricaded/demarcated.
	Hazard communications	Label all containers as to contents (fuel cans, etc.)
		Obtain Material Safety Data Sheets for materials brought on site.
	Cross contamination and contact with potentially contaminated materials	No Exclusion Zone activities are associated with this task.

Principal Steps	Potential Hazards	Recommended Controls
Installation of office and support structures	Strains and sprains	Use the proper tool for the job being performed.
		Get assistance if needed.
		Avoid twisting/turning while pulling on tools, materials, etc.
	Unattended worker	"Buddy system" visual contact will be maintained between personnel during site activities.
~~Mobilization of trailers~~	~~Driving over soft ground~~	~~Make initial visual check. Level ground with loader and spread gravel.~~
		Apply gravel if needed to prevent mud of standing water. Loader (if used for spreading or grading) must meet all safety requirements.
	Level/Blocking trailer, driving stakes (stabilization) anchoring	Use caution when jacking and placing blocks or cribbing. If ground is soft, add stone to secure footing.
	Setting steps in place.	Steps must be OSHA-approved (with proper handrails, midrail, steps, with a platform in front of door; Refer to USACE (Section 21.E 02, 05, 07, 08).
		Lighting for work and means of egress; electrical hookup to trailers to be made by qualified electrician. GFCIs required on all circuits.
	Clearing hazards	If clearing is necessary, tree cutting will comply with chainsaw equipment manufacturer's safety standards.
	Ventilation	Trailer ventilation shall not bring in exhaust from vehicles, etc.
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
• Hand tools ~~• PPE~~ • Heavy equipment • Vendor trucks	• Pre-post maintenance • Visual prior to use	• Tailgate Safety Meeting • Site specific orientation • Hazard communication

Principle Steps	Potential Hazards	Recommended Controls
Termination of contract agreement with subcontractor (Bio Genesis Enterprizes, Inc), has mandated a change from the original scope of work. Delivery Order 0009 will include the following phases: Transportation of PCB and lead contaminated soils to a TSTA facility to be constructed on the NAS-Alameda premises - (West of Site 15), and back-filling open excavations at Site 15.	Transportation of contaminated soils. Backfilling and site restoration	Equip decontamination Equip/vehicle operations Backfilling and site restoration Equip decontamination Mobilization / demobilazation

ACTIVITY HAZARD ANALYSIS
SITE PREPARATION

ANALYZED BY/DATE_____ REVIEWED BY/DATE_____

Activity	Potential Hazards	Recommended Controls
Placement/unloading of construction materials	Noise	Noise levels above 85 dBA mandates hearing protection.
	Slip, trip and fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip and fall hazards.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Beware of contact points.
		Stay alert at all times!
	Fire	Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Strains and sprains	Use proper lifting techniques, lifts greater than 60 lbs. require assistance or mechanical equipment. Size up the lift. Recommend wearing a back support if possible.
	Heavy equipment operations	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		All lockout-tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Machinery and mechanized equipment shall be operated only by designated personnel.
		Getting off or on any equipment while it is in motion is prohibited.

Activity	Potential Hazards	Recommended Controls
Placement/unloading of construction materials	Heavy equipment operations	Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
		All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.
		Bulldozer and scraper blades, end-loader buckets, and similar equipment will be either fully lowered or blocked when being repaired or when not in use.
	Ropes, slings, chains and hooks	The use of ropes, slings and chains shall be in accordance with the safe recommendations of their manufacturer.
		Rigging equipment shall not be loaded in excess of its recommended safe working load.
		The use of open hooks is prohibited in rigging to lift any load where there is danger of relieving the tension on the hook due to the load or hook catching or fouling.
		Hooks, shackles, rings, pad eyes and other fittings that show excessive wear or that have been bent, twisted or otherwise damaged shall be removed from service.
		Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during it use to insure that it is safe. Defective rigging equipment shall be removed from service.

Activity	Potential Hazards	Recommended Controls
Placement/unloading of construction materials	Ropes, slings, chains and hooks	Rigging equipment, when not in use, shall be removed from the immediate work area and properly stored so as not to present a hazard.
		Taglines shall be used to control the loads being handled by hoisting equipment.
	Hoisting equipment	All hoisting equipment shall be capable of passing a performance (operating) test prior to being placed into service.
Placement of building materials	Hoisting equipment	At no time shall the hoisting equipment be loaded in excess of the manufacturers rating.
		While hoisting equipment is in operation, the operator shall not perform any other work and he/she shall not leave his/her position at the controls until the load has been safely landed or returned to the ground.
		A standard signal system shall be used on all hoisting equipment.
Support Area Construction	Knife cuts	Cutting strokes will always be away from the body.
		Leather gloves will be worn when cutting.
		Place knife in sheath on holder when not in use.
		Unused knives will never be left with cutting edges exposed.
		Never use a knife that is defective or has a broken blade or handle.
		Never use a knife as a prybar or screwdriver.
		Don't use a dull blade; replace or have sharpened prior to use.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Stay alert at all times!
	Flying debris	Wear safety glasses at all times.
	Fire	A dry chemical fire extinguisher with a minimum UL rating of 5 A:B:C will be readily available.

Activity	Potential Hazards	Recommended Controls
Support Area Construction	Fire	No smoking or open flames within 50 ft. of the work area. (Work area will be posted)
		Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
		All hoses, couplings, fixtures, etc. shall be properly bonded and grounded.
		IT Corporation's HS314 "Hot Work in Hazardous Locations" Policy and Procedure shall be adhered to at all times.
	Fueling	Only UL/FM approved safety cans shall be used to store fuel.
		Do not refuel equipment while it is operating.
		Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Faulty or damaged equipment	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
	Electrical hand tools/electrocution	Preventive maintenance procedures recommended by the manufacturer shall be followed.
		A lockout-tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Ground fault circuit interrupters inspect extension cords, hand tool inspection, lockout-tagout procedure.
	Contact with glues, solvents, etc.	Be familiar with the materials you are working with (MSDSs)
	Noise	If noise levels exceed 85 dBA wear hearing protection.

Activity	Potential Hazards	Recommended Controls
Support Area Construction	Heavy lifting	Safe lifting procedures. Loads over 60 lbs require assistance or mechanical lifting device.
	Slip, trip and fall hazards	Good housekeeping
	Confined spaces	Follow policy and procedures for confined spaces.
	Excavation and trenching	Follow policy and procedures for safe trench excavation.
	Hot work	Hot work permits.
	Scaffolding	IT Policy and Procedure HS308 "Scaffolding" will be adhered to at all times.
		Scaffolds and their components will be capable of supporting without failure at least 4 times the maximum anticipated load.
		Scaffolds will be plumb and level.
		Scaffolds will bear on base plates upon sills of other adequate foundation.
		Working levels of work platforms will be fully planked or decked.
		All planking of platforms will be either overlapped a minimum of 12 inches or secured from movement.
		Scaffold planks will extend over their end supports not less than 6 inches nor more than 18 inches.
		Planking on scaffolds will extend from the toeboard to not more than 14 inches from the face of the structure unless standard guardrails are installed or personal fall protection systems are used.
		Planking will be supported or braced to prevent excessive spring or deflection; secured and supported to prevent loosening, tipping, or displacement.
		Work platforms will be securely fastened to the scaffold.
		An access ladder or equivalent safe access will be provided.
		Climbing of braces is prohibited.

Activity	Potential Hazards	Recommended Controls
Support Area Construction	Scaffolding	When the scaffold height exceeds 4 times the minimum scaffold base dimension (including the width added by outriggers) the scaffold will be secured to the structure.
		Sections of metal scaffold will be securely connected and all braces will be securely fastened.
		Scaffolds will be properly braced by cross, horizontal, or diagonal braces or a combination of these braces, so that vertical members are securely together laterally and the cross braces will be of such a length so that they will automatically square and align vertical members so that the erected scaffold is always plumb, square, and rigid.
		Frames will be placed one on top of the other with coupling or stacking pins to provide vertical alignment of the legs.
		If uplift may occur, panels will be locked together vertically by pins or equivalent means.
Welding and Cutting	U.V. light and fire	Utilize appropriate eye protection. Provide fire watch. Obtain hot work permit. Torches must have anti-flashback device.
	Pressurized cylinders	Properly store and secure compressed gas cylinders.
Handling sharp objects	Cuts	Wear appropriate hand protection.
Grinding/sawing	Flying particles	Proper eye protection.
Working on elevated heights	Falls	Lanyards, lifelines, and ladder/scaffolding safety.
	Falling objects	Overhead protection hardhats.
Material storage	Flammable and combustible liquids	Store in NO SMOKING AREA and 50 ft. from combustible construction materials.
		Fire extinguisher readily available.
		Properly grounded and bonded.
	Round stock	Secure from rolling, work from the top of the stack.
	Slip, trip and fall hazards	Good housekeeping

Activity	Potential Hazards	Recommended Controls
Material Storage	Sprains and strains	Safe lifting procedures
	Pinch points/cuts	Adequate hand protection and observation of contact points.
	Hazard communication	Proper labeling/MSDSs.
Application of sealants	Pinch points	Beware of contact points.
		Keep hands, fingers, and feet clear of moving parts.
		Stay alert at all times!
	Cut hazards	Wear adequate hand protection.
	Noise	Noise levels above 85 dBA mandate hearing protection.
	Heavy lifting	Any lifting over 60 lbs. requires assistance or the use of a mechanical lifting device.
	Moving equipment	Signal person will assist in positioning equipment.
		Signal person will wear a reflective vest for high visibility.
	Contact with sealants	Personnel will wear adequate protective clothing and equipment to protect themselves against contact with sealant.
		MSDS's of all sealant materials will be obtained and reviewed with applicable personnel.
Material Hauling	Dump truck operations	Dump truck bodies shall be fully lowered or blocked when maintenance is being performed or when not in use.
		Dump trucks will have back-up alarms.
		A signal person will be used when the point of operation is not in full view of the vehicle, machine or equipment operator; vehicles are backed more than 100 ft; terrain is hazardous; or 2 or more vehicles are backing in the same area.
		Dump trucks will not be loaded in a manner that obscures the operator's view ahead or to either side or that interferes with the safe operation of the vehicle.

Activity	Potential Hazards	Recommended Controls
Material Hauling	Dump truck operations	The load on every truck will be distributed, checked, tied down, or secured.
		Loads will be covered when there is a hazard of flying/falling dirt, rock, debris, or material.
		All dump trucks will be equipped with a holding device to prevent accidental lowering of the body.
		All hoist levers will be secured to prevent accidental starting or tripping of the mechanism.
		Trip handles for tailgates will be arranged to keep the operator in the clear.
Falling trees	Dropping trees onto personnel	Only qualified personnel will drop trees.
		The work area shall be cleared to permit safe working conditions and an escape route planned before any cutting is started.
		Just before the tree or limb is ready to fall an audible warning shall be given to those in the area. All personnel in the vicinity shall be safely out of range.
		Employees shall work from the uphil side whenever possible.
		Prior to falling operations, the surrounding area, the shape of the tree, the lean of the tree, wind force anddirection, and the location of other employees will be reviewed.
	Chainsaw operations	The chainsaw will not be fueled while running, when not, or near open flame. The saw will not be started within 10 ft. of a fuel container.
		The operator will hold the saw with both hands during all cutting operations.
		Operators must wear eye, ear, hand, foot and leg protection.
		The chainsaw must never be used to cut above the operator's shoulder height.

Activity	Potential Hazards	Recommended Controls
Falling trees	Chainsaw operations	The idle speed will be adjusted so that the chain does not move when the engine is idle.
		The operator will shut off the saw when carrying it over slippery surfaces, through heavy brush, and when adjacent to personnel.
		All chainsaws on-site shall have an automatic cnain brake or kick back device.
Clearing brush and debris	Slip, trip and fall hazards	Individuals must survey the terrain and look before stepping.
	Sharp objects	Individuals must be alert to sharp objects that may be lying under brush. Metal inserts may be used inside boots to make them puncture resistant.
	Poisonous plants, snakes and insects (poison oak prevalent)	Individuals must be aware of the potential for these hazards to be present. Precautionary measures to be taken will be addressed in daily tailgate safety meetings.
	Use of machetes.	Keep other personnel clear of swing area. Us extreme caution when using.
	Heavy lifting.	Use proper lifting techniques. Lifts greater than 60 lbs. require assistance or mechcanical equipment; size up the lift. Recommend wearing a back support if possible.
	Pinch points	Keep hands, fingers and feet clear of moving/suspended materials and equipment.
	Falling objects	Hardhat, stay alert and clear of materials suspended overhead; steel-toed boots.
	Flying debris, dirt, dust, etc.	Safety glasses/eye wash.
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
• Heavy equipment • Liner material • Fencing • PPE • Dump trucks • Hand tools	• Pre-postmaintenance • Visual prior to use	• Tailgate Safety Meeting • Site specific orientation • Hazardous waste operations • Hazard communication • Lead Control Plan • UXO Training

ACTIVITY HAZARD ANALYSIS
REMOVAL OF LIQUIDS/SEDIMENTS

ANALYZED BY/DATE_____ REVIEWED BY/DATE_____

Activity	Potential Hazards	Recommended Controls
Placement/unloading of materials	Noise	Noise levels above 85 dBA mandates hearing protection.
	Slip, trip and fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip and fall hazards.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Beware of contact points.
		Stay alert at all times!
	Strains and sprains	Use proper lifting techniques, lifts greater than 60 lbs. require assistance or mechanical equipment. Size up the lift. Recommend wearing a back support if possible.
	Heavy equipment operations	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		All lockout-tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Machinery and mechanized equipment shall be operated only by designated personnel.
		Getting off or on any equipment while it is in motion is prohibited.
		Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.

Activity	Potential Hazards	Recommended Controls
Placement/unloading of materials	Heavy equipment operations	All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.
		Bulldozer and scraper blades, end-loader buckets, and similar equipment will be either fully lowered or blocked when being repaired or when not in use.
	Ropes, slings, chains and hooks	The use of ropes, slings and chains shall be in accordance with the safe recommendations of their manufacturer.
		Rigging equipment shall not be loaded in excess of its recommended safe working load.
		The use of open hooks is prohibited in rigging to lift any load where there is danger of relieving the tension on the hook due to the load or hook catching or fouling.
		Hooks, shackles, rings, pad eyes and other fittings that show excessive wear or that have been bent, twisted or otherwise damaged shall be removed from service.
		Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during it use to insure that it is safe. Defective rigging equipment shall be removed from service.
		Rigging equipment, when not in use, shall be removed from the immediate work area and properly stored so as not to present a hazard.
		Taglines shall be used to control the loads being handled by hoisting equipment.
		All hoisting equipment shall be capable of passing a performance (operating) test prior to being placed into service.
	Hoisting equipment	At no time shall the hoisting equipment be loaded in excess of the manufacturers rating.
		While hoisting equipment is in operation, the operator shall not perform any other work and he/she shall not leave his/her position at the controls until the load has been safely landed or returned to the ground.

Activity	Potential Hazards	Recommended Controls
Placement/unloading of materials	Hoisting equipment	A standard signal system shall be used on all hoisting equipment.
Removal of Liquids/Sediments	Fire	A dry chemical fire extinguisher with a minimum UL rating of 5 A:B:C will be readily available.
		No smoking or open flames within 50 ft. of the work area. (Work area will be posted)
		Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
		All hoses, couplings, fixtures, etc. shall be properly bonded and grounded.
		IT Corporation's HS314 "Hot Work in Hazardous Locations" Policy and Procedure shall be adhered to at all times.
	Fueling	Only UL/FM approved safety cans shall be used to store fuel.
		Do not refuel equipment while it is operating.
		Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Faulty or damaged equipment	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
	Fall hazard	No employee will be exposed to a fall of over 6 feet without being adequately protected. See section ▒▒▒ of SHSP.
	Contact with blood borne pathogens	Adhere to HS512 "Handling of blood or other potentially infectious material"
	Contact with potentially contaminated materials	Real-time air monitoring will take place. Proper personal protective clothing and equipment will be utilized.
		Good housekeeping will be stressed to safe guard against cross contamination of surrounding areas and eliminate safety hazards.

Activity	Potential Hazards	Recommended Controls
Removal of Liquids/Sediments	Contact with potentially contaminated materials	All site personnel will practice good personal hygiene.
		They work area will be demarcated. All unnecessary personnel will be kept out of the work area and in an upwind location.
		Refer to Section ▒ of SHSP for chemical hazard discussion.
Pumping Liquids	Faulty Equipment	Equipment will be inspected prior to being placed into service and at the beginning of each shift.
	Pressurized systems	All discharge hoses and connections shall be routinely inspected.
	Noise	A dry chemical fire extinguisher with a minimum UL rating of 5:A:B:C will be readily available.
	Refueling	Proper bonding and grounding. Only UL/FM approved safety cans will be used.
Confined Spaces	Various	Adhere to HS300 "Confined Spaces."

Equipment to be Used	Inspection Requirements	Training Requirements
Pumps Piping Hand Tools Vacuum Truck	• Pre-post maintenance • Visual prior to use	• Tailgate safety meeting • Site-specific orientation • Hazardous waste operations • Hazard communication

ACTIVITY HAZARD ANALYSIS
UXO OPERATIONS

ANALYZED BY/DATE_____ REVIEWED BY/DATE_____

Activity	Potential Hazards	Recommended Controls
UXO and surface clearance	Accidental detonation Misidentification	Work areas will be cleared by UXO specialists personnel prior to starting work
Using earthmoving machinery [EMM]		Do not use EMM within 12 inches of a potential subsurface UXO
		Hand excavation shall be used within 12 inches of a potential subsurface UXO
		Hand excavation will be accomplished only by UXO personnel
		Only excavation necessary to identify the UXO will be accomplished.
		If more than one EMM is used on the same site, they will be separated by at least 100M during excavation.
		Multiple search teams will be separate by a minimum of 50M
		Minimize personnel exposure
		Render positive identification
		Observe UXO safety precautions contained in USACE-Huntsville Division safety concepts and basic considerations for UXO operations
		Attempt to estimate location of buried UXO
		No attempt will be made to move UXO. USACE UXO experts will be notified to handle UXO destruction activities.
		All personnel in vicinity of EMM will wear hearing protection.

Activity	Potential Hazards	Recommended Controls
Using earthmoving machinery [EMM]		All personnel working in close vicinity of EMM will wear proper head protection.
Subsurface ordnance quarrying by hand digging	Accidental detonation Misidentification	Do not use earthmoving machinery (EMM) within 12 inches of a subsurface UXO
		Hand excavation will be used within 12 inches of a subsurface UXO
		Use magnetometers
		Excavation and trenching will comply with H&S307 Procedure
Removal of UXO scrap metal, certified inert ordnance, and transport	Sharp jagged metal Heavy lifting	Wear protective equipment when handling scrap metal; gloves, protective head gear, steel shank toed boots
		Wear appropriate PPE
General UXO Activities	Numerous	All site UXO operations will adhere with the USACE-Huntsville Division Safety Concepts and Basic Considerations for UXO operations
Equipment to be Used	Inspection Requirements	Training Requirements
• Hand tools • PPE • Heavy equipment • Ordnance locator	• Pre-postmaintenance • Visual prior to use	• Tailgate Safety Meeting • Site specific orientation • Hazardous waste operations • Hazard communication • Lead Control Plan (if applicable) • UXO Training

ACTIVITY HAZARD ANALYSIS
TRENCHING

ANALYZED BY/DATE_____ REVIEWED BY/DATE_____

Principal Steps	Potential Hazards	Recommended Controls
Excavate trench	Underground utilities	All underground utilities will be located prior to excavating.
	Open trenches	IT Policy and Procedure HS307-"Excavation and Trenching" will be adhered to at all times.
	Contact with potentially contaminated materials	Real time air monitoring will take place. If necessary proper personal protective clothing and equipment will be utilized.
	Noise	Noise levels above 85 dBA mandates hearing protection.
	Equipment operations	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in a safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventative maintenance procedures recommended by the manufacturer shall be followed.
		A lockout-tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Machinery and mechanized equipment shall be operated only be designated personnel.
		Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.

Principal Steps	Potential Hazards	Recommended Controls
Excavate trench	Equipment operations	All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.
	Fire	A dry chemical fire extinguisher will be readily available.
	Pinch points	Keep hands, fingers, and feet clear of moving parts.
	Heavy lifting	Any lifting over 60 lbs. requires assistance or the use of a mechanical lifting device.
	Slip, trip, fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip, and fall hazards. Look where you step, ensure safe footing.
	Cut hazards	Wear adequate hand protection.
	Traffic	Work area will be barricaded off.
		Personnel will wear reflective vests for high visibility.
	Hazard communication	Obtain MSDs for materials used on site. Label all containers as to contents.
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
Heavy Equipment Shoring Devices	• Pre-post maintenance • Visual prior to use	• Tailgate safety meeting • Site specific orientation • Hazardous waste operations • Hazard communication • Lead Control Plan (if applicable) • Excavation safety

ACTIVITY HAZARD ANALYSIS
EXCAVATION OF CONTAMINATED MATERIALS

ANALYZED BY/DATE_____ REVIEWED BY/DATE_____

Activity	Potential Hazards	Recommended Controls
Excavation	Underground utilities	All underground utilities will be located prior to excavating.
	Open excavations	IT Policy and Procedure HS307 - "Excavation and Trenching" will be adhered to at all times.
	Confined spaces	IT Policy and Procedure HS 300 - "Confined Spaces" will be adhered to at all times.
	Noise	Noise levels above 85 dBA mandates hearing protection.
	Heavy equipment operations	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		A lockout - tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Machinery and mechanized equipment shall be operated only by designated personnel.
		Getting off or on any equipment while it is in motion is prohibited.
		Machinery or equipment requiring an operator shall not be permitted to run unattended.
	Contact with overhead power lines	See distances

Activity	Potential Hazards	Recommended Controls
Excavation	Heavy equipment operations	Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
		All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.
		Bulldozer and scraper blades, end-loader buckets, and similar equipment will be either fully lowered or blocked when being repaired or when not in use.
		All self-propelled construction equipment shall be equipped with a back-up alarm.
	Fire	Each bulldozer, backhoe, or other similar equipment will be equipped with at least one dry chemical fire extinguisher having a minimum UL rating of 5 A:B:C.
	Contact with potentially contaminated materials	Real-time air monitoring will take place. Proper personal protective clothing and equipment will be utilized.
		Good housekeeping will be stressed to safe guard against cross contamination of surrounding areas and eliminate safety hazards.
		All site personnel will practice good personal hygiene.
		The work area will be demarcated. All unnecessary personnel will be kept out of the work area and in an upwind location.
		Refer to SHSP for chemical hazard discussion.
	Noise	Noise levels above 85 dBA mandates hearing protection.

Activity	Potential Hazards	Recommended Controls
Excavation	Slip, trip and fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip and fall hazards.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Beware of contact points.
		Stay alert at all times!
	Strains and sprains	Use proper lifting techniques, lifts greater than 60 lbs. requires assistance or mechanical equipment; size up the lift. Recommend wearing a back support if possible.
Material hauling	Dump truck operations	Dump truck bodies shall be fully lowered or blocked when maintenance is being performed or when not in use.
		Dump trucks will have back-up alarms.
		A signal person will be used when the point of operation is not in full view of the vehicle, machine or equipment operator; vehicles are backed more than 100 ft; terrain is hazardous; or 2 or more vehicles are backing in the same area.
		Dump trucks will not be loaded in a manner that obscures the operator's view ahead or to either side or that interferes with the safe operation of the vehicle.
		The load on every truck will be distributed, checked, tied down, or secured.
		Loads will be covered when there is a hazard of flying/falling dirt, rock, debris, or material.
		All dump trucks will be equipped with a holding device to prevent accidental lowering of the body.
		All hoist levers will be secured to prevent accidental starting or tripping of the mechanism.

Activity	Potential Hazards	Recommended Controls
Material hauling	Dump truck operations	Trip handles for tailgates will be arranged to keep the operator in the clear.
Equipment to be Used	Inspection Requirements	Training Requirements
• Hand tools • PPE • Heavy equipment • Dump trucks	• Pre-postmaintenance • Visual prior to use	• Tailgate Safety Meeting • Site specific orientation • Hazardous waste operations • Hazard communication • Lead Control Plan • UXO Training

ACTIVITY HAZARD ANALYSIS
EQUIPMENT DECONTAMINATION

ANALYZED BY/DATE_____ REVIEWED BY/DATE_____

Activity	Potential Hazards	Recommended Controls
Job setup for decontamination of equipment	Heavy lifting	Use proper lifting techniques. Lifts greater than 60 lbs. require assistance or mechanical equipment; size-up the lift. Recommend wearing a back support if possible.
	Slip, trip and fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip and fall hazards.
	Cut hazards	Wear adequate hand protection.
	Lighting	Adequate lighting will be provided to ensure a safe working environment.
	Strains/sprains	When pulling or lifting, do not turn or twist your back.
		Use the proper tool for the task being performed.
	Contact with potentially contaminated materials	Appropriate PPE protection will be required.
		Real time air monitoring will take place during decontamination activities.
		Keep airborne particulates to a minimum.
		Practice good housekeeping, avoid spreading potentially contaminated materials.
	Fueling	Only UL/FM approved safety cans shall be used to store fuel.
		Do not refuel equipment while it is operating.
		Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.

Activity	Potential Hazards	Recommended Controls
Job setup for decontamination of equipment	Faulty or damaged equipment	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.
		Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		A lockout - tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
Pressure washing equipment	High pressures	IT Policy and Procedure HS303 "Hydroblasting" shall be adhered to at all times.
	Unqualified operators	Machinery and mechanized equipment shall be operated only by designated personnel.
	Out of control equipment	Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
	Noise	Sound levels above 85 dBA mandates hearing protection.
	Activation during repairs	All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Stay alert at all times!
	Falling objects	Hardhats, remove unsecured tools and materials before operating equipment.

Activity	Potential Hazards	Recommended Controls
Pressure washing equipment	Falling objects	Stay alert and clear of materials suspended overhead.
	Flying debris	Splash shield will be used.
	Contact with potentially contaminated materials	Appropriate PPE will be required.
	Hot work (hot water/steam cleaning)	IT Policy and Procedure HS314 "Hot Work in Hazardous Locations" will be adhered to at all times during any operations involving hot work.
Stage-setup equipment for pumping liquids	Pinch points	Keep hands, fingers, and feet clear of moving parts.
	Heavy lifting	Any lifting over 60 lbs requires assistance or the use of a mechanical lifting device.
	Moving equipment	Signal person will assist in positioning equipment.
	Contact with potentially contaminated materials	Real time air monitoring will take place. Appropriate PPE protection will be required.
Pumping liquids	Faulty equipment	Equipment will be inspected prior to being placed into service and at the beginning of each shift.
	Pressurized systems	All discharge hoses and connections shall be routinely inspected.
	Noise	Sound levels above 85 dBA mandates hearing protection.
	Fire	A dry chemical fire extinguisher with a minimum UL rating of 5 A:B:C will be readily available.
	Refueling	Proper bonding and grounding. Only UL/FM approved safety cans will be used.
Loadout of equipment	Noise	Noise levels above 85 dBA mandates hearing protection.
	Heavy equipment operations	Before any machinery or mechanized equipment is placed into service, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition.

Activity	Potential Hazards	Recommended Controls
Loadout of equipment	Heavy equipment operations	Equipment shall be inspected before being placed into service and at the beginning of each shift.
		Preventive maintenance procedures recommended by the manufacturer shall be followed.
		A lockout - tagout procedure shall be used for equipment found to be faulty or undergoing maintenance.
		Machinery and mechanized equipment shall be operated only by designated personnel.
		Getting on or off any equipment while it is in motion is prohibited.
		Machinery or equipment requiring an operator shall not be permitted to run unattended.
		Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
		All machinery or equipment will be shutdown and positive means taken to prevent its operation while repairs or manual lubrications are being done.
		All repairs on machinery or equipment will be made at a location which provides protection from traffic for repair persons.
		All self-propelled construction equipment shall be equipped with a back-up alarm.
	Fire	Each bulldozer, backhoe, or other similar equipment will be equipped with at least one dry chemical fire extinguisher having a minimum UL rating of 5 A:B:C.
Loadout of equipment	Truck and Equipment Traffic	Site personnel will wear orange safety vests to identify themselves to traffic.
		Load out area will be properly demarcated.

Activity	Potential Hazards	Recommended Controls
Loadout of equipment	Slip, trip and fall hazards	Good housekeeping, keep work area picked up and as clean as feasible. Continually inspect the work area for slip, trip, and fall hazards. Look where you step, ensure safe footing when climbing on/off equipment etc.
	Pinch points	Keep feet and hands clear of moving/suspended materials and equipment.
		Beware of contact points. Stay alert at all times!
	Strains/sprains	Use proper lifting techniques. Lifts greater than 60 lbs require assistance or mechanical equipment. Size-up the lift. Recommend wearing a back support if possible. When pulling on materials, pull in a straight line. Do not twist and pull simultaneously.
	Ropes, slings, chains, and hooks	The use of ropes, slings, and chains shall be in accordance with the safe recommendations of their manufacturer.
		Rigging equipment shall not be loaded in excess of its recommended safe working load.
		The use of open hooks is prohibited in rigging to lift any load where there is danger of relieving the tension on the hook due to the load or hook catching or fouling.
		Hooks, shackles, rings, pad eyes, and other fittings that show excessive wear or that have been bent, twisted, or otherwise damaged shall be removed from service.
		Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to insure that it is safe. Defective rigging equipment shall be removed from service.

Activity	Potential Hazards	Recommended Controls
Loadout of equipment	Ropes, slings, chains and hooks	Rigging equipment, when not is use, shall be removed from the immediate work area and properly stored so as not to present a hazard.
		Taglines shall be used to control the loads being handled by hoisting equipment.
	Hoisting Equipment	All hoisting equipment shall be capable of passing a performance (operating) test prior to being placed into service.
		At no time shall the hoisting equipment be loaded in excess of the manufacturers rating except during performance tests.
		While hoisting equipment is in operation, the operator shall not perform any other work and he/she shall not leave his/her position at the controls until the load has been safely landed or returned to the ground.
		A standard signal system shall be used on all hoisting equipment.
	Heat	Be aware of warning signs of these conditions
	Bees, spiders, and snakes	Inspect work area carefully and avoid placing hands and feet into concealed areas.
	Cut hazards	Wear adequate hand protection.
	Falling objects	Hardhat, stay alert and clear of materials suspended overhead, steel-toed boots.
Equipment to be Used	Inspection Requirements	Training Requirements
• Hand tools • PPE • Heavy equipment • Pressure Washer	• Pre-postmaintenance • Visual prior to use	• Tailgate Safety Meeting • Site specific orientation • Hazardous waste operations • Hazard communication • Lead Control Plan

ACTIVITY HAZARD ANALYSIS
SOIL/WATER SAMPLING

ANALYZED BY/DATE_____ REVIEWED BY/DATE_____

Activity	Potential Hazards	Recommended Controls
Staging equipment	Slip, trip and fall hazards	Determine best access route before transporting equipment.
		Good housekeeping, keep work area picked up and clean as feasible. Continually inspect the work area for slip, trip and fall hazards.
		Look before you step, insure safe and secure footing.
	Heavy lifting	Use proper lifting techniques. Lifts greater than 60 lbs. require assistance or mechanical equipment; size-up the lift. Recommend wearing a back support if possible.
	Falling objects	Stay alert and clear of materials suspended overhead. Use steel-toed boots and hard hat.
	Flying debris, dirt, dust etc.	Use safety glasses/goggles. Ensure that eye wash is in good working order.
	Pinch points	Keep hands, fingers, and feet clear of moving/suspended materials and equipment.
		Beware of contact points.
		Stay alert at all times!
	Bees, spiders and snakes	Inspect work area carefully and avoid placing hands and feet into concealed areas.
	Cut hazards	Wear adequate hand protection. Use care when handling glassware.
	Fire	Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Fire/chemical exposure	All solvents will be transported in UL/FM approved containers and sources of ignition will be prohibited.
		Initial real time air monitoring will take place.

Activity	Potential Hazards	Recommended Controls
Staging Equipment	Contact with moving equipment/vehicles	Work area will be barricaded/demarcated.
	Work in excavations	IT Policy and Procedure HS 307 - "Excavation and Trenching" will be adhered to at all times.
	Contact with moving equipment/vehicles	Equipment will be laid out in an area free of traffic flow.
	Hazard communication	Label all containers as to contents and dispose of properly.
		Obtain Material Safety Data Sheets for solvents, etc. that are being used.
	Noise	Sound levels above 85 dBA mandates hearing protection.
Sample Collection	Working at elevated heights/falls	Ladders will be secured by top, bottom, and intermediate fastenings as required.
		Personnel working at heights of 6 feet or more must be secured with fall protection (safety belt/lanyard).
	Electrical shock	All electrical circuits will be deenergized and locked out.
	Bees, spiders and snakes	Inspect work areas carefully and avoid placing hands and feet into concealed areas.
	Cross-contamination and contact with potentially contaminated materials	Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.
		Only essential personnel will be in the work area.
		Initial real-time air monitoring will take place before and during sampling activities.
		All personnel will follow good hygiene practices.
		Proper decontamination procedures will be followed.
		All liquids and materials used for decontamination will be contained and disposed of in accordance with Federal, State and Local regulations.
	Cut hazards	Use care when handling glassware.
		Wear adequate hand protection.

Activity	Potential Hazards	Recommended Controls
Sample Collection	Hazard communication	Label all containers as to contents.
	Strains/sprains	Use the proper tool for the job being performed.
		Get assistance if needed.
		Avoid twisting/turning while pulling on tools, grates, manway covers, etc.
	Spills/residual materials	Absorbent material and containers will be kept available where leaks or spills may occur.
	Lighting	Adequate lighting will be provided to insure a safe working environment.
	Unattended worker	"Buddy System" - visual contact will be maintained with the sampling technician during sampling activities.
	Confined spaces	IT Policy and Procedure HS300 - "Confined Spaces" will be adhered to at all times.
	Contact with potentially contaminated materials	Real-time air monitoring will take place. Appropriate PPE will be utilized.
		Good housekeeping will be stressed to safeguard against cross contamination of nearby areas and eliminate safety hazards.
		All site personnel will practice good personal hygiene by utilizing the decon facility on site.
		The work area will be demarcated. All unnecessary personnel will be kept out of the work area and in an upwind location.
		IT Policy and Procedure HS601 - "Respiratory Protective Devices" will be adhered to at all times.
		Maintain MSDS's for any preservatives such as HCl acid. Follow protection procedures.
Equipment decontamination	Chemical exposure	Maintain MSDS's for all chemicals such as methanol or hexane and follow protection procedures.
On-site sample analysis	Various	On-site laboratory will develop and adhere to a site specific chemical hygiene plan (CHP). The CHP will be submitted to the Program CIH for review and acceptance.