Disposition of Investigation-Derived Waste at the Former Plum Brook Ordnance Works Sandusky, Ohio

Includes:

Field Work Plan
Safety and Health Plan

Prepared by:

IT Corporation
312 Directors Drive
Knoxville, Tennessee 37923

Submitted to:

Commander
U.S.Army Corps of Engineers
Nashville District
Post Office Box 1070
Nashville, Tennessee 37202-1070

December 1995

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Former Plum Brook Ordnance Works
Sandusky, Ohio

I have read and approve this site safety and health plan with respect to project hazards, regulatory requirements, and IT procedures.

Don C Burton

Don Burton, PE
Project Manager

12/21/95
Date

Melissa G Smith

Melissa G. Smith, CIH
Health and Safety Manager

12/21/95
Date

Site Safety and Health Plan
Acknowledgement Form

I have been informed of, and will abide by the procedures set forth, in this safety and health plan and its amendments for the activities at the former Plum Brook Ordnance Works, Sandusky, Ohio.

Printed Name	***Signature***	***Representing***	***Date***

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List of Acronyms

AIDS	Acquired Immune Deficiency Syndrome
CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
CRZ	contamination reduction zone
dBA	decibels
°C	degrees Celsius
°F	degrees Fahrenheit
DNT	dinitrotoluene
DOL	U.S. Department of Labor
EPA	U.S. Environmental Protection Agency
H&S	health and safety
HBV	hepatitis B virus
HIV	human immunodeficiency virus
IDW	investigation-derived waste
IT	IT Corporation
MCL	maximum contaminant levels
NASA	National Aeronautics and Space Administration
NIOSH	National Institute of Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
PBOW	Plum Brook Ordnance Works
PEL	permissible exposure limit
PM	project manager
PPE	personal protective equipment
RBC	risk-based concentrations
SEIR	Supervisor's Employee Injury Report
SSHO	site safety and health officer
SSHP	site safety and health plan
TNT	trinitrotoluene
USACE	U.S. Army Corps of Engineers

1.0 Introduction

1.1 Objectives

The Nashville District, U.S. Army Corps of Engineers (USACE-Nashville) has retained IT Corporation (IT) to dispose of investigation-derived waste (IDW) generated during the most recent investigative activities at the former Plum Brook Ordnance Works (PBOW) in Sandusky, Ohio. The drums are stored at two locations within PBOW: the drum staging area west of the Reactor Facility and in Igloo 9155. This site safety and health plan (SSHP) is being prepared in support of the activities.

This SSHP establishes the work practices necessary to ensure the protection of IT personnel during field activities.

The objective of this plan is to provide a mechanism for the establishment of safe working conditions at the site. The safety organization and health and safety (H&S) procedures have been established following an analysis of potential hazards at the site. Specific hazard control methodologies have been evaluated and selected in an effort to minimize the potential of accident or injury.

All site operations will be performed in accordance with applicable state, local, and IT corporate regulations and procedures, Occupational Safety and Health Administration (OSHA) requirements, and USACE guidelines contained within EM385-1-1. All IT employees and IT subcontractors must comply with the requirements of this plan.

1.2 Facility and Location Description

The former PBOW is located approximately 4 miles south of Sandusky, Ohio and is specifically located in the Perkins, Milan, Huron, and Oxford Townships. The site is bounded on the north by Bogart Road, on the south by Mason Road, on the east by U.S. Highway 250, and on the west by County Road 43 (Figure 1-1). The former PBOW site is consisted of approximately 9,000 acres and lies in an area that is primarily rural and agricultural with low population density. National Aeronautics and Space Administration (NASA) currently owns 6,400 acres of the original site.

Previous activities conducted at the site in the early 1940s included manufacturing trinitrotoluene (TNT), dinitrotoluene (DNT), pentolite, nitric acid, and sulfuric acid. In 1945,

manufacturing operations ceased and decontamination of TNT, acid, pentolite, and DNT manufacturing lines were completed. NASA acquired PBOW in 1963 and is presently using the site to conduct space research. Over the years several thousand acres of the origional PBOW have been sold off by NASA. The details of these sales are listed in the Site Management Plan and can be found at the NASA PBS.

Currently, a total of 241 55-gallon drums of IDW and several wooden core boxes are stored at the site. The IDW includes well development water, purge water, decontamination water, soil cuttings from soil borings and monitoring well borings, rock core from the installation of monitoring wells, used sampling equipment, and disposable personal protective equipment (PPE).

1.3 Policy Statement

It is IT's policy to provide a safe and healthful work environment for all its employees. IT considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts. IT believes every accident and every injury is preventable, and will take every reasonable step to reduce the possibility of injury, illness, or accident.

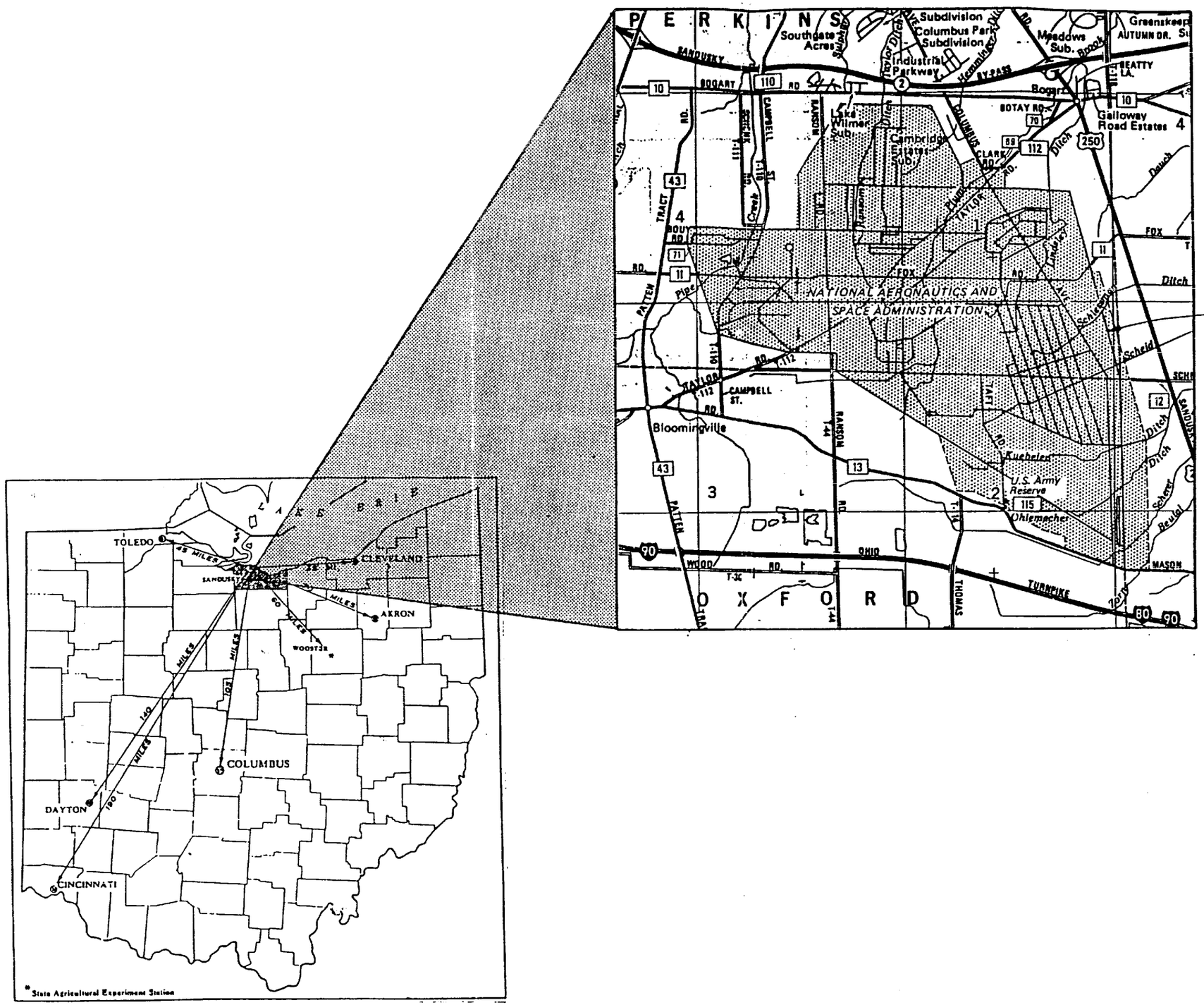
This SSHP prescribes the procedures that must be followed during the activities at PBOW. Operational changes that could affect the H&S of personnel, the community, or the environment will not be made without the prior approval of the USACE, the IT PM, and the IT H&S manager.

The provisions of this plan 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 the plan.

1.4 References

This SSHP complies with applicable OSHA and U.S. Environmental Protection Agency (EPA) regulations. This plan follows the guidelines established in the following:

- *Standard Operating Safety Guidelines* (EPA, November 1984)
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (National Institute of Occupational Safety and Health [NIOSH] 86-116)



FORMER PLUM BROOK ORDNANCE WORKS BOUNDARY

FIGURE 1-1
VICINITY MAP

FORMER PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO

INTERNATIONAL TECHNOLOGY CORPORATION

STARTING DATE: 4-26-89	INITIATOR: D. BURTON	DATE LAST REV.: 2-27-90	DRAWING NO.: 409658-B-WP08
DRAWN BY: S. MOORE	PROJ. MGR.: D. BURTON	DRAWN BY: P.L. SUAREZ	PROJECT NO.: 409658

BRUNING 72425

KD00834

- Title 29 of the Code of Federal Regulations (CFR), Part 1910.120, U.S. Department of Labor (DOL)/OSHA

- Title 29 of the CFR, Part 1926.65, DOL/OSHA.

The contents of this plan are consistent with the IT H&S policies and procedures.

2.0 Responsibilities

2.1 All Personnel

Each person is responsible for his safety and that of his coworkers, for completing tasks in a safe manner, and reporting any unsafe acts or conditions to his supervisor. All personnel are responsible for continuous adherence to these H&S procedures during the performance of their work. No person may work in a manner that conflicts with the safety and environmental precautions expressed in this SSHP. After due warnings, IT will dismiss from the site any person who violates safety procedures. IT's employees are subject to progressive discipline and may be terminated for blatant or continued violations. All on-site personnel will be trained in accordance with 29 CFR 1910.120, 29 CFR 1926.65, and this document.

2.2 Project Manager: Don Burton

The PM, Don Burton, is ultimately responsible for ensuring that all project activities are completed in accordance with requirements set forth in this plan. The PM must coordinate at least one on-site safety review during the project. He is responsible for ensuring all accidents and incidents on the project are reported and thoroughly investigated. The PM must approve in writing any addenda or modifications of the SSHP.

2.3 Health & Safety Manager: Melissa G. Smith

The H&S manager for this project, Melissa G. Smith, is responsible for developing and coordinating the SSHP and addenda as required. This plan complies with 29 CFR 1910.120 and 29 CFR 1926.65 in all respects and includes medical surveillance and training requirements, hazard assessment, PPE specifications, field implementation procedures, and audits. The H&S manager is the contact for regulatory agencies on matters of safety and health. Other H&S manager responsibilities include:

- Administering general H&S program
- Determining the level of personnel protection required
- Updating equipment or procedures based on information obtained during site operations
- Establishing air monitoring parameters based on expected contaminants
- Establishing employee exposure monitoring notification programs

- Investigating significant accidents and illnesses and implementing corrective action plans

- Performing regular site inspections

- Developing site-specific employee/community emergency response plans as required based on expected hazards.

2.4 Site Safety and Health Officer: George Yu

The site safety and health officer (SSHO) has the ultimate responsibility to stop any operation that threatens the health and safety of the team or surrounding populace, or that causes significant adverse impact to the environment. Other responsibilities include, but are not limited to:

- Implementing all safety procedures and operations on site

- Observing work crew members for symptoms of on-site exposure or stress

- Upgrading or downgrading, in coordination with the H&S manager and the PM, the levels of personal protection based upon site observations and monitoring results

- Informing the project H&S manager of significant changes in the site environment that require equipment or procedure changes

- Arranging for the availability of first aid and on-site emergency medical care, as necessary

- Determining evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation

- Ensuring that all site personnel and visitors have received the proper training and medical clearance prior to entering the site (refer to Chapter 6.0 of this plan)

- Establishing exclusion, contamination reduction, and support zones (refer to Chapter 7.0 of this plan)

- Presenting tailgate safety meetings and maintaining attendance logs and records

- Ensuring that the respiratory protection program is implemented (refer to Chapter 5.0 of this plan)

- Ensuring that decontamination procedures meet established criteria

- Ensuring that there are qualified first-aid persons on site who are trained in universal precautions and the use of PPE (refer to Chapter 12.0 of this plan).

2.5 Forklift Operators

Forklift operators shall be responsible for the safe operation and maintenance of the forklift they operate and other equipment and supplies associated with forklift operations. Operators shall possess appropriate and current licenses/certifications/permits required by local, state, or federal authorities or required by their contract for each project. Forklift operators are responsible for complying with the controls requirements of the subsection entitled "Forklift Safety."

2.6 Subcontractors

On-site subcontractors and their personnel are responsible for understanding and complying with all site requirements. Subcontractors are required to read and acknowledge the subcontractor certification (Appendix A) and follow all of the provisions set forth in this SSHP.

2.7 On-Site Personnel and Visitors

All on-site personnel and visitors are required to comply with the provisions of this SSHP and all applicable federal, state, local, and USACE regulations. Each person is responsible for his/her own safety and health and for completing tasks in a safe manner. All on-site personnel will report any unsafe acts or conditions to his/her supervisor or the IT representative. Personnel will monitor themselves and their fellow employees for signs and symptoms of heat/cold stress and chemical exposure.

2.8 Occupational Physician

The occupational physician for this project, Dr. David Barnes, is board-certified in occupational medicine with more than 20 years of experience. Dr. Barnes is the Medical Director of Environmental Medical Resources, a consulting service for IT.

3.0 Job Hazard Analysis

3.1 Scope of Work

IT will conduct an evaluation of the analytical results of drum contents documented in the March 1995 investigation-derived waste (IDW) report by Dames and Moore. The analytical results will be compared to EPA risk-based concentrations (RBC), maximum contaminant levels (MCL), and National Pollutant Discharge Elimination System (NPDES). If results are equal to or greater than these environmental criteria levels, a collective decision among the Ohio Enviornmental Protection Agency, USACE, and EPA (if required) will be made to determine whether the drum contents will be emptied on site. If results are less than these environmental criteria levels, the IDW drums and wooden core boxes will be emptied on site.

Solid IDW will be disposed of by spreading the soils on the ground surface in an area of known contamination utilizing heavy equipment. Aqueous IDW will be poured on the ground within the area of known contamination utilizing a forklift or equivalent drum handling device. PPE IDW will be double-bagged and placed in an industrial dumpster for disposal at an off-site industrial landfill.

No decontamination of equipment or drums will be necessary. Empty drums will be staged at the site.

3.2 Job Hazard Analysis by Task

The job hazard analysis identifies potential safety, health, and environmental hazards and provides for the protection of personnel, the community, and the environment. Because of the complexity and constant change of remediation projects, supervisors must continually inspect the work site to identify hazards that may harm site personnel, the community, or the environment. The PM, site superintendent, and SSHO must be aware of these changing conditions and discuss them with the H&S manager. The H&S manager will write addenda to modify job hazard analyses as necessary. Detailed activity hazard analyses by task are provided in Table 3-1.

3.3 Physical Hazards

The primary physical hazards for this project are associated with the use of the drum moving equipment and manually opening/closing drums.

Table 3-1

Activity Hazard Analysis
Plum Brook Ordnance Works

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, ensure safe and secure footing.
	Heavy lifting	• Use proper lifting techniques. Lifts greater than 60 lb require assistance or mechanical equipment.
	Falling objects	• Stay alert and clear of materials suspended overhead, wear hard hat and steel-toed boots.
	Flying debris, dirt, dust, etc.	• Wear safety glasses/goggles, ensure that eye wash is in proper working condition
	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.
	Fire	• Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
	Contact with moving equipment/vehicles	• Work area will be barricaded/demarcated. • Equipment will be laid out in an area free of traffic flow.
	Hazard communication	• Label all containers as to contents and dispose of properly. • Ensure MSDSs are available for hazardous chemicals used on site.
	Noise	• Sound levels above 85 dBA mandates hearing protection.

Table 3-1

Activity Hazard Analysis
Plum Brook Ordnance Works

Activity	Potential Hazards	Recommended Controls
Forklift Operation	Property damage, equipment damage, and/or personnel injury	• All forklifts will be inspected. • When any machinery or equipment is found to be unsafe as a deficiency is noted, the equipment shall immediately be taken out of service and its use prohibited until unsafe conditions have been corrected. • Only authorized personnel shall operate forklifts. • Use qualified and certified forklift operators. • Moving heavy equipment must have properly functioning back-up alarms. • Loads shall never be carried over personnel. • Operators shall maintain a constant awareness of personnel and equipment in the work areas. • Machinery or equipment shall not run unattended. • Loads shall be lifted to the minimum height necessary to accomplish the task. • The load shall be well secured and balanced in the drum sling or hook before being lifted more than a few feet. • Machinery or equipment shall not be operated in a manner that will endanger persons or property nor shall the safe operating speeds or loads be exceeded. • Operators shall inform their Supervisor(s) of any prescribed mediation that they are taking that would impair their judgement. • When conditions are such that lighting is occurring, all equipment operations shall cease.
	Noise	• Hearing protection is mandatory above 85 dBA.
Heavy equipment operation	Faulty or damaged equipment being utilized to perform work	• All machinery or mechanized equipment will be inspected by a competent mechanic and be certified to be in safe operating condition. • Equipment will be inspected before being put to use and at the beginning of each shift. • Faulty/unsafe equipment will be tagged and if possible locked out.
	Uneven terrain, poor ground support, inadequate clearances, contact with utilities	• Inspections or determinations of road conditions and structures shall be made in advance to assure that clearances and load capacities are safe for the passage or placing of any machinery or equipment. • All mobile equipment and areas in which they are operated shall be adequately illuminated. • Above and below ground utilities will be located prior to staging equipment. • Whenever the equipment is parked, the parking brake shall be set. • Equipment parked on inclines will have the wheels chocked. • Inspect brakes and tire pressure on drill rig before staging for work. • Obtain trenching/drilling permit prior to operation.

Table 3-1

Activity Hazard Analysis
Plum Brook Ordnance Works

Activity	Potential Hazards	Recommended Controls
Heavy equipment operation (Continued)	Inexperienced operator	• Machinery and mechanized equipment shall be operated only be designated personnel. • Heavy equipment operators shall inform their Supervisor(s) of any prescribed medication that they are taking that would impair their judgment.
	Fire	• Mechanized equipment shall be shut down prior to and during fueling operations. • Have fire extinguishers inspected and readily available.
	Fall hazards	• Personnel are not allowed to work off of machinery or use them as ladders. • Use safety belts and lifeline when working above 6 ft.
	Noise	• Hearing protection is mandatory above 85 dBA.
	Vehicle traffic	• Site workers shall establish hand signals when verbal communication becomes difficult. • Seats should be provided for each occupant of the equipment. • equipment operated on the highway shall be equipped with headlights, taillights, brake lights, back-up lights, and turn signals visible from the front and rear. • Never walk or work directly in back of or to the side of heavy equipment without the operator's knowledge. • Assign flag person(s) if necessary to direct traffic.
Opening/Closing IDW Drums	Cuts, punctures, or abrasions	• Work (leather or cotton) gloves shall be worn by personnel. • The proper tool shall be utilized to open/close drums.
	Back injury	• Use mechanical equipment to lift and move items, when necessary. • Get assistance when necessary. • Size up the job. • Lift with your legs, not your back. • Do not lift awkwardly sized items and those items over 60 pounds. • If a worker loses control of item, STAND CLEAR and DO NOT try to prevent its fall.
	Pinch Points	• Keep hands and feet clear of moving/suspended materials and equipment. • Wear hard toe/shank safety shoes/boots and hand protection.

Table 3-1

Activity Hazard Analysis
Plum Brook Ordnance Works

Activity	Potential Hazards	Recommended Controls
Opening/Closing IDW Drums (Continued)	Strains/sprains	• Do not stand on drums. • Use the proper tool for the job being performed. • Get assistance if needed. • Avoid twisting/turning while pulling on tools, moving equipment, etc.
	Unattended worker	• "Buddy System" - visual contact will be maintained with the sampling technician during activities.
	Slip, trip, fall	• Site workers will be required to wear hard hat, safety glasses with side shields, work gloves, and steel-toe/shank boots when working in the field. • Whenever possible, avoid routing cords and hoses across walking pathways. • Flag or cover inconspicuous holes to protect against falls.
	Bees, spiders, and snakes	• Workers shall inspect the work area carefully and avoid placing hands and feet into concealed areas. • Evaluate need for sensitive workers to have prescribed antibiotic or medicine to combat onset of symptoms.
	Poison ivy/oak/sumac	• Avoid plant areas if possible. • Wear long sleeves and long pants. • Promptly wash clothing that has contacted poisonous plants. • Wash affected areas immediately with soap and water.
	Cold Stress	• Provide insulating clothing to workers when temperatures drop below 40°F. • Drink warm beverages on breaks. Refrain from drinking caffeinated beverages. • Remove wet clothing promptly. • Take breaks in warm areas. • Reduce work periods as necessary. • Layer work clothing.

Table 3-1

Activity Hazard Analysis
Plum Brook Ordnance Works

Activity	Potential Hazards	Recommended Controls
Opening/Closing IDW Drums	Lighting strikes	• Whenever possible, halt activities and take cover. • If outdoors, stay low to the ground. • Limit the body surface area that is in contact with the ground (i.e., kneeling on one knee is better than laying on the ground). • Seek shelter in a building if possible. • Stay away from windows. • If available, crouch under a group of trees instead of one single tree. • Keep all body parts in contact with the ground as close as possible. • Remain 6 feet away from tree trunk if seeking shelter beneath tree(s). • If in a group, keep 6 feet of distance between people.
	Thunderstorms, tornados	• Listen to radio or TV announcements for pending weather information. • Cease field activities during thunderstorms or tornado warnings. • Seek shelter. Do not try to outrun a tornado.

The potential physical hazards of the work site are as follows:

- Drum handling hazards
- Heavy equipment hazards
- Forklift operation hazards.

3.4 Chemical Hazards

The analytical results for the following contaminants will be compared to RBCs, MCLs, and NPDESs as indicated in the scope of work (see Section 3.1):

- Nitroaromatics and Nitramines
  - Trinitrotoluene
  - Nitrobenzene
  - Dinitrotoluene
  - Nitrotoluene
  - Dinitrobenzene

- Priority Pollutant Metals
  - Antimony
  - Arsenic
  - Beryllium
  - Cadmium
  - Chromium
  - Copper
  - Lead
  - Manganese
  - Mercury
  - Nickel
  - Selenium
  - Silver
  - Thallium
  - Zinc.

It is unlikely that drums containing contaminants concentrations below environmental criteria levels pose a chemical hazard to workers on site during drum disposition.

3.5 Noise

Noise exposure at or above the OSHA action level (85 decibels [dBA]) is likely during some activities. Exposure to noise levels in excess of 90 dBA, the OSHA permissible exposure limit (PEL) for noise, is likely during heavy equipment operation. Sound level monitoring will not be conducted during these activities as previous noise monitoring during similar operations revealed noise levels at or above 85 dBA near the motor side of the operating equipment. A hearing conservation program shall be required for heavy equipment operators.

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In

addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on site.

3.6 Anticipated Biological Hazards

3.6.1 Snakes

Workers at the site have potential for encountering poisonous snakes such as water moccasins, rattlesnakes, and copperheads. All personnel shall be cautioned to be alert to the presence of snakes. If a snake bite occurs, attempts should be made to kill the snake for positive identification. The victim should be transported to the nearest hospital within 30 minutes. First aid consists of applying a pressure bandage; omit cutting and sucking (unless medical care cannot be obtained within 30 minutes). Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of snake bites include swelling, edema and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

3.6.2 Insects

All IT personnel and subcontractors should be aware of the potential presence of deer ticks in wooded areas during the months of April through October. Precautionary methods include familiarity with the signs/symptoms and potential health hazards of Lyme disease, and the proper implementation of appropriate work practices.

During the months of April through October, particular caution must be exercised to prevent being bitten by ticks and potentially contracting Lyme disease, Rocky Mountain Fever, and other tick-borne diseases. Specific precautions include:

- Wear hooded coveralls to cover your body as much as possible. Light color clothing makes spotting of ticks easier.

- Try to eliminate possible paths by which the deer tick may reach unprotected skin. For example, tuck bottoms of pants into socks or boots and sleeves into gloves. (Duct tape may be utilized to help seal cuffs and ankles.) If heavy concentrations of ticks or insects are anticipated or encountered, Tyvek coveralls may be utilized.

- Conduct periodic and frequent (e.g., hourly) surveys of your clothing for the presence of ticks. Remove any ticks/insects that become attached to clothing.

- Use insect/tick repellents. Apply repellents in accordance with manufacturers' recommendations. These repellents are readily available and include such brands as Deep Woods OFF and Maximum Strength OFF. Check the ingredients of the repellent. IT field personnel should check with the PM to ensure use of insect repellents will not interfere with sample collection procedures.

3.6.3 Poisonous Plants

If work sites are located in areas where poisonous plants such as poison ivy, poison sumac, and poison oak may be encountered, personnel should wear long pants, long sleeves, and gloves to minimize the possibility of exposure. In some areas, the use of a Tyvek or other protective suit may be advisable.

3.7 Cold Stress

Cold and/or wet environmental conditions can place workers at risk of a cold-related illness. Hypothermia can occur whenever temperatures are below 45 degrees Fahrenheit (°F), and is most common during wet, windy conditions, with temperatures between 40 to 30°F. The principal cause of hypothermia in these conditions is loss of insulating properties of clothing due to moisture, coupled with heat loss due to wind and evaporation of moisture on the skin.

Frostbite, the other illness associated with cold exposure, is the freezing of body tissue, which ranges from superficial freezing of surface skin layers to deep freezing of underlying tissue. Frostbite will occur only when ambient temperatures are below 32°F. The risk of frostbite increases as the temperature drops and wind speed increases.

4.0 Safety Program and Procedures

The following work practices will be observed during all site activities.

4.1 General Practices

- At least one copy of this plan shall be available at the project site, in a location readily available to all personnel, including visitors.

- Ensure that no one is required to lift more than 60 pounds.

- Legible and understandable precautionary labels that comply with the hazard communication standard shall be affixed prominently to all containers of contaminated scrap, waste, debris, and clothing.

- No food or beverages shall be present or consumed in the work areas.

- No tobacco products shall be present or used in the work areas.

- Cosmetics shall not be applied within the work areas.

- All crew personnel on site shall use the buddy system (working in pairs or teams). If protective equipment or noise levels impair communications, then prearranged hand signals shall be used for communication. Visual contact shall be maintained between crew members at all times, and crew members must observe each other for signs of toxic exposure. Indication of adverse effects include, but are not limited to:

  - Changes in complexion and skin coloration
  - Changes in coordination
  - Changes in demeanor
  - Excessive salivation and pupillary response
  - Changes in speech pattern.

- Employees shall inform their partners or fellow team members of nonvisible effects of overexposure to toxic materials. The symptoms of such overexposure may include:

  - Headaches
  - Dizziness
  - Nausea
  - Blurred vision
  - Cramps
  - Irritation of eyes, skin, or respiratory tract.

- Visitors to the site shall abide by the following:
  - "Visitor" means persons not involved in routine site work activities.
  - All visitors shall be instructed to stay outside the work area and remain within the support area during the extent of their stay. Visitors shall be cautioned to avoid skin contact with contaminated or potentially contaminated surfaces.

4.2 Operating Procedures

4.2.1 Drum Handling Safety

Operations shall be organized to minimize the amount of drum or container movement. Employers shall be warned of the potential hazards associated with the contents of the drums or containers during tailgate safety meetings prior to the beginning of disposition operations. Ignition sources during transfer operations shall be minimized by using proper equipment and procedures. Standing upon or working from drums or containers is prohibited.

4.2.2 Forklift Safety

- All forklift operators shall be aware of safe operating rules, load handling, and emergency procedures.
- All forklifts will be inspected.
- All forklifts will carry a multipurpose dry chemical fire extinguisher (at least 5 pounds).
- A forklift shall not lift more than its capacity.

4.2.3 Heavy Equipment Operating Safety

The physical hazards and control methods shown in Table 3-1 shall be reviewed for each task and communicated to all affected personnel. As new hazards are discovered, the hazards will be promptly communicated to site personnel. Prior to the start of site work, the heavy equipment operators will inspect all equipment in the presence of the site supervisor.

All heavy equipment will be used in the manner it was intended. Drivers will operate all equipment in accordance with the manufacturers instructions and within the safe operating parameters as defined by the manufacturer.

Ground personnel should always make eye contact and wait for a signal to proceed before passing close to or in front of operating equipment or moving vehicles. Where possible, heavy equipment in stationary operation should be barricaded (with hazard tape) at a sufficient distance for ground personnel to avoid swinging cabs, counter weights, and brooms. When ground personnel are working in the vicinity of heavy equipment, they should inform the flagman of their presence.

All drivers and operators will be expected to adhere to the speed limits, signs, and road markings.

All heavy equipment will carry a multipurpose dry chemical fire extinguisher (at least 5 pounds).

Backhoes and other noncrane heavy equipment will be used to "pull" (lift) equipment only when this is within the normal design parameter of the equipment. If a piece of equipment such as a trackhoe is used to make a lift, it will have a lifting eye mounted on or near the bucket. This lifting eye must be standard equipment for the make and the model of equipment.

4.2.4 Lifting Safety

Back strain or injury may be prevented by using proper lifting techniques. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. Two persons must lift an object if it cannot be lifted safely alone (e.g., greater than 60 pounds).
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces.
- Fingers must be kept away from points which could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.

- The load should be kept as low as possible, close to the body with the knees bent.

- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.

4.2.5 Confined-Space Entry

Confined-space entry will not be performed during activities at the sites. If confined-space entry must be performed, an SSHP addenda shall be prepared and approved prior to work start.

4.3 Cold Stress Prevention

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.

Site 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. To prevent such occurrence, the following measures will be implemented:

- Site 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, employees must wear clothing for warmth, in addition to chemical protective clothing. This will 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 cat, 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 site 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.

- Site workers must have a warm (65°F or above) break area.

- Hot liquids such as soups or warm, sweet drinks must 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 must be practiced at all times on site. Any site worker observed with severe shivering must leave the work area immediately.

- Site workers should dress in layers, with thinner lighter clothing worn next to the body.

- Site workers should avoid overdressing when going into warm areas or when performing strenuous activities.

4.4 Hearing Conservation

All on-site IT and subcontractor personnel shall wear hearing protection with a Noise Reduction Rating (NRR) of at least 20 when noise levels exceed 85 dBA. 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. Noise monitoring is discussed in Section 8.3.

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.

4.5 Sanitation

4.5.1 Potable Water

The following rules apply for all project field operations:

- An adequate supply of potable water will be provided at each work site.

- Portable containers used to dispense drinking water shall be capable of being tightly closed, and shall be equipped with a tap dispenser. Water shall not be drunk directly from the container.

- Containers used for drinking water shall be clearly marked and not used for any other purpose.

- Disposable cups will be supplied; both a sanitary container for unused cups and a receptacle for disposing of used cups shall be provided.

4.5.2 Nonpotable Water

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

4.5.3 Toilet Facilities

Toilet facilities shall be available for employees. If permanent toilet facilities are not available (i.e., the work site is more than 500 feet from a building with an accessible toilet), then a portable chemical toilet(s) will be provided.

4.5.4 Trash Collection

Trash collected from the contaminated reduction zone (CRZ) will be separated as routine hazardous waste. Trash collected in the support and break areas will be disposed of as nonhazardous waste. Labeled trash receptacles will be set up in the CRZ and in the support zone.

5.0 Personal Protective Equipment

The PPE outlined in this chapter has been selected according to the site characterization and analysis, job tasks, site hazards, intended use, and potential for employee exposures.

A comprehensive respiratory protection program has been established by IT and is required at all locations where use of such equipment is intended to lessen the potential for adverse health affects to any employee. Contents of this program are not included in this plan because respiratory protection will not be required for any activities on site.

Levels of Protection. The level of protection required for use by all site personnel is Level D.

The following equipment will be used for Level D protection:

- Coveralls or work clothing
- Leather or cotton work gloves (when handling drums)
- Steel-toed safety boots
- Safety glasses
- Hard hat
- Hearing protection (when working near/adjacent to operating heavy equipment).

6.0 Site Control

6.1 Authorization to Enter

Access to work areas where drums are stored is regulated and limited to authorized personnel. Only persons who have completed the following training and medical requirements will be allowed to enter in this work zone:

- Completion of 40 hours of hazardous waste operations training as defined under 29 CFR 1910.120 or 29 CFR 1926.65
- Completion of the 40-hour hazardous waste operations training within the past 12 months <u>or</u> completion of an 8-hour hazardous waste operations refresher
- Certification by a physician of fitness for hazardous waste operations within the last 12 months.

Personnel not meeting these requirements may enter the designated support zone only. The SSHO will maintain a list of persons authorized to enter contaminated work areas, and only personnel on the authorized persons list will be allowed within the work zone.

6.2 Site-Specific Orientation

No person shall be allowed on any field site without first being given a site-specific H&S orientation. This orientation will provide training on the potential H&S hazards and procedures specific to the site, and will discuss the provisions of this SSHP. All personnel will acknowledge their attendance by signing the SSHP Acknowledgement Form. IT subcontractors must also acknowledge and sign the form in Appendix A, Subcontractor Certification.

6.3 Documentation of Certificates

Personnel entering the site to work will have satisfied the medical and training requirements of 29 CFR 1910.120. The project file will contain copies of certificates documenting status for all on-site personnel. Personnel not entering the work zone need not meet the requirements in Section 6.1. The PM will accommodate requests from representatives of regulatory agencies to review documentation. All visitors must present documentation of current training and medical status before being granted authorization to enter the work zone.

6.4 Entry Log

The PM shall keep a daily roster of all on-site personnel and record the time of entry into and exit from the work zone for each person.

7.0 Decontamination

The project areas will be divided into work zones and support zones. The SSHO will be responsible for designation of the zones. The work zone is considered as the drum staging areas, the disposition areas, and the areas within a 20-foot radius around these work zones. These areas will be identified in the tailgate safety meeting required prior to any work start.

Only IT personnel and authorized visitors who have met the requirements of Section 6.1 and who are wearing the required PPE will be allowed within the work zone.

The remainder of the IT project area will be designated as the support zone.

8.0 Site Monitoring

8.1 Air Monitoring

Based on IT's evaluation of analytical results from drum contents, no drums containing contaminants equal to or greater than environmental criteria levels will be disposed of on site without concurrence from the Ohio Environmental Protection Agency, USACE, and EPA as required.

Air monitoring during disposition of low contaminant levels is not required because there is no anticipated chemical exposure hazards.

8.2 Other Hazardous Conditions

If unknown chemicals or contamination are encountered, operations will cease until the situation is evaluated. The SSHO will contact the H&S manager to evaluate any potentially hazardous situations, or any situation involving elevated contamination levels. Operations will be resumed only if they can be accomplished in a safe manner.

8.3 Noise Monitoring

Noise monitoring will not be conducted because previous noise monitoring during similar heavy equipment operations has characterized noise levels greater than 85 dBA within a 5-foot radius around the rear end (motor side) of heavy equipment. Hearing protection is mandatory for all employees in or when working near/adjacent to operating heavy equipment. Noise monitoring will occur when new heavy equipment is brought on site and when new tasks are started that have not previously had their noise levels characterized.

9.0 Employee Training

9.1 General

All on-site project personnel shall have completed at least 40 hours of hazardous waste operations training, as required by 29 CFR 1910.120 and 29 CFR 1926.65. In addition, all field employees shall have received a minimum of 3 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. Supervisors shall have completed an additional 8 hours of relevant H&S training. Subcontractor personnel must meet these training requirements. Documentation of IT and subcontractor training shall be maintained with the project files.

9.1.1 Site-Specific Orientation

All personnel, before performing any work at the site, are required by the NASA PBS to go through a safety orientation, which will include a short briefing at the guard house, and a ten-minute orientation video. In addition, all on-site project personnel will be given a site-specific H&S orientation. This orientation will provide training on the potential H&S hazards and procedures specific to the site, and will discuss the provisions of this SSHP. All personnel will acknowledge their attendance by signing the SSHP Acknowledgement Form. Additionally, subcontractors must acknowledge the Subcontractor Certification Form in Appendix A.

9.1.2 Tailgate Safety Meetings

The SSHO shall conduct a tailgate safety meeting at the beginning of each shift or whenever new employees arrive at the job site once the job commences. The topics discussed at the tailgate safety meeting will include H&S considerations for the day's activities, necessary protective equipment, potential for encounters with biological hazards, problems encountered, and new operations. Attendance records and meeting notes will be maintained with the project files.

9.2 Site Workers' Basic Course

The following is a list of the topics covered in IT's 40-hour training course:

- General site safety
- Physical hazards (fall protection, noise, heat stress, cold stress)

- Names and titles of key personnel responsible for site H&S
- 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 that might indicate overexposure to hazards
- Worker right-to-know (Hazard Communication OSHA 1910.1200)
- Routes of exposure to contaminants
- Engineering controls and safe work practices
- Components of the site H&S program
- Decontamination practices for personnel and equipment
- Confined-space entry procedures
- Emergency response plan.

9.3 Supervisors' Course

Management and supervisors must receive an additional 8 hours of training presented by the IT Training Department that includes:

- General site safety and health programs
- PPE programs
- Air monitoring techniques.

9.4 First Aid and Cardiopulmonary Resuscitation

At least two employees current in first aid/cardiopulmonary resuscitation (CPR) will be assigned to the work crew and will be on the site whenever operations are ongoing. First aid and CPR training courses are offered to all IT employees. Annual refresher training in CPR and triannual refresher training in first aid is required to maintain the currency of the certificate.

9.5 Instructors

The IT Training Department, headquartered in Torrance, California, teaches the 40-hour hazardous waste operations classes using certified environmental trainers. When training needs exceed the capacity of the training division, IT uses outside institutions. IT is recognized by EPA and listed in the Federal Register (53 FR 3982). Only similarly recognized outside training institutions may be used with prior approval of the IT Training Department.

10.0 Medical Surveillance Program

10.1 Physical Examinations

All on-site project personnel shall within the past 12 months have completed a comprehensive medical examination that meets the requirements of OSHA regulations 29 CFR 1910.120 and 29 CFR 1926.65. The annual medical includes the following elements:

- Medical and occupational history questionnaire
- Physical examination
- Complete blood count, with differential
- Liver enzyme profile
- Chest X-ray, once every 3 years, for nonasbestos workers
- Pulmonary function test
- Audiogram
- Electrocardiogram for persons older than 35 years of age, or if indicated during the physical examination
- Drug screening
- Visual acuity
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

All employee medical clearance forms are maintained by the H&S group within the worker's home profit center, or for subcontractors at the subcontractor's office. The examining physician provides the employee with a letter summarizing his findings and recommendations. Each employee also has the right to inspect and copy medical records.

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 project workers will be kept on site during all project site work.

Subcontractors will verify on the certification form that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations shall meet the requirements of 29 CFR 1910.120, 29 CFR 1910.134, HS100, and HS101. Subcontractors must submit a completed Subcontractor Certification Form (Appendix A) and 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 similar in scope to the placement 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 6 months. The exit examination consists of the annual examination without drug screen. The employee's immediate supervisor is to notify the home office H&S assistant 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. 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 will complete the Supervisor's Employee Injury Report (SEIR) (Appendix B) and conduct an accident investigation as soon as emergency conditions no longer exist and first aid and/or medical treatment has been rendered. The results of the investigation should be reported on the accident/injury investigation report. The SEIR must be completed and submitted to the H&S manager within 24 hours of the incident. The accident/injury investigation report must be submitted within 72 hours of the incident.

If first-aid treatment is required, first-aid kits are available at the CRZ and in all IT vehicles. If treatment beyond first aid is required, the injured should be transported to the medical

facility shown in Appendix C. 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. In case of any emergency, the IT field supervisor needs to contact the PBS Communications Center located in the front gate for assistance using the portable station radio provided by the PBS.

10.3 Medical Restriction

When a medical care provider identifies a need to restrict work activity, the employee's home office H&S assistant will communicate the restriction to the employee, his supervisor, and the H&S manager. 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 1910.20 and HS103, and shall be kept for 30 years after employment. Employee confidentiality shall be maintained. Employees and their authorized representatives have access to these records through the H&S assistant.

11.0 Emergency Procedures

11.1 General

This SSHP has been developed to allow site activities to be conducted without adversely impacting the safety of the workers, the community, and the environment. Procedures included in this section address the action required in the event extraordinary conditions occur at the site.

11.2 First Aid

If first aid and/or CPR is administered by site personnel, the SSHO must ensure full compliance with the requirements of Chapter 12.0, Bloodborne Pathogen Exposure Control Plan. First-aid kits shall be maintained at the control access point between the decontamination and support zones and in all support vehicles. If the victim cannot be safely moved from the contaminated area, first aid necessary to stabilize the victim for safe transport shall be administered at the accident location. Appropriate decontamination of all clothing and equipment shall be followed upon leaving the contaminated area. The SSHO is responsible for administering first aid.

11.3 Emergency Response

11.3.1 Pre-Emergency Planning

During the site-specific orientation and at the daily tailgate safety meetings, all employees will be trained in and reminded of the provisions of this emergency response plan, the communication systems and evacuation routes. This plan will be reviewed and revised, if necessary, on a regular basis. This will ensure that the plan is adequate and consistent with prevailing site conditions.

11.3.2 Project Manager's Responsibilities

The PM has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the site area. The PM is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. In the absence of the PM, the site superintendent shall assume the responsibilities of the PM. All project personnel are responsible for assisting the PM in responding to emergency situations within the capabilities of their skills, equipment, and training.

11.3.3 Evacuation Signal

Vehicle or portable air horns will be used for evacuation signals as follows:

- One long, continuous blast: Emergency evacuation of the site.

11.3.4 Emergency Equipment/Facilities

All individuals shall be familiar with the site and be able to identify the locations of the following emergency equipment:

- "IT-Approved" first-aid kits
- Fire extinguishers (minimum of 20 lb A; B; C)
- Emergency eye wash/portable shower which complies with ANSI Z-358.1
- Cellular telephone
- PPE.

11.3.5 Medical Emergencies

First aid should be administered by the SSHO while awaiting an ambulance or paramedics. In the event of serious injury on site, all activities will be immediately suspended and resources will be diverted until it can be ensured that response procedures are adequate and that proper assistance has been provided to ambulance or paramedics responsible for treating the injury.

All injuries and illnesses must be immediately reported to the PM or the SSHO, who will then notify appropriate off-site personnel and organizations as necessary.

For ambulance, fire, or police contacts, give the name of the road and the nearest intersection to the Communication Center (Front Gate). Notify the IT PM, the USACE representative, and the IT H&S manager after primary emergency contacts have been made.

Attending emergency physicians should be given the telephone number of the IT medical director to obtain immediate access to an employee's medical records and for consultation purposes.

11.3.6 Emergency Contact/Notification Listing

In case of any emergency, the PBS Communication Center will be contacted for appropriate services. The PBS Communication Center will coordinate Station access and response.

Local, State, and National emergency numbers as listed below:

Police Department	(419) 627-5863
Fire Department	(419) 627-5837
Ambulance	911
Hospital	(419) 621-7000
National Response Center	(800) 424-8802
Poison Control Center	(800) 542-4225
Ohio EPA Emergency Spill Number	(800) 282-9378

11.3.7 Key Project and IT Personnel

Project Manager	Don Burton, PE	(423) 690-3211
H&S Manager	Melissa Smith, CIH	(423) 690-3211
SSHO	George Yu	(423) 690-3211

11.3.8 Directions to the Nearest Hospital

Hospital is located at:

Providence Hospital
1912 Hayes Avenue
Sandusky, Ohio 44870

For directions to the hospital, see Appendix C, Site and Hospital Location Map.

11.4 General Emergency Procedures

- If a member of the field crew experiences any adverse effects or symptoms of exposure while on the scene, the entire field crew shall immediately halt work and act according to the instructions provided by the SSHO.

- The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in the evacuation of the field team and re-evaluation of the hazard and the level of protection required.

- If an accident occurs, the site supervisor must immediately complete the SEIR (Appendix B). If necessary, follow-up action shall be taken to correct the situation that caused the accident.

11.4.1 Personal Injury

The SSHO is trained in American Red Cross first-aid procedures and shall administer appropriate first-aid treatment, including CPR, in emergency situations. The following general emergency procedures shall be carried out in the event of injury:

- Notify the SSHO of the incident.
- Administer first aid.
- Notify PBS Communication Center for assistance. Call for ambulance transport, or transport victim to nearest hospital or emergency medical center, as appropriate.
- Notify the IT PM, the USACE representative, and the IT H&S manager of the incident and describe the emergency response actions taken.

11.4.2 Fire or Explosion

In the event of a fire of explosion:

1. Immediately evacuate injured personnel and leave the area.
2. Administer first aid, as appropriate.
3. Notify emergency services through the PBS Communication Center.
4. Notify the IT PM, the USACE representative, and the IT H&S manager.

11.5 Evacuation Routes and Procedures

Evacuation routes and procedures will be developed by IT upon arrival at the site in coordination with the NASA PBS personnel.

12.0 Bloodborne Pathogen Exposure Control Plan

This exposure control plan presents H&S guidelines for voluntary first aid and CPR care providers. To meet the requirements of OSHA 29 CFR 1910.151 and EM 385-1-1, during day shift operations, at least one person on site will adequately trained in first aid and CPR, and in the requirements of the Bloodborne Pathogens Standard as listed in 29 CFR 1910.1030, IT Procedure HS512, and the contents of this plan.

12.1 Definition

Bloodborne pathogens are those agents (i.e., bacteria, virus, fungi) found in blood components, certain body fluids, and other materials, objects or surfaces that have had contact with blood that are capable of causing human disease or death to unprotected people who came into contact with blood or blood-affected items. Diseases caused by bloodborne pathogens include, but are not limited to, hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C, malaria, and syphilis. The most significant and of greatest concern are HBV and HIV.

12.1.1 Hepatitis B Virus

HBV is the major bloodborne pathogen hazard that first aid/CPR care providers are most likely to encounter. The HBV can remain infectious for up to 10 days even in dried blood. The virus adversely affects 8,000 to 10,000 workers annually, resulting in approximately 200 deaths each year.

Hepatitis Exposure Symptoms. Hepatitis means "inflammation of the liver" causing severe liver damage or cirrhosis. Exposure symptoms include fever, fatigue, nausea, vomiting, muscle aches, loss of appetite, and jaundice (yellowing of the eyes or skin). Hepatitis diagnosis is difficult because some symptoms are similar to the flu and may remain mild for an extended period of time.

Presently, no cure exists for hepatitis, but it can be prevented with a vaccination.

12.1.2 Human Immunodeficiency Virus

HIV attacks and deteriorates the body's immune system and eventually weakens it to the point that infection sets in causing the disease Acquired Immune Deficiency Syndrome (AIDS). HIV is primarily transmitted through sexual contact, but may also be transmitted

through contact with blood and body fluids. HIV is not transmitted by touching or working with people who are HIV-positive.

Human Immunodeficiency Virus Exposure Symptoms. HIV leads to AIDS-related illnesses that eventually cause neurological problems, cancer, pneumonia, and death. People can carry the virus for many years without experiencing any symptoms. Upon development, symptoms may include weight loss, skin lesions, dry cough, fever, fatigue, diarrhea, or swelling of the lymph glands.

Presently, no cure exists for HIV or AIDS, and no vaccination is currently available.

12.2 Exposure Determination

The purpose of the guidelines in this plan are designed to limit occupational exposure of site workers to infectious blood materials that could result in disease or possibly death. The contents of this plan are intended to protect the IT employees trained in first aid and CPR who are responsible for administering medical assistance to site workers.

Means of Transmission. The major activity that may expose any of these IT employees to bloodborne pathogens is their response and care to on-site personal injuries or decontamination of equipment/surfaces contaminated by blood or other potentially infectious materials during the incident.

These IT employees could be subject to bloodborne pathogens during rendering of first aid or CPR by accidental exposure due to:

- Punctures through the skin with a contaminated sharp object (i.e., scissors)
- Contact or absorption of blood or blood-contaminated objects through open or broken skin (i.e., cuts, scratches, rashes)
- Blood splashes to their eyes, nose, or mouth, or other mucous membranes.

Workers can reduce their risk of contacting HBV or HIV by implementing the recommended work practices (outlined in this plan) before, during, and after responding to emergency medical incidents involving personal injuries.

12.3 Measures for Prevention

The establishment of work practice controls is an integral part of an effective exposure control plan in preventing accidental infection of employees. These work practices are designed to protect employees from reasonably foreseeable occupational exposures to bloodborne pathogens from blood and other potentially infectious material. The work practice controls outlined in this section are applicable to the administration of first aid in emergency situations and subsequent cleanup only.

12.3.1 Universal Precautions

Universal precautions is an approach to infection control that operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be contaminated with HIV, HBV, or other infectious diseases. Universal precautions shall be implemented whenever there exists a foreseeable potential for contact with blood or bodily fluids.

12.3.2 Engineering Controls

Due to the remote location of the worksite, the nature of work in outdoor locations with potential exposure to airborne chemical contaminants, and the potential for exposure being limited to emergency situations, the implementation of engineering controls is not feasible. Exposure control shall be accomplished through implementation of work practice controls and use of PPE.

12.3.3 Work Practice Controls

Work practice controls shall be instituted whenever foreseeable potential contact with, or exposure to, blood and bodily fluid exists. Examples of situations in which these controls are to be implemented include, but are not limited to, accidents or injuries in which administration of first aid is required, application of bandages to minor cuts and abrasions of another person, and contact with sores, wounds, or broken skin.

Following are specific work practice controls that shall be implemented:

- Open wounds or cuts will be promptly bandaged.
- Hands and face will be washed as soon as possible after administering first aid or CPR. If wash facilities are not readily available, stock disposable one-time use towelettes.
- No eating, drinking, or smoking is allowed in any work area where a potential exists for occupational exposure to bloodborne pathogens.

- Nondisposable equipment or materials that have or may have blood or infectious fluid contact must be washed immediately after their use. (A 1-to-10 solution of bleach and water is recommended for proper decontamination.)

- Any clothing that becomes contacted with blood or infectious fluids shall be removed as soon as possible after administering first aid or CPR.

- No personal clothing that becomes contacted with blood or infectious fluids shall be laundered off site.

- First-aid kits on site will be equipped with a pair of surgical gloves and CPR mouth pieces.

Minimization of Contact. Direct contact with blood and bodily fluids should be kept to an absolute minimum, as required in a particular situation. In situations where direct contact is likely, PPE shall be worn to help prevent infection.

Based upon professional judgment, an employee may choose to temporarily forego the use of PPE if he determines that the use of the PPE will further jeopardize his well-being or that of the injured worker. This limited application must be carefully evaluated by the employee.

If this situation does occur, IT is obligated to investigate and document the circumstances in an effort to provide alternative means to avoid further occurrence.

12.3.4 Personal Protective Equipment

The following are specific PPE items that shall be implemented:

- Always use CPR mouthpieces or ventilation devices.

- Inspect PPE prior to use to ensure it is in good working order and without flaws.

- Do not reuse gloves once removed.

- After use, remove gloves from top to bottom inside-out, not allowing unprotected skin to contact the exterior of the gloves.

12.3.5 Waste Handling

Disposable items that have or may have blood contact must be bagged separately from other trash. These wastes must be placed in leak-proof containers or bags and labeled.

A collection container for contaminated articles will be available on site. Wastes used in medical emergency treatment (i.e., gloves, towels, gauze) shall be disposed in the infectious waste container(s). The container will be replaced as needed and will not be overfilled.

12.3.6 Waste Disposal

The waste will remain on site in approved container(s) until an approved disposal facility capable of receiving medical wastes is identified. Disposal of the infectious waste container(s) shall be in accordance with applicable local, state, and federal regulations.

12.4 Medical Requirements

The medical requirements of the exposure control plan include provision of a hepatitis B vaccination to all exposed employees, and postexposure procedures and evaluation.

12.4.1 Hepatitis B Vaccination

All potentially exposed employees will have made available to them at no cost a hepatitis B vaccination. The employee will also receive training as to the vaccine's efficacy, safety, benefits, and consequences prior to administration. The vaccination series shall be initiated within 24 hours of providing first aid/CPR in an incident and shall be administered under the supervision of a licensed physician. Employees may at their own discretion decline the vaccination, in which case documentation of declination will be completed and employees may be assigned immediately. If an employee covered by this exposure plan decides to accept the vaccination at a later date, the vaccination will be offered at that time at no cost to the employee.

12.4.2 Postexposure Procedures and Evaluation

Subsequent to all reported exposure incidents, a confidential medical evaluation and follow-up shall be made available to each employee exposed in the incidents.

Documentation Procedures. Documentation of the exposure incident shall be recorded as soon as possible, and shall include the route(s) of exposure, the circumstances surrounding the incident, and the identification of the source individual. Additionally, each incident shall be placed on the "first aid incident list" attached to the location OSHA Log of Occupational Injuries and Illnesses.

Blood Testing

Source Individuals. As soon as feasible, the source individual in an exposure incident will be asked to consent to a blood test to determine HBV and HIV infectivity. Where applicable laws require employee consent, documented consent shall be obtained prior to testing. If an employee refuses the blood test, documentation of the refusal will be made. Documentation of the test results shall be made available to the exposed employee(s). All results should be kept confidential, because criminal and civil penalties may be charged against persons negligently or willfully releasing such information, depending on local laws.

Exposed Employees. Exposed employees will be asked to consent to a blood test for HBV and HIV serological status. If consent to HIV testing is denied, the blood sample will be preserved for 90 days; within this time, the employee may elect to consent to the HIV test.

12.4.3 Postexposure Medical Evaluations

Exposed employees shall receive a healthcare professional's written opinion for postexposure evaluations. The written opinion shall include the results of the evaluation and any medical conditions resulting from the exposure incident that require further medical treatment.

12.5 Hazard Communication

12.5.1 Warning Labels

Containers used for disposal of blood contaminated supplies and waste will be labeled in accordance with the word "biohazard."

12.5.2 Warning Signs

There are no designated areas for medical treatment on site, because first aid will be provided on an emergency basis only; therefore, warning signs are not applicable. In cases of potential exposure, observers and nonessential personnel should be verbally warned to keep a safe distance from injured personnel.

12.5.3 Employee Training Program

All associates who are first aid/CPR trained and may provide assistance shall be trained in the requirements for voluntary providers as described in HS512, this SSHP and its addenda, and the general provisions of HS512.

12.6 Record Keeping

12.6.1 Training Records

All employees selected to attend the training program that covers the contents of this plan shall sign the Acknowledgment Form and the Training Attendance Form.

The training record will contain the date, training outline, name and qualifications of the trainer, and names and job titles of attendees.

At the completion of the training program, all participants must take and pass the training quiz.

The training records will be maintained by the IT Training Department for at least 3 years from the training date.

12.6.2 Medical Records

Medical records necessary for IT employees must include documentation of HBV vaccination status, medical follow-up, postexposure testing, and a medical professional's written evaluation.

Confidentiality. The employee medical records will be forwarded to Washington Occuaptional Health Associates Consulting Services for inclusions in the employee's medical file.

Maintenance and Transfer of Records. IT shall maintain the employee medical records for the duration of the employee's employment plus 30 years thereafter.

If, for whatever reason, IT no longer does business and no successor exists, IT will notify the director of NIOSH in writing 3 months prior to the disposal of records. If so directed, the records shall be transferred to the director of NIOSH.

12.6.3 Incident Recording

An incident that occurs as a result of rendering emergency medical care will be recorded on the OSHA 200 log as OSHA defines work-related injuries and illnesses. All injuries involving the release of blood or bodily fluids must be immediately reported to the H&S department to ensure proper reporting and followup.

APPENDIX A

SUBCONTRACTOR CERTIFICATION

SUBCONTRACTOR CERTIFICATION

I, _____ as an agent of _____, do hereby certify that the following employees have successfully completed a 40-hour training course which complies with the provisions of 29 CFR 1910.120/29 CFR 1926.65, and respiratory protection training which complies with 29 CFR 1910.134. Each employee has successfully completed a medical examination which complies with the above regulations.

Individual copies of certification of successful completion of the required training and medical examinations are attached for each employee.

_____ _____

Signature Date

APPENDIX B

SUPERVISOR'S EMPLOYEE ACCIDENT REPORT

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 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 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 the incident_____ Did the employee leave work? ☐ No ☐ Yes When_____

Has employee returned to work? ☐ No ☐ Yes When_____ Did employee miss a regularly scheduled shift? ☐ No

Doctor/Hospital name_____ Address_____

Witness name(s)_____ Statement attached? ☐ No

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 ☐ Recordable, no lost work days ☐ Lost work days ☐ Restricted activity ☐ Fatali

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_

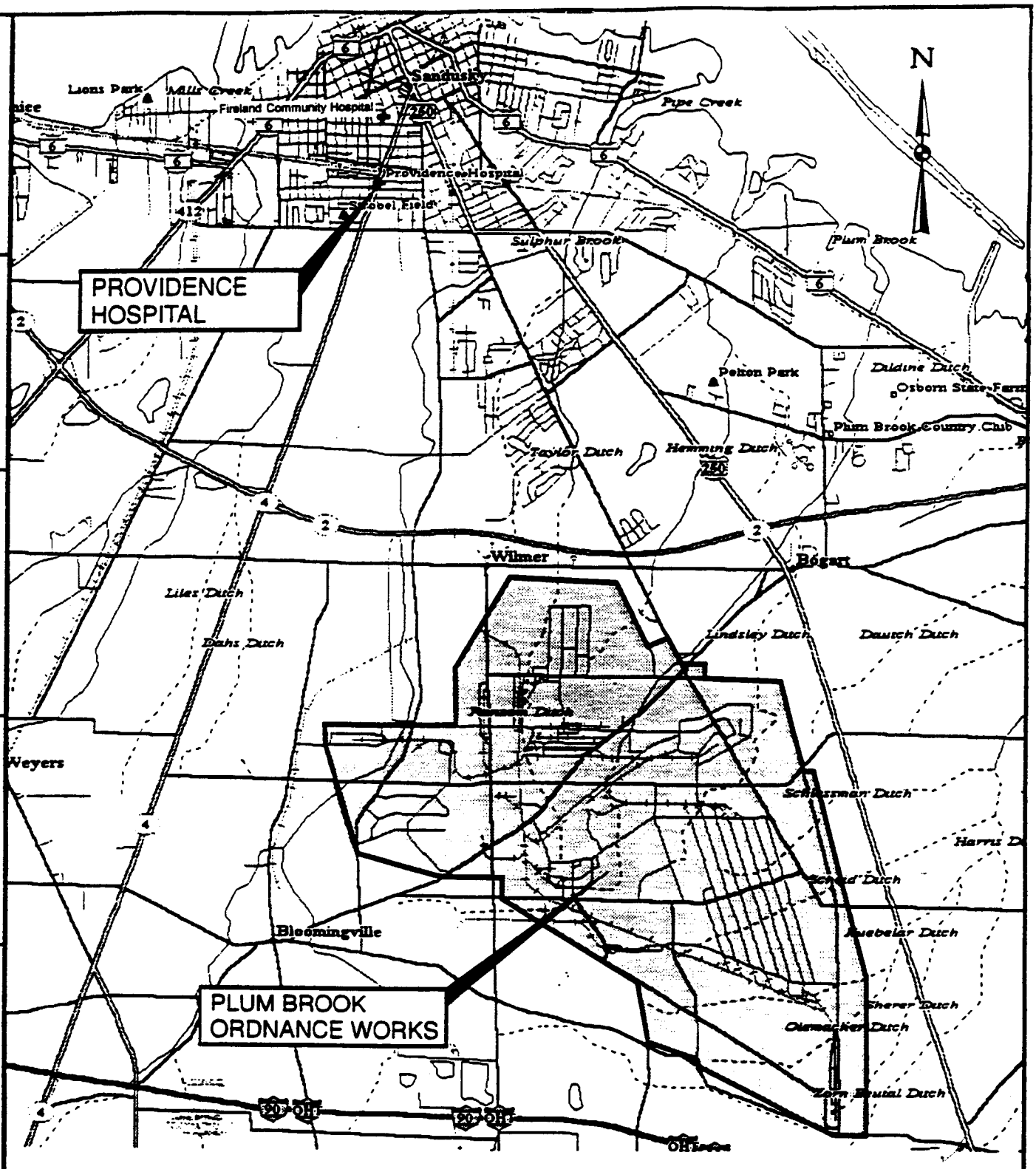
Name _____ (Print) _____ Signature _____ Date

Form HS0204 5/25/94

Submit copies to: Corporate HS, Corporate Risk Mgmt., Region HS, Profit/Cost Center Mgr. and EMR

APPENDIX C

SITE AND HOSPITAL LOCATION MAP



DWG. No.: 764676-A
PROJ. NO.: 764676
INITIATOR: J. LI
PROJ. MGR.: D. BURTON
DRAFT. CHCK. BY: J. HUBBARD
ENGR. CHCK BY: G. YU
DATE LAST REV.:
DRAWN BY:
STARTING DATE: 10/26/95
DRAWN BY: D. HIGGS

EMAP5.CDR 10/26/95 DJH

APPENDIX C

SITE AND HOSPITAL LOCATION MAP

PLUM BROOK ORDNANCE WORKS
HURON COUNTY, OHIO

PROVIDENCE HOSPITAL
1912 HAYES AVE.
SANDUSKY, OHIO 44870

PH. (419) 621-7000

INTERNATIONAL TECHNOLOGY CORPORATION

Direction to the Providence Hospital:

Exit from the front gate of Plum Brook Station, turn right to **Taylor Road**, go about 1/4 mile turn left to **Botay Road**, at the stop sign make a left turn to **Bogart Road** (county road #10), take **Bogart Road** all way to **State Road #4** (Wright Brothers Memorial HWY); make a right turn at **State Road #4**, the Providence Hospital will be on your right hand side.

Estimated travel time to the hospital from PBS is between 15 and 30 minutes, depending on traffic condition.

Site-Specific Field Work Plan
Disposition of Investigation-Derived Waste
at the Former Plum Brook Ordnance Works
Sandusky, Ohio

Prepared by:

IT Corporation
312 Directors Drive
Knoxville, Tennessee 37923

Submitted to:

Commander
U.S. Army Corps of Engineers
Nashville District
Post Office Box 1070
Nashville, Tennessee 37202-1070

Revision 1

December 1995

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1.0 Introduction

This document is intended to provide field operational procedures for the disposition of investigation-derived wastes (IDW), generated during recent investigative activities at the former Plum Brook Ordnance Works (PBOW) in Sandusky, Ohio. This field work plan will be used in conjunction with the site-specific safety and health plan (SSHP) prepared as a separate document. Low levels of nitroaromatic compounds, volatile organic compounds, and several heavy metals were detected in the site soils and groundwater during the most recent investigation (Dames and Moore, 1995).

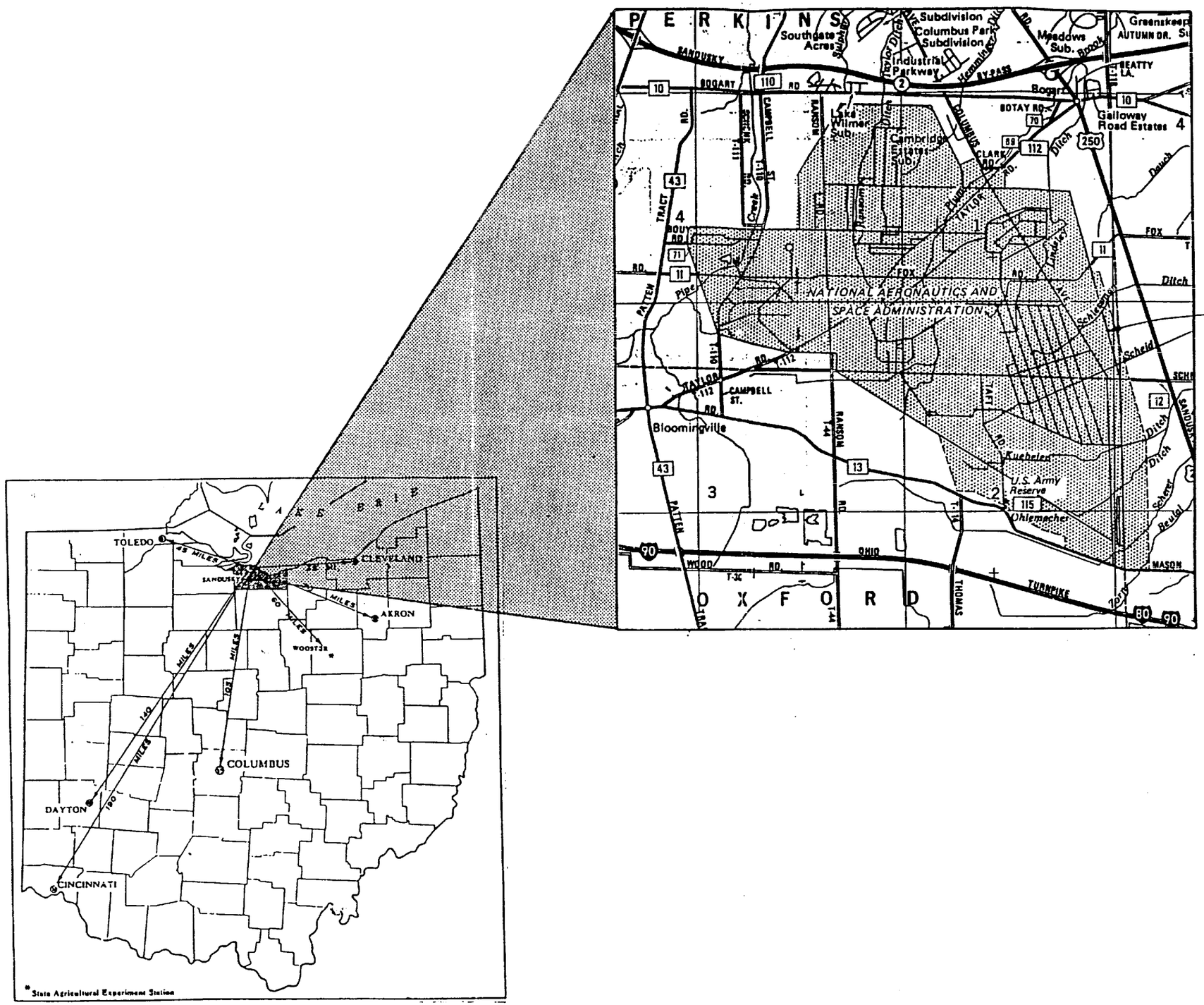
The former PBOW site, currently owned by the National Aeronautics and Space Administration (NASA), is located near Sandusky, Ohio. Figure 1-1 shows the site location.

2.0 Type and Storage of IDW

A total of 241 drums of IDW and several wooden core boxes are currently stored at the site. The IDW includes well development water, purge water, decontamination water, soil cuttings from soil borings and monitoring well borings, rock core from the installation of monitoring wells, used sampling equipment, and disposable personal protective equipment (PPE). All IDW are stored in 55-gallon steel drums, with the exception of the rock core, which was stored in wooden core boxes. All IDW drums were placed on wooden pallets and covered with tarps. During a recent site visit by U.S.Army Corps of Engineers (USACE) and IT Corporation (IT), it was noted that some of the existing tarps covering drums have become badly shredded. A complete IDW drum inventory is provided in Table 2-1.

3.0 Locations of IDW Drums

Drums containing IDW are located in two segregated staging areas as shown in Figure 3-1. Staging area 1 is located immediately north of the Pentolite Road, west of the Warehouse E-9 (Building 9201 on NASA PBS Site Map, Appendix B). A total of 177 drums are stored in this area. Staging Area 2 is located inside the Igloo 9155, off the North Magazine Road in the Magazine Area. A total of 64 drums are stored in this area. The steel door to the igloo 9155 was locked and the key can be obtained from the Environmental Office of the NASA



FORMER PLUM BROOK ORDNANCE WORKS BOUNDARY

FIGURE 1-1
VICINITY MAP

FORMER PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO

INTERNATIONAL TECHNOLOGY CORPORATION

STARTING DATE: 4-26-89	INITIATOR: D. BURTON	DATE LAST REV.: 2-27-90	DRAWING NO.: 409658-B-WP08
DRAWN BY: S. MOORE	PROJ. MGR.: D. BURTON	DRAWN BY: P.L. SUAREZ	PROJECT NO.: 409658

BRUNING 72425

KD00834

TABLE 2-1
IDW DRUM INVENTORY

Row	Drum #	Source of IDW	Drum Contents	Date
A	1-25	Site Wide	PPE/Sampling Waste	10/94 - 1/95
B	26	TNTA-MW10	Soil	10/15/94
	27	TNTA-MW11	Soil	10/15/94
	28	TNT Area A	Soil Cuttings	10/25/94
	29	TNT Area A	Soil Cuttings	10/29/94
	30	TNT Area B	Soil Cuttings	10/15/94
	31	TNT Area B	Soil Cuttings	10/14-15/94
	32	TNTB-MW12	Soil	10/14/94
	33	Background	Soil Cuttings	10/30/94-11/02/94
	34	TNT Area C	Soil Cuttings	10/12/94
	35	TNTC-MW4	Soil	10/12-13/94
	36	TNTC-MW5	Soil	10/13-14/94
	37	TNTC-MW5	Soil	10/13-14/94
	38	TNTC-MW6	Soil	10/16/94
	39	TNTC-MW3	Soil	10/12/94
	40	TNTC-MW4	Soil	10/12-13/94
	41	TNTA-MW11	Post Hole Soil	11/16/94
	42	TNTA-MW10	Post Hole Soil	11/15/94
	43	TNTC-MW3	Post Hole Soil	11/16/94
	44	TNTC-MW4	Post Hole Soil	11/16/94
	45	TNTC-MW5	Post Hole Soil	11/16/94
	46	TNTC-MW6	Post Hole Soil	11/16/94
	47	PB-PR-MW7	Post Hole Soil	11/15/94
	48	PB-PR-MW8	Post Hole Soil	11/15/94
	49	PB-PR-MW9	Post Hole Soil	11/15/94
	50	PB-WA-MW1	Post Hole Soil	11/16/94
	51	PB-BED-MW13	Post Hole Soil	11/16/94
	52	PB-BED-MW14	Post Hole Soil	11/16/94
	53	PB-BED-MW17	Post Hole Soil	11/15/94
	54	PB-BED-MW16	Post Hole Soil	11/16/94
	55	PB-BED-MW19	Post Hole Soil	11/16/94
	56	PB-BED-MW20	Post Hole Soil	11/16/94
C	57	PB-PR-S_?_	Soil	10/28/94
	58	PB-PR-MW8 (S14)	Soil	11/7/94
	59	PB-PR-S6	Soil	10/29/94
	60	PB-PR-MW9/S19	Soil	11/1/94
	61	PB-PR-S15	Soil	10/30/94
	62	PB-PR-S16	Soil	11/2/94
	63	PB-PR-S2,S5	Soil	10/28/94
	64	PB-PR-MW9/S19	Soil	11/1/94
	65	PB-PR-S12	Soil	10/30/94
	66	PB-PR-S6,S9	Soil	10/29/94
	67	PB-PR-MW7	Soil	10/31/94
	68	PB-PR-S10,S11	Soil	10/29/94
	69	PB-PR-S14/MW8	Soil	11/7/94
	70	PB-PR-MW7	Soil	10/31/94
	71	Pentolite Rd. RWP	Soil Cuttings	10/30/94

TABLE 2-1

Row	Drum #	Source of IDW	Drum Contents	Date
C (cont.)	72	PB-WA-MW2	Soil	10/27/94
	73	PB-WA--S18	Soil	10/18-19/94
	74	PB-WA-MW1	Soil	10/17-18/94
	75	PB-WA-MW1	Soil	10/17-18/94
	76	West Area RWP	Soil Cuttings	10/17/94
	77	West Area RWP	Sediment	10/26/94
	78	PB-WA-MW2	Soil	11/13/94
	79	PB-BED-MW13, 14, 15, 16	Rock Core Samples	10/94-11-94
	80	PB-BED-MW17, 18, 20	Rock Core Samples	10/94-11-94
	WCB	PB-BED-MW14, 15, 17	Rock Core Samples	10/94-11-94
D	81	PB-BED-MW13	Soil	10/14/94
	82	PB-BED-MW13	Soil	10/14/94
	83	PB-BED-MW13	Soil	10/14/94
	84	PB-BED-MW13	Soil	10/14/94
	85	PB-BED-MW14	Soil	10/18/94
	86	PB-BED-MW14	Soil	10/18/94
	87	PB-BED-MW15	Soil	10/19/94
	88	PB-BED-MW15	Soil	10/15/94
	89	PB-BED-MW15	Soil	10/19/94
	90	PB-BED-MW16	Soil	10/15/94
	91	PB-BED-MW16	Soil	10/15/94
	92	PB-BED-MW16	Soil	10/15/94
	93	PB-BED-MW16	Soil	10/16/94
	94	PB-BED-MW16	Soil	10/16/94
	95	PB-BED-MW17	Soil	10/26/94
	96	PB-BED-MW17	Soil	10/26/94
	97	PB-BED-MW17	Soil	10/26/94
	98	PB-BED-MW17	Soil	10/26/94
	99	PB-BED-MW18	Soil	10/25/94
	100	PB-BED-MW18	Soil	10/25/94
	101	PB-BED-MW18	Soil	11/15/94
	102	PB-BED-MW18	Soil	10/25/94
	103	PB-BED-MW19	Soil	11/10/94
	104	PB-BED-MW20	Soil	10/29/94
	105	PB-BED-MW20	Soil	10/29/94
E	106	PB-TNTA-MW10,1	Purge Water	12/7/94
	107	PB-TNTA-MW10	Purge Water	11/7/94
	108	PB-TNTA-MW11	Purge Water	11/7/94
	109	MK-MW24	Purge Water	11/11/94
	110	MK-MW22	Purge Water	11/10/94
	111	MK-MW23	Purge Water	11/10/94
	112	MK-MW17	Purge Water	11/10/94
	113	MK-MW16	Purge Water	11/10/94
	114	PB-TNTC-MW6	Purge Water	11/8/94
	115	PB-TNTC-MW5	Purge Water	12/7/94
	116	PB-TNTC-MW5	Purge Water	11/7/94
	117	PB-WA-MW2	Purge Water	11/10/94

TABLE 2-1

Row	Drum #	Source of IDW	Drum Contents	Date
E (cont.)	118	IT-MW02	Purge Water	11/10/94
	119	IT-MW05	Purge Water	11/15/94
	120	PB-PR-MW7	Purge Water	12/6/94
	121	PB-PR-MW8	Purge Water	12/10/94
	122	PB-PR-MW9	Purge Water	11/10/94
	123	PB-BED-MW13	Purge Water	12/10/94
	124	PB-BED-MW13	Purge Water	12/11/94
	125	PB-BED-MW13	Drill Water	11/14/94
	126	PB-BED-MW13	Drill Water	10/14/94
	127	PB-BED-MW13	Drill Water	10/14/94
	128	PB-BED-MW13	Drill Water	11/14/94
	129	PB-BED-MW13	Drill Water	10/14/94
	130	PB-BED-MW13	Drill Water	11/14/94
F	131	PB-BED-MW14	Purge Water	11/14/94
	132	PB-BED-MW14	Drill Water	10/18/94
	133	PB-BED-MW14	Drill Water	11/12/94
	134	PB-BED-MW14	Drill Water	10/18/94
	135	PB-BED-MW14	Purge Water	12/11/94
	136	PB-BED-MW15	Drill Water	11/11/94
	137	PB-BED-MW15	Drill Water	10/19/94
	138	PB-BED-MW15	Purge Water	12/11/94
	139	PB-BED-MW15	Drill Water	11/11/94
	140	PB-BED-MW15	Drill Water	11/11/94
	141	PB-BED-MW15	Drill Water	10/19/94
	142	PB-BED-MW15	Purge Water	12/11/94
	143	PB-BED-MW16	Core Water	10/30/94
	144	PB-BED-MW16	Core Water	10/30/94
	145	PB-BED-MW16	Drill Water	10/15/94
	146	PB-BED-MW16	Drill Water	10/16/94
	147	PB-BED-MW16	Drill Water	10/16/94
	148	PB-BED-MW16	Purge Water	12/7/94
	149	PB-BED-MW17	Purge Water	12/11/94
	150	PB-BED-MW17	Drill Water	11/12/94
	151	PB-BED-MW17	Drill Water	11/12/94
	152	PB-BED-MW18	Purge Water	11/11/94
	153	PB-BED-MW18	Drill Water	10/25/94
	154	PB-BED-MW18	Drill Water	11/2/94
	155	PB-BED-MW18	Drill Water	11/2/94
	156	PB-BED-MW18	Drill Water	11/2/94
	157	PB-BED-MW18	Drill Water	10/25/94
	158	PB-BED-MW18	Drill Water	11/2/94
	159	PB-BED-MW18	Purge Water	12/10/94
	160	PB-BED-MW18	Drill Water	10/25/94
G	161	PB-BED-MW19	Purge Water	12/10/94
	162	PB-BED-MW19	Purge Water	12/10/94
	163	PB-BED-MW19	Drill Water	11/13/94
	164	PB-BED-MW19	Drill Water	11/13/94
	165	PB-BED-MW19	Drill Water	11/13/94
	166	PB-BED-MW19	Drill Water	11/10/94
	167	PB-BED-MW19	Drill Water	11/10/94

TABLE 2-1

Row	Drum #	Source of IDW	Drum Contents	Date
G (cont.)	168	PB-BED-MW19	Drill Water	11/10/94
	169	PB-BED-MW20	Drill Water	10/29/94
	170	PB-BED-MW20	Purge Water	11/15/94
	171	PB-BED-MW20	Purge Water	11/15/94
	172	PB-BED-MW20	Drill Water	11/13/94
	173	PB-BED-MW20	Drill Water	11/13/94
	174	PB-BED-MW20	Drill Water	10/29/94
	175	PB-BED-MW20	Drill Water	10/29/94
	176	Reactor-2	Purge Water	12/7/94
	177	Reactor-2	Purge Water	12/7/94

WCB - Wooden Core Boxes include Core Samples from:
PB-BED-MW14
PB-BED-MW15
PB-BED-MW17

Total of 11 Core Boxes

TABLE 2-1
IDW DRUM INVENTORY

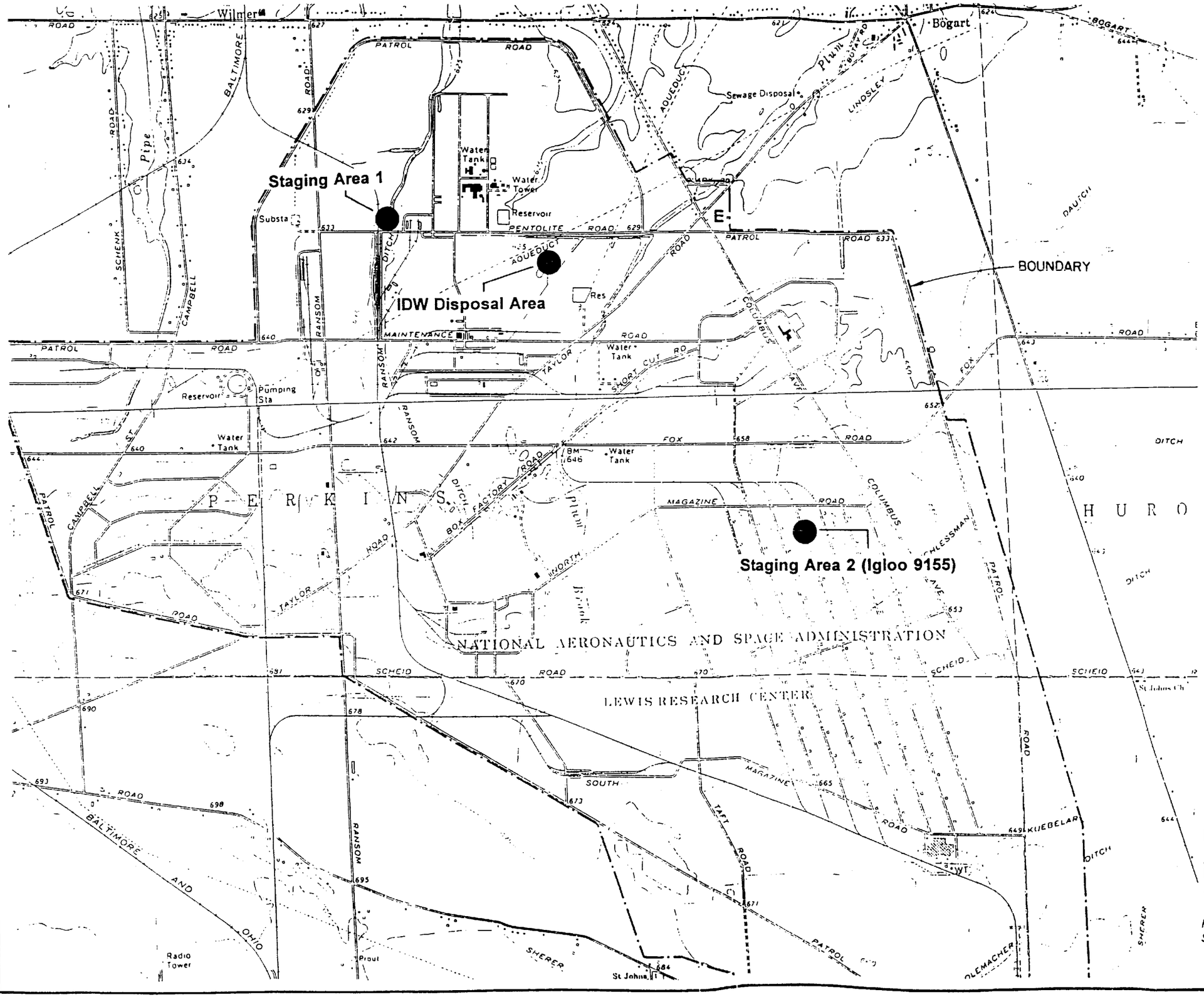
Igloo 9155 Drum Staging Area

Drum #	Source of IDW	Drum Contents	Date
178	Decon area and hand auger decon	Decon Water	10/18/94
179	Decon area and hand auger decon	Decon Water	10/17/94
180	PB-BED-MW20	Drill Water	11/13/94
181	PB-BED-MW20	Drill Water	11/13/94
182	PB-BED-MW14	Drill Water	11/12/94
183	PB-BED-MW14	Drill Water	11/12/94
184	PB-BED-MW17	Drill Water	11/12/94
185	Decon area and hand auger decon	Decon Water	11/10/94
186	Decon area and hand auger decon	Decon Water	11/2/94
187	Decon area and hand auger decon	Decon Water	11/2/94
188	Decon area and hand auger decon	Decon Water	10/27/94
189	Decon area and hand auger decon	Decon Water	10/17/94
190	Decon area and hand auger decon	Decon Water	Oct-94
191	Decon area and hand auger decon	Decon Water	10/31/94
192	Decon area and hand auger decon	Decon Water	11/1/94
193	Decon area and hand auger decon	Decon Water	10/18/94
194	Decon area and hand auger decon	Decon Water	10/27/94
195	Decon area and hand auger decon	Decon Water	Oct-94
196	Decon area and hand auger decon	Decon Water	11/2/94
197	Decon area and hand auger decon	Decon Water	10/14/94
198	Decon area and hand auger decon	Decon Water	10/14/94
199	Decon area and hand auger decon	Decon Water	10/14/94
200	Decon area and hand auger decon	Decon Water	10/26/94
201	Decon area and hand auger decon	Decon Water	11/4/94
202	Decon area and hand auger decon	Decon Water	10/16/94
203	Decon area and hand auger decon	Decon Water	11/1/94
204	Decon area and hand auger decon	Decon Water	10/14/94
205	Decon area and hand auger decon	Decon Water	10/14/94
206	Decon area and hand auger decon	Decon Water	10/19/94
207	Decon area and hand auger decon	Decon Water	10/19/94
208	Decon area and hand auger decon	Decon Water	10/31/94
209	Decon area and hand auger decon	Decon Water	10/14/94
210	Decon area and hand auger decon	Decon Water	11/2/94
211	Decon area and hand auger decon	Decon Water	10/16/94
212	PB-BED-MW17	Drill Water	10/27/94
213	PB-BED-MW17	Drill Water	11/12/94
214	Decon area and hand auger decon	Decon Water	10/27/94
215	Decon area and hand auger decon	Decon Water	10/28/94
216	Decon area and hand auger decon	Decon Water	11/1/94
217	Decon area and hand auger decon	Decon Water	10/14/94
218	Decon area and hand auger decon	Decon Water	10/14/94
219	Decon area and hand auger decon	Decon Water	10/14/94
220	Decon area and hand auger decon	Decon Water	10/14/94

TABLE 2-1

Igloo 9155 Drum Staging Area
(Continued)

Drum #	Source of IDW	Drum Contents	Date
221	Decon area and hand auger decon	Decon Water	10/13/94
222	Decon area and hand auger decon	Decon Water	10/26/94
223	Decon area and hand auger decon	Decon Water	10/17/94
224	Decon area and hand auger decon	Decon Water	10/14/94
225	Decon area and hand auger decon	Decon Water	10/14/94
226	Decon area and hand auger decon	Decon Water	10/14/94
227	Decon area and hand auger decon	Decon Water	10/14/94
228	Decon area and hand auger decon	Decon Water	10/17/94
229	Decon area and hand auger decon	Decon Water	10/18/94
230	Decon area and hand auger decon	Decon Water	10/27/94
231	Decon area and hand auger decon	Decon Water	Oct-94
232	Decon area and hand auger decon	Decon Water	10/17/94
233	Decon area and hand auger decon	Decon Water	11/2/94
234	Decon area and hand auger decon	Decon Water	11/2/94
235	Decon area and hand auger decon	Decon Water	10/18/94
236	Decon area and hand auger decon	Decon Water	10/18/94
237	Decon area and hand auger decon	Decon Water	10/14/94
238	Decon area and hand auger decon	Decon Water	10/27/94
239	Decon area and hand auger decon	Decon Water	Oct-94
240	Flume west of Engineering Building	Excavation Water	11/1/94
241	Flume west of Engineering Building	Excavation Water	11/1/94



SOURCE: USGS SANDUSKY QUADRANGLE OHIO 7.5 MINUTE SERIES (TOPOGRAPHIC) REVISED 1979

USGS KIMBALL QUADRANGLE OHIO 7.5 MINUTE SERIES (TOPOGRAPHIC) 1969

FIGURE 3-1

LOCATION OF IDW STAGING AREAS AND PROPOSED DISPOSAL SITE

FORMER PLUM BROOK ORDNANCE WORKS SANDUSKY, OHIO

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWING NO.: 409658-B-WP09	
PROJECT NO.: 409658	
INITIATOR: D. BURTON	
PROJ. MGR.: D. BURTON	
STARTING DATE: 4-26-89	DATE LAST REV.:
DRAWN BY: S. MOORE	DRAWN BY:

BRUNING 72425

PBS located in the Building 7141 (see Appendix B). Figures 3-2 and 3-3 present an illustration of the layout of each drum by drum number in Staging Areas 1 and 2, respectively.

4.0 On-Site Disposition of IDW

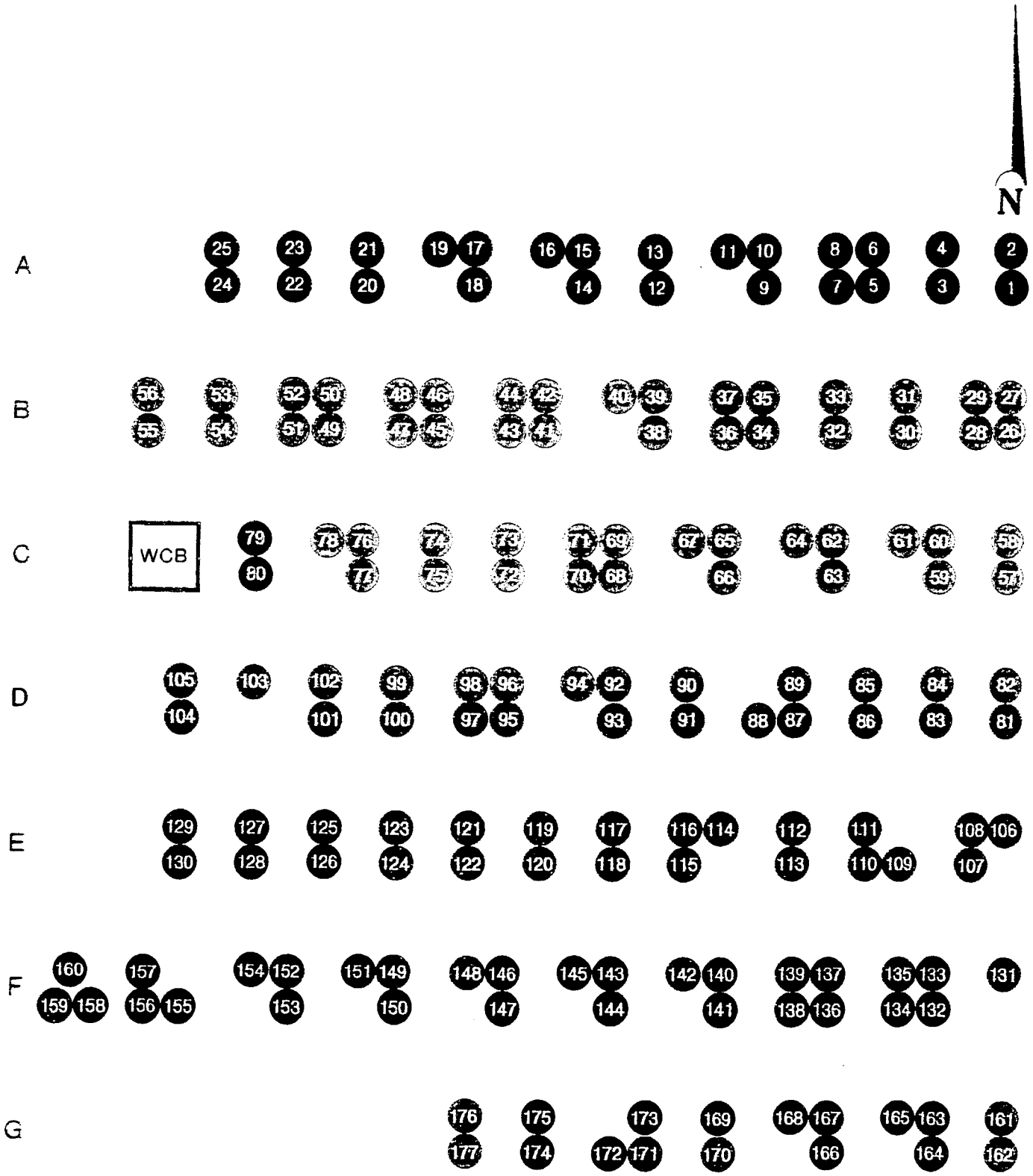
All field activities to be conducted by IT personnel will be coordinated with NASA PBS environmental office.

During the December site visit by USACE and IT, a designated IDW disposal area has been tentatively selected. The area is located within the Pentolite Road Red Water Pond (PRRWP), south of the Pentolite Road. IT Corporation conducted an environmental investigation at PRRWP in 1989 and referred to this area as "the Waste Disposal Area #1" and stated that areas of shallow soil contamination by metals and nitroaromatic compounds were evident (IT, 1991). The detailed location of the selected IDW disposal area is shown in Figure 3-4 and is also shown in the aerial photograph located in Appendix B. The analytical results of soil and surface water samples collected from PRRWP by IT are presented as Appendix C to support the proposed IDW disposal area as being an area of contamination.

During on-site disposal of IDW, precaution will be made to prevent migration of potential contamination from IDW. This may include, as appropriate, construction of berms around the disposal area and fill in holes on the ground which may serve as a preferential pathway for downward infiltration.

Before IDW is disposed of on-site, each IDW container will be checked for identification, content, and volume, and recorded in a field log as shown on Figure 4-1. IDW will be disposed of as specified:

> ***Solid IDW:*** Solid IDW, including soil cuttings, drill cutting, and rock cores, will be disposed of by spreading the soils on the surface in the designated area. After spreading solid IDW in the designated area, a front-end loader or similar equipment will be used to backfill and compact the soil to prevent adverse erosion.
>
> ***Aqueous IDW:*** Aqueous IDW will be poured on the ground within the designated area.
>
> ***PPE:*** IDW consisting of disposable PPE will be double-bagged and placed in an industrial dumpster for disposal at an off-site industrial landfill.

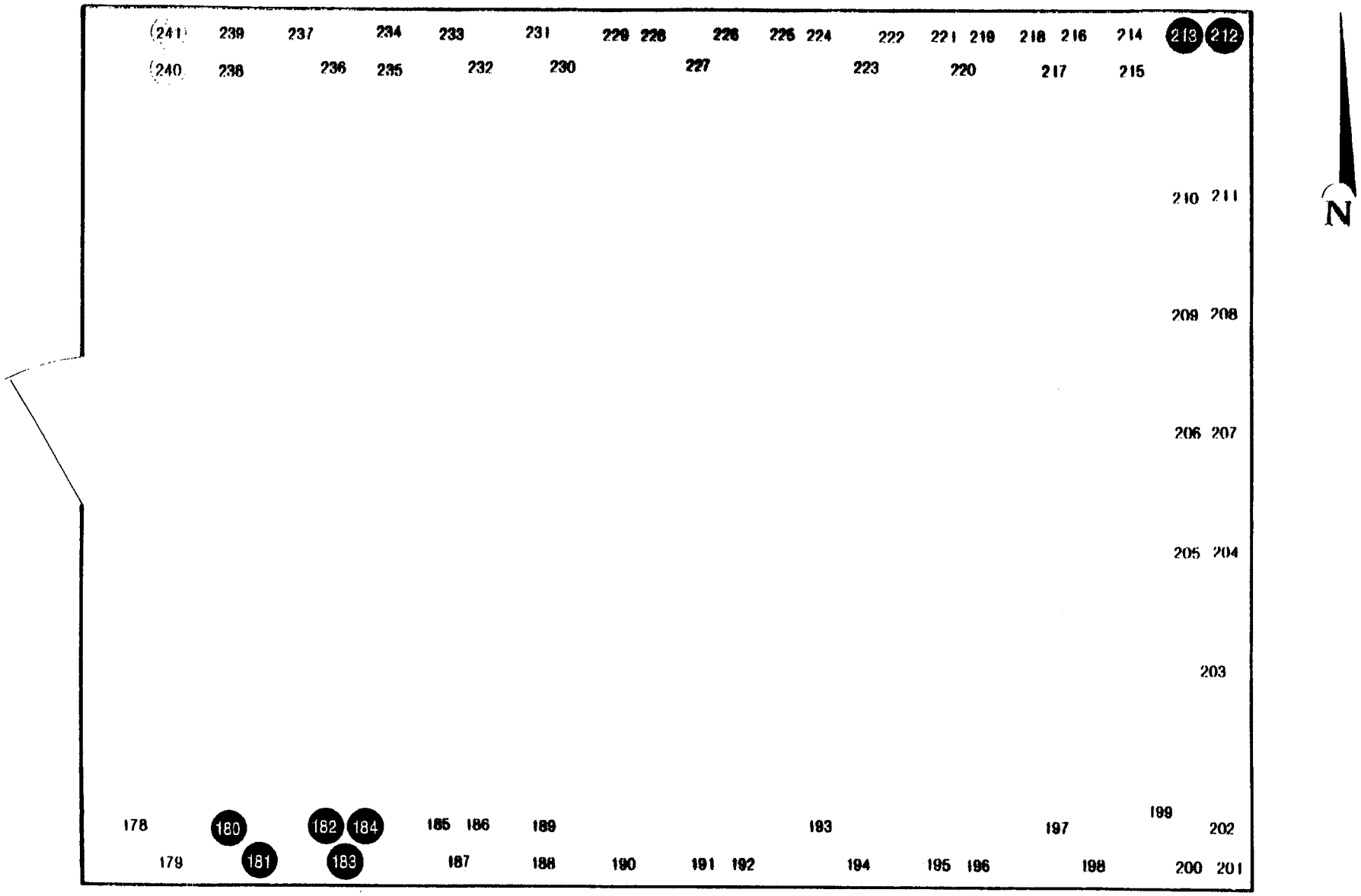


DRUM CONTENTS KEY: (for individual contents, see Table 2-1)

- Personal Protective Equipment / Sampling Waste
- Soil / Sediment
- Rock Core Samples
- Purge Water
- Drill Water

WCB = Wooden Core Boxes

Figure 3-2
Location of Drums
Containing IDW at Staging Area 1
Plum Brook Ordnance Works
Sandusky, Ohio



DRUM CONTENTS KEY:

● Drill Water

Decon Water

( ) Excavation Water

(not to scale)

Figure 3-3
Location of Drums
Containing IDW at Staging Area 2
Plum Brook Ordnance Works
Sandusky, Ohio

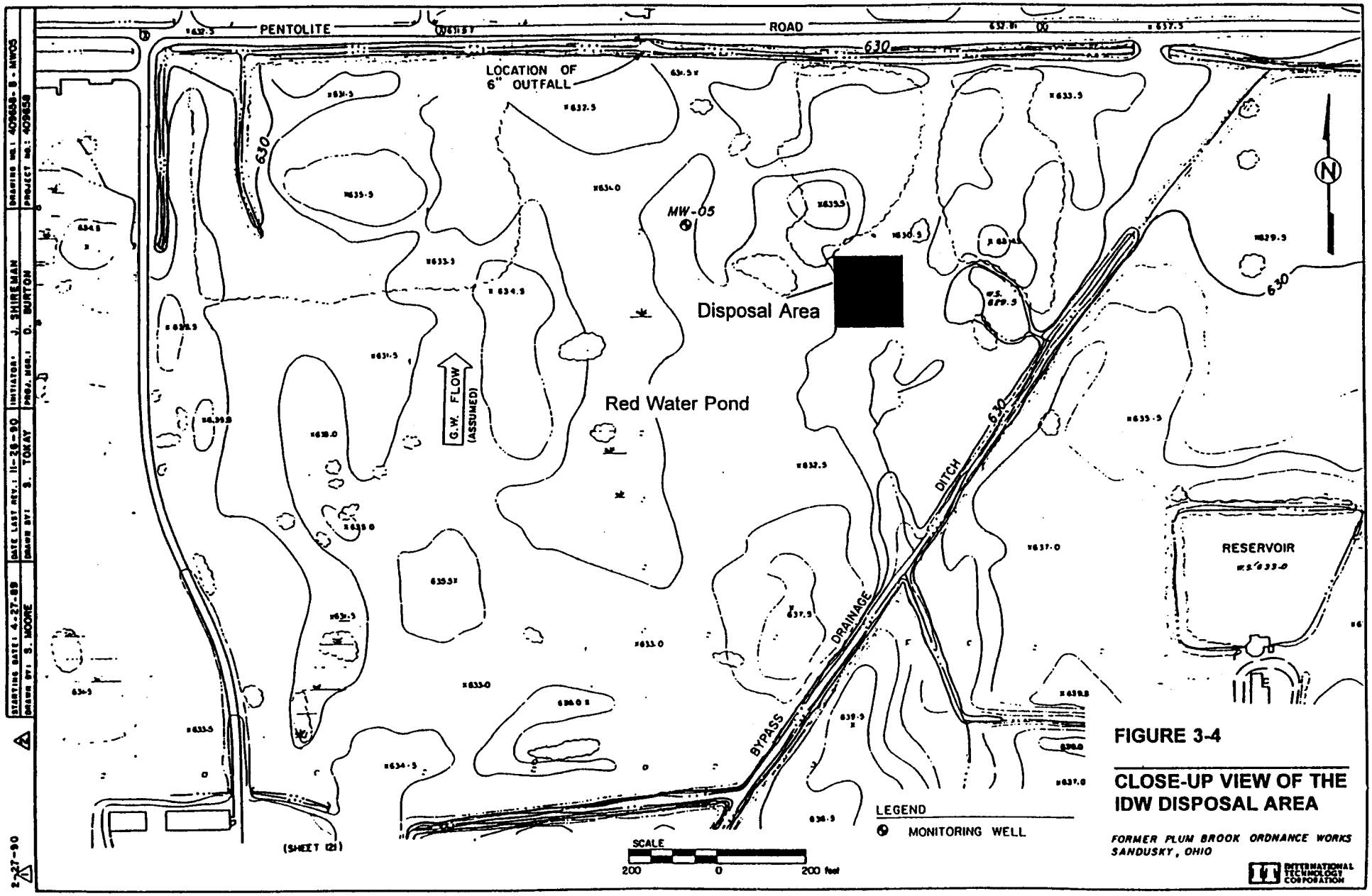


FIGURE 3-4

CLOSE-UP VIEW OF THE IDW DISPOSAL AREA

FORMER PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO

Figure 4-1

Field Log for IDW Disposition

Staging Area	Row Number	Drum #	Drum Contents	Drum Volume	Date of Disposition	Note

Removal, lifting, opening, transport, and disposal of IDW drums require the use of a front-end loader, a pick-up truck, a drum dolly (for use inside the igloo), and an adjustable wrench. Operation of field equipment will follow safety procedures as specified in the SSHP.

5.0 Decontamination Requirement

No decontamination of equipment will be needed. Drums will be rinsed with tap water after being emptied/drained. Usable and unusable drums will be segregated and will be staged at the site. Rinse water will be poured on the ground within the designated area. Potable water source is readily available at the site.

6.0 Project Organization and Responsibilities

The project team will be IT and IT's approved subcontractors.

The IT team has identified management and technical personnel who will participate in this project. Project manager Don Burton, Professional Engineer (PE), will have the responsibility for contract management, overall project execution, and allocation of resources necessary to implement the work plan and safety and health plan. Melissa Smith, Certified Industrial Hygienist (CIH), will be the safety and health officer in charge of health and safety issues related to the field activities. The project geologist and site safety and health officer, George H. Yu, Registered Professional Geologist (RPG), will coordinate field operations and ensure efficient and effective information transfer among team members. Other key IT associates are identified within the organization and will serve in their respective roles for the completion of this field effort.

IT services to be used for this work are primarily located in Knoxville, Tennessee and include:

- Project Management
- Health and Safety
- Contract Administration.

Guidance will be provided to individuals and their activities will be coordinated by the project manager to ensure that overall project goal and objectives are met. Additional IT technical

staff will be available throughout the course of the project. The project manager will determine needs as they arise and obtain the appropriate resources accordingly.

7.0 Reference

Dames and Moore, 1995a, ***Investigation-Derived Waste Report, Plum Brook Ordnance Works, Hazardous and Toxic Waste Investigation,*** March 22, 1995.

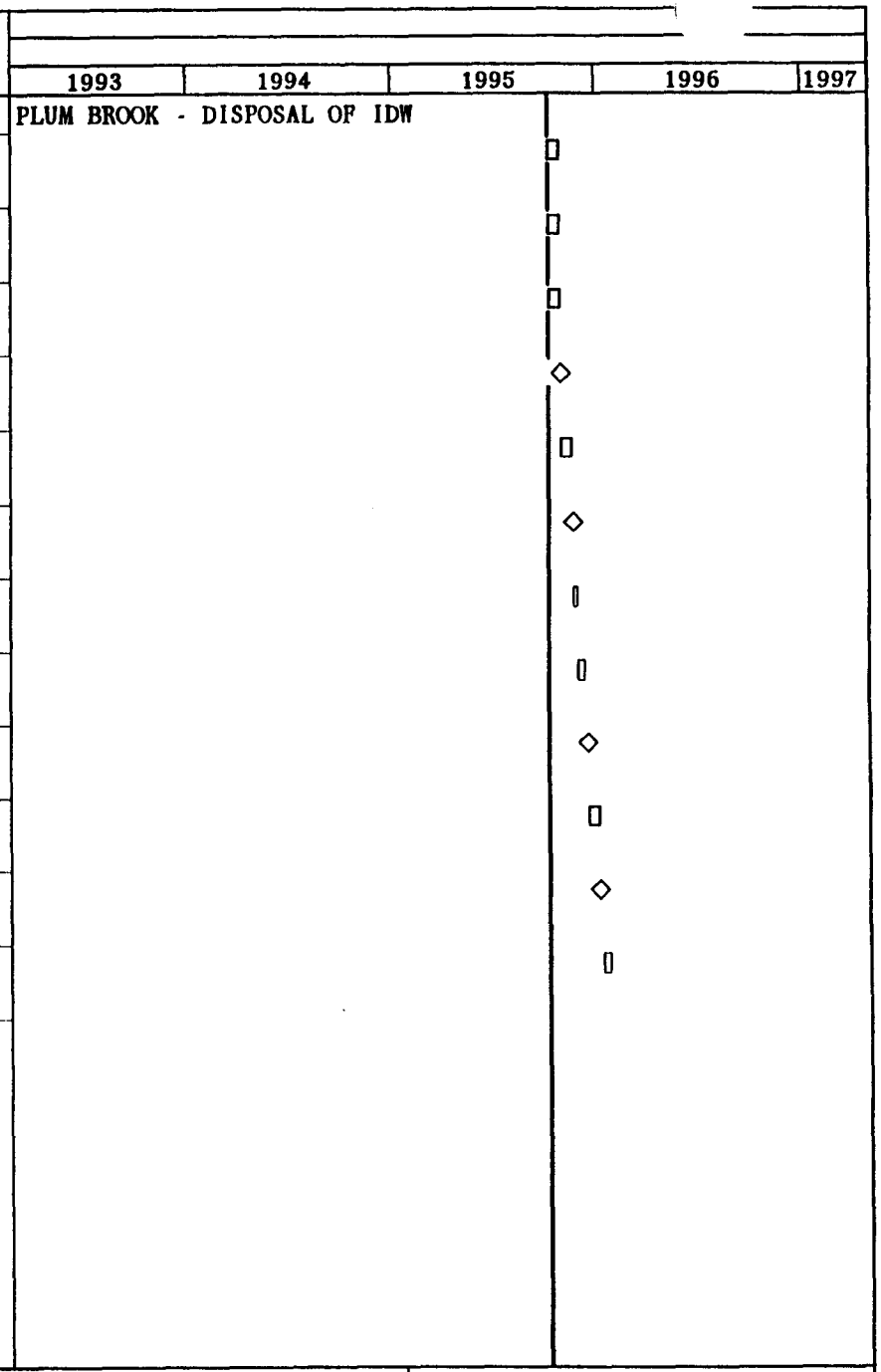
Dames and More, 1995b, ***Record Review Report, Plum Brook Ordnance Works, Sundusky, Ohio***. April 27, 1995

IT Corp., 1991, ***Conclusions and Recommendations for the Contamination Evaluation at the Former Plum Brook Ordnance Works, Sundusky, Ohio***. January 1991.

APPENDIX A

PROJECT SCHEDULE

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	REM DUR
REVIEW EXISTING DATA & ISSUE RECOMMENDAT	10OCT95	31OCT95	22
SITE SPECIFIC HEALTH & SAFETY PLAN	10OCT95	31OCT95	22
SITE SPECIFIC SAMPLING AND ANALYSIS PLAN	10OCT95	31OCT95	22
SUBMIT DRAFT SSHSP AND SSAP		31OCT95	0
REGULATORY REVIEW OF WORK PLAN	1NOV95	20NOV95	20
RECEIVE COMMENTS		22NOV95	0
RESPOND TO COMMENTS	23NOV95	29NOV95	7
PREPARE FINAL WORK PLAN	1DEC95	12DEC95	12
SUBMIT FINAL WORK PLAN		18DEC95	0
REGULATORY REVIEW OF FINAL WORK PLAN	19DEC95	8JAN96	21
APPROVAL OF FINAL WORK PLAN		8JAN96	0
ON-SITE DISPOSAL OF IDW	15JAN96	26JAN96	11



Plot Date 15DEC95
Data Date 10OCT95
Project Start 10OCT95
Project Finish 26JAN96

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

NCOE PBWD Sheet 1 of 1

USACE - NASHVILLE DISTRICT
PLUM BROOK - DISPOSAL OF IDW

CONSTRAINT
NARROCK

SCHEDULE REVISIONS

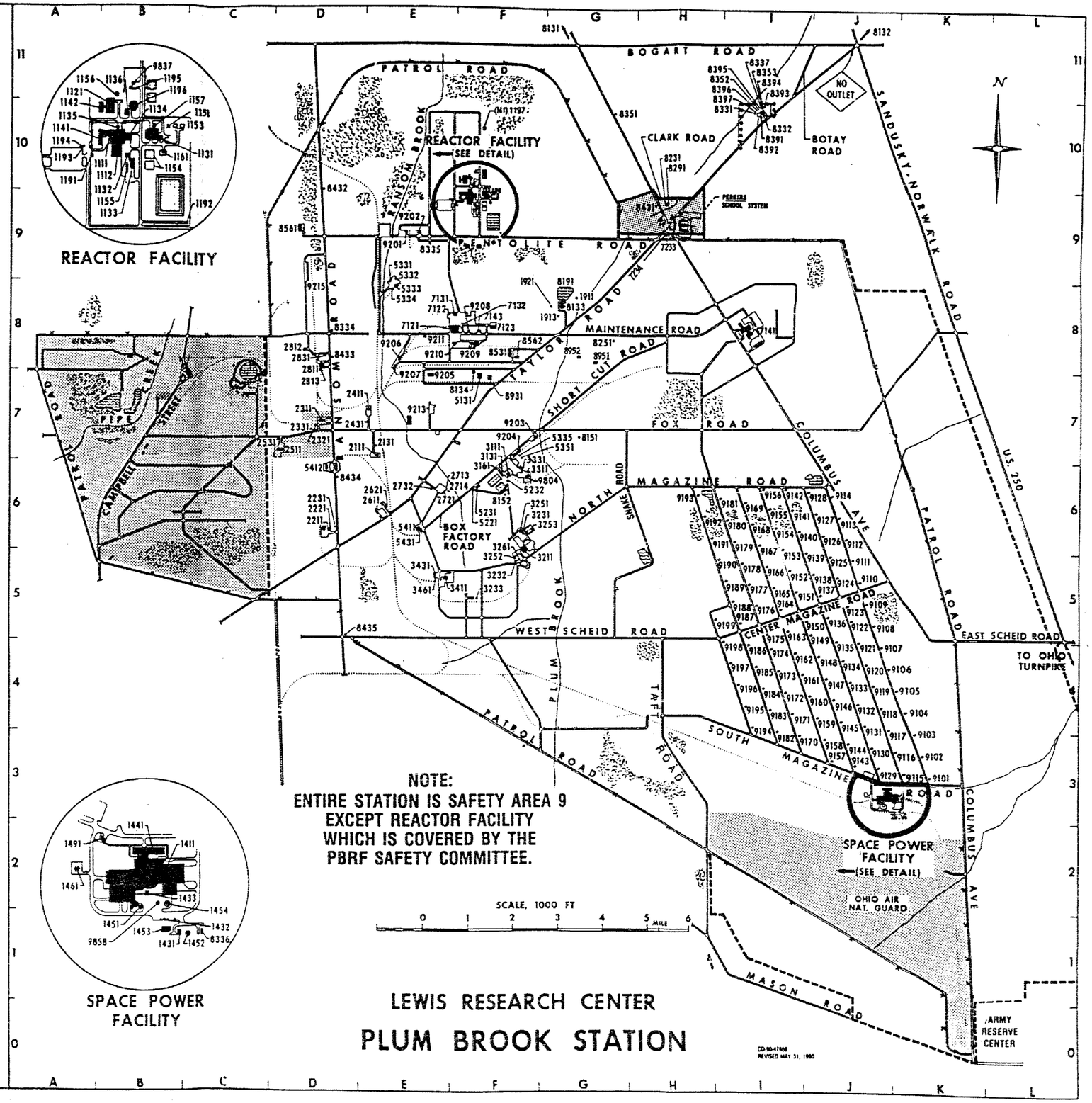
Date	Revision	Checked	Approved

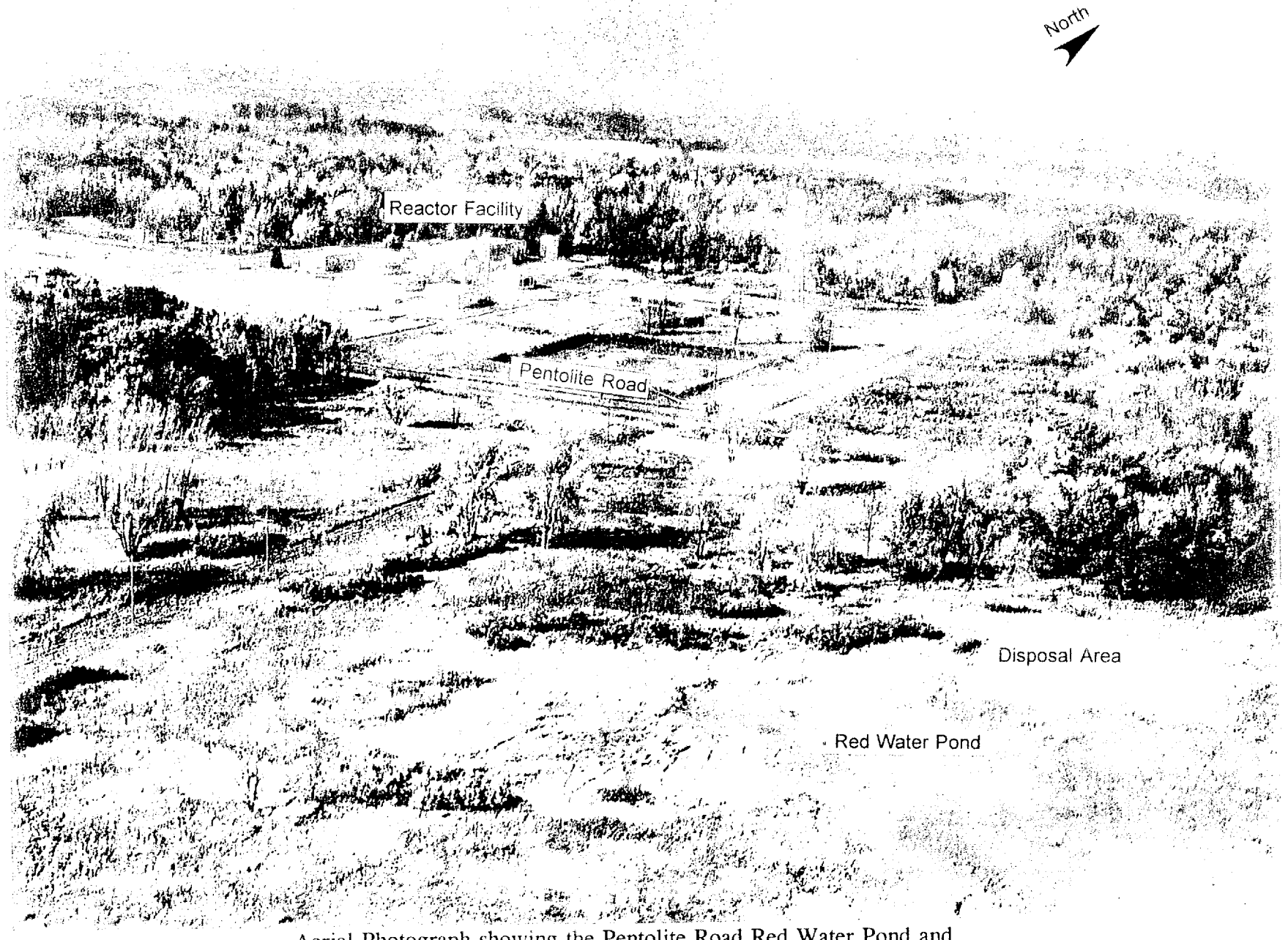
APPENDIX B

NASA PLUM BROOK STATION SITE MAP AND AERIAL PHOTOGRAPH

1111 REACTOR BUILDING. F-9
1112 REACTOR HOT LABORATORY. F-9
1121 REACTOR ATS BUILDING. F-10
1131 REACTOR SERV. EQUIP. BLDG. F-9
1132 REACTOR FAN HOUSE. F-9
1133 REACTOR WASTE HANDLING BLDG. F-9
1134 REACTOR PRIMARY PUMP HOUSE. F-9
1135 REACTOR GAS SERVICES BLDG. F-10
1136 REACTOR COMPRESSOR BLDG. F-10
1141 REACTOR OFFICE & LABORATORY. F-9
1142 REACTOR OFFICE BUILDING. F-10
1151 REACTOR WATER TOWER. F-10
1153 REACTOR SLUDGE BASINS. F-10
1154 REACTOR COLD RETENTION BASINS. F-9
1155 REACTOR HOT RETENTION BASINS. F-9
1156 REACTOR ATS WATER STORAGE TANK (200K GAL). F-10
1157 REACTOR PRECIPITATOR. F-10
1161 REACTOR SUBSTATION (E). F-9
1191 REACTOR SECURITY BUILDING. F-9
1192 REACTOR EFFLUENT METERING STA. F-9
1193 REACTOR WEATHER TOWER HOUSE. E-9
1194 REACTOR WEATHER TOWER. E-9
1195 REACTOR CRYOGENIC AND GAS SUPPLY SYSTEM. F-10
1196 REACTOR GAS STOR. STRUC. F-10
1197 REACTOR MONITORING STATION (N1) F-10
1411 SPF TEST BUILDING. J-3
1431 SPF WATER TREATMENT BLDG. K-3
1432 SPF LN2 SERVICE BUILDING. J-3
1433 SPF BOTTLE STORAGE BUILDING. J-3
1441 SPF OFFICE BUILDING. J-3
1451 SPF STACK. J-3
1452 SPF WATER TOWER (G). K-3
1453 SPF COOLING TOWER. J-3
1454 SPF LN2 TANK (200K GAL.). J-3
1461 SPF SUBSTATION (H). J-3
1491 SPF SECURITY BUILDING. J-3
1911 100 KW WIND TURBINE. G-8
1913 WIND TURBINE WEATHER TOWER. G-8
1921 WTG SHOP G-8
2111 A SITE TEST BUILDING. E-7
2131 A SITE BOILER HOUSE. E-7
2211 C SITE TEST BUILDING. D-6
2221 C SITE SHOP BUILDING. D-6
2231 C SITE BOILER HOUSE. D-6
2311 D SITE TEST BUILDING. D-7
2321 D SITE SHOP BUILDING. D-7
2331 D SITE BOILER HOUSE. D-7
2411 E SITE TEST BUILDING. E-7
2431 E SITE BOILER HOUSE. E-7
2511 F SITE TEST BUILDING. D-7
2531 F SITE BOILER HOUSE. D-7
2611 I SITE TEST BUILDING. E-6
2621 I SITE SHOP BUILDING. E-6
2713 J SITE J5 TEST BUILDING. E-6
2714 J SITE J5 CONTROL TANK. E-6
2721 J SITE SHOP BUILDING. E-6
2732 J SITE BOILER HOUSE. E-6
2811 K SITE TEST BUILDING. D-8
2812 K SITE CONTROL BUILDING D-8
2813 K SITE VACUUM EQUIPMENT BUILDING D-8
2831 K SITE BOILER HOUSE D-8
3111 B1 TEST STAND. F-6
3131 B1 PUMP AND SHOP BUILDING. F-6
3161 B1 SUBSTATION (D). F-6
3211 B2 TEST BUILDING. F-5/6
3231 B2 REFRIGERATION BUILDING. F-6
3232 B2 UTILITY SERVICE BUILDING. F-5
3233 B2 LN2 TRANSFER BUILDING. F-5
3251 B2 COOLING TOWER. F-6
3252 B2 COOLING TOWER (TEST BLDG.). F-5
3253 B2 RETENTION POND (2.5M GAL). F-6
3261 B2 SUBSTATION (G). F-5
3311 B3 TEST STAND. F-6
3331 B3 BOILER HOUSE. F-6
3411 HTF TEST BUILDING. E-5
3431 HTF BOILER AND ELECTRICAL SWITCHGEAR HOUSE. E-5
3461 HTF SUBSTATION (F). E-5
5131 AIR COMPRESSOR BUILDING. F-7
5221 SHOP BUILDING. F-6
5231 BOILER BUILDING. F-6
5232 VALVE HOUSE. F-6
5331 GAS HANDLING HELIUM BUILDING. E-9
5332 GAS HANDLING N2 BUILDING. E-9
5333 GAS HANDLING H2 BUILDING. E-8
5334 GAS HANDLING STORAGE BLDG. E-8
5335 LH2 STOR. DEWAR CONT. BLDG. F-7
5351 LH2 STORAGE DEWAR (200K GAL). F-7
5411 B CONTROL AND DATA BUILDING. E-6
5412 H CONTROL AND DATA BUILDING. D-6
5431 GUARANTEE POWER BUILDING. E-6
7121 MAINTENANCE SHOP. E/F-8
7122 CARPENTER SHOP. E-8
7123 LOCOMOTIVE SHOP. F-8
7131 GARAGE. F-8
7132 VEHICLE SERVICE STATION. F-8
7141 ENGINEERING BUILDING. I-8
7143 CHEMICAL LABORATORY. F-8
7233 PLANT PROTECTION BUILDING. H-9
7234 PLANT PROTECTION BOILER HOUSE H-9
8132 RYE BEACH PUMPING STATION. J-11
8133 PUMP STATION NO. 1. G-8
8134 PUMP HOUSE. F-7
8151 RAW WATER TOWER (D). G-7
8152 RAW WATER TOWER (E). F-6
8191 RESERVOIR NO. 1. G-8
8231 DOMESTIC WATER PUMP HOUSE. H-9
8251 DOMESTIC WATER TOWER (A). G-8
8291 DOMESTIC WATER RESERVOIR. H-9
8331 SEWAGE PUMPING STATION. I-10
8332 SEWAGE PUMP & CHLORINE BLDG. I-10
8334 SEWAGE LIFT STATION. D-8
8335 SEWAGE LIFT STATION. E-9
8336 SEWAGE TREATMENT PLANT-SPF. K-3
8337 SEWAGE CHEMICAL BUILDING. I-10
8351 SEWAGE LIFT STATION. G-10
8352 SEWAGE CHLORINE CONTACT TANK. I-10
8353 SEWAGE MIXING CHAMBER. I-10
8391 SEWAGE SETTLING TANK. I-10
8392 SEWAGE DIGESTING TANK. I-10
8393 SEWAGE SLUDGE BEDS. I-10
8394 SEWAGE SLUDGE BEDS. I-10
8395 SEWAGE FLOCCULATOR AND FINAL SETTLING TANK. I-10
8396 SEWAGE DIVERSION CHAMBER. I-10
8397 SEWAGE TRICKLING FILTER. I-10
8431 GAS METER HOUSE. H-9
8432 GAS METER HOUSE. D-9/10
8433 GAS METER HOUSE. D-7
8434 GAS METER HOUSE. D-6
8435 GAS METER HOUSE. D-5
8531 POWER HOUSE NO. 1. F-8
8561 SUBSTATION A. D-9
8562 SUBSTATION B. F-8
8931 INCINERATOR BUILDING. F-7
8951 FUEL STORAGE TANK. G-8
8952 FUEL STORAGE TANK. G-8
9101-9199 MAGAZINES H/K-3/6
9201 WAREHOUSE. E-9
9202 WAREHOUSE. E-9
9203 WAREHOUSE. F-7
9204 WAREHOUSE. F-7
9205 WAREHOUSE. E-7
9206 WAREHOUSE. E-8
9207 WAREHOUSE. E-8
9208 WAREHOUSE. F-8
9209 WAREHOUSE. F-8
9210 WAREHOUSE. F-8
9211 WAREHOUSE. E-8
9213 WAREHOUSE. E-7
9215 WAREHOUSE. D-9
9804 GN_2 FARM. F-6
9837 GHE FARM. F-10

(This Site Map is provided by NASA Plum Brook Station)





Aerial Photograph showing the Pentolite Road Red Water Pond and the designated IDW Disposal Area (Photograph provided by NASA PBS)

APPENDIX C

ANALYTICAL RESULTS OF SOIL AND SURFACE WATER SAMPLES COLLECTED FROM THE PENTOLITE ROAD RED WATER POND DURING THE ENVIRONMENTAL INVESTIGATION IN 1989

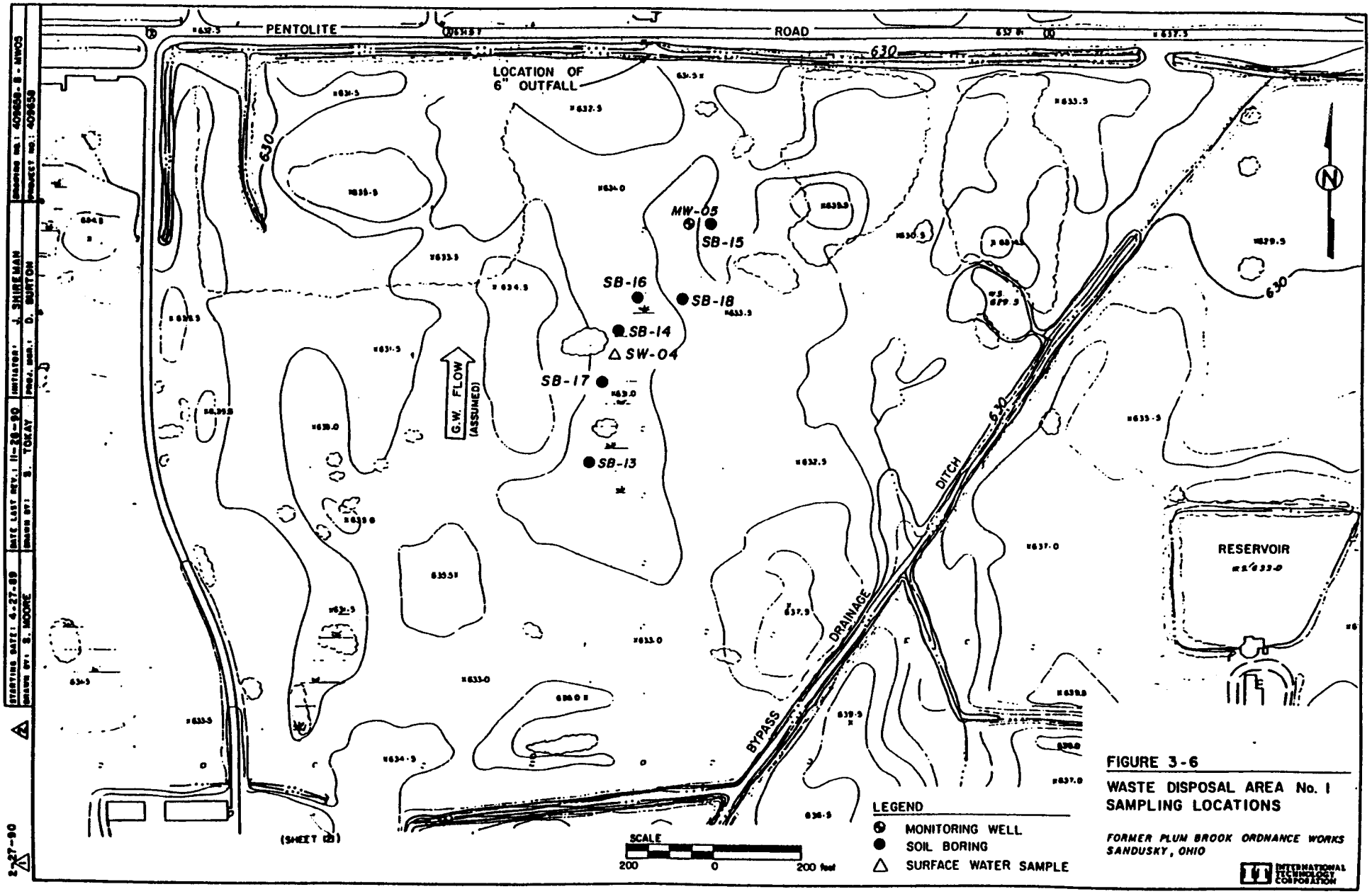


FIGURE 3-6

WASTE DISPOSAL AREA No. 1
SAMPLING LOCATIONS

FORMER PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO

STARTING DATE: 4-27-89 | DATE LAST REV.: 11-28-89 | INITIATOR: J. SHIREMAN | DRAWING NO.: 409650-B-MW05
DRAWN BY: S. MOORE | DRAWN BY: S. TOKAY | PROJ. MGR.: D. BURTON | PROJECT NO.: 409650

2-27-90

Table 4-4
Plum Brook Ordnance Works
Soil Samples - Metal Analysis
Results in mg/kg (ppm)

	Borehole Number											-----Background-----	
Compound	SB-11	SB-12	Method Blank PBSC0897	SB-13 0-2	SB-14 0-2	SB-15 2-4	SB-15 4-6	SB-16 0-2	SB-16 4-6	SB-17 0-2	SB-18 0-2	SB-19 0-2	SB-19 0-2 Field Dup.
METALS													
Arsenic	2.3	3U	0.2	2.7U	1.8	4.6	3.2U	2.8	4.9	0.8	1.3	9.4	3U
Barium	48.4	52.2	0.2U	56.7	51.6	14.1	31.1	16.5	27.1	21.9	20.2	35.2	45.4
Cadmium	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Chromium	11	10	1U	13	10	8	10	8	6	6	5	10	8
Iron	12,800	18,000	44	15,500	12,000	10,900	13,100	5,910	7,700	8,370	6,890	23,800	9,800
Lead	14	14	3U	9	11	11	12	5	7	8	11	25	18
Maganese	211	262	0.2U	263	146	181	244	78.2	435	141	97.6	18.0	15.5
Mercury	0.5U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
Selenium	2.5U	0.5U	0.2U	1.0U	0.9U	0.5U	1.7U	0.7U	1.0U	0.4U	2.0U	0.2	1.0U
Silver	0.5U	U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Sodium	539	1,660	20U	2,590	3,420	96.9	125	1,040	2,820	1,240	1,980	40.1	40

U - Compound was analyzed for but not detected; value listed is detection limit for that sample.
Method Blank PSC0836 applies to samples SB-13 0/2, SB-14 0/2, SB-15 2/4, SB-15 4/6, SB-16 0/2, SB-16 4/6, SB-17 0/2, SB-18 0/2, SB-19 0/2 replicate.

Table 4-3
Plum Brook Ordnance Works Soil Samples -
Nitro-Aromatic Explosive Compounds
Results in mg/kg (ppm)

Compound	SB-11	SB-12	SB-13 0-2'	SB-14 0-2'	SB-15 2-4'	SB-15 4-6'	SB-16 0-2'	SB-16 4-6'	SB-17 0-2'	SB-18 0-2'	Background SB-19 0-2'	Background SB-19 Field Duplicate
1,3,5-Trinitrobenzene	0.050U	3.4	0.73	14	0.050U	0.050U	1.2	15	0.67	10	0.050U	0.050U
1,3-Dinitrobenzene	0.050U	0.59	0.62	3.7	0.50U	0.050U	0.55	6.4	0.25U	5.0	0.050U	0.050U
Nitrobenzene	0.048U	U	0.24U	2.5U	0.048U	0.048U	0.48	2.4U	0.24U	2.4U	0.048U	0.048U
2,4,6-Trinitrotoluene	0.074U	0.68	0.37U	3.7U	0.074U	0.074U	0.74	3.7U	0.37U	3.7U	0.074U	0.074U
2,6-Dinitrotoluene	0.053U	U	0.26U	2.6U	0.053U	0.053U	0.53	2.7U	0.27U	2.7	0.053U	0.053U
2,4-Dinitrotoluene	0.11U	0.91	2.2	20	0.11U	0.11U	3.2	16	1.1	19	0.11U	0.11U
Nitrotoluene	0.048U	U	0.24U	2.4U	0.048U	0.48U	0.48	2.4U	0.24U	2.4U	0.048U	0.048U

U - Compound was analyzed for but not detected; value listed is the detection limit for the sample.

Table 4-2
Plum Brook Ordnance Works Soil Samples -
Volatile and Semivolatile Organic Compounds
Results in ug/kg (ppb)

Compound	Method Blank VB1101	Method Blank 4983	SB-13 0-2'	SB-14 0-2'	SB-15 2-4'	SB-15 4-6'	SB-16 0-2'	SB-16 4-6'	SB-17 0-2'	SB-18 0-2'	Background SB-19 0-2'	Background SB-19 Field Duplicate	Soil Rinsate 1	Soil Rinsate 2
VOLATILE ORGANIC														
Acetone	10U	NA	170	80	12U	12U	160	54	150	12U	3,000E	11,000	10U	80
Toluene	5U	NA	6U	6U	1J	6U	6U	6U	25J	1J	9	7U	5U	5U
Methylene chloride	2J	NA	6	9	7	7	5J	8	5J	6U	7	6J	5U	5U
SEMIVOLATILE ORGANIC														
2,6-Dinitrotoluene	NA	330U	180J	1,700	390U	390U	320J	1,500	82J	1,000	440U	860U	NA	NA
2,4-Dinitrotoluene	NA	330U	1,600	11,000	390U	390U	1,900	7,300	740	5,900	440U	860U	NA	NA
Bis(2-ethylhexyl) phthalate	NA	79J	230J	180J	320J	450	340J	500J	280J	250J	410J	270J	NA	NA

U - Compound was analyzed for but not detected; value listed is the detection limit for that sample.
J - Indicates a value less than the detection limit; value listed is estimated.
E - Compound exceeded CLP calibration range.
NA - Not analyzed.

Table 4-10. Plum Brook Ordnance Works Surface Water Samples -
Volatile and Semivolatile Organic Compounds
Results in mg/liter (ppb)

	Method Blank EB1030	Method Blank BL4982	SW-01	SW-02	SW-03	SW-04	SW-04 Field Duplicate	Trip Blank JJ7938
Volatile Organics								
Acetone	10U	NA	10U	10U	10U	3J	10U	10U
Methylene chloride	3J	NA	5U	5U	5U	5U	5U	3J
4-methyl-2-pentanone	1J	NA	10U	10U	10U	10U	10U	10U
Semivolatile Organics								
bis(2-ethylhexyl)phthalate	NA	2J	10U	10U	10U	10U	10U	NR
butylbenzylphthalate	NA	10U	10U	10U	10U	10U	19	NR

U - Compound was analyzed for but not detected; value listed is the detection limit for that sample.
J - Indicates a value less than the detection limit; values listed are estimated.
NR - Not required.
NA - Not analyzed.

Table 4-11. Plum Brook Ordnance Works
Surface Water Samples - Nitro-Aromatic Explosive Compounds
Results in mg/liter (ppm)

Compound	Method Blank BL0141	SW-01	SW-02	SW-03	SW-04	SW-04 Field Duplicate
1,3,5-trinitrobenzene	0.050U	0.050U	0.050U	0.050U	0.050U	0.050U
1,3-dinitrobenzene	0.050U	0.050U	0.050U	0.050U	0.050U	0.050U
Nitrobenzene	0.048U	0.048U	0.048U	0.048U	0.048U	0.048U
2,4,6-trinitrotoluene	0.074U	0.074U	0.074U	0.074U	0.074U	0.074U
2-6-dinitrotoluene	0.053U	0.053U	0.054U	0.054U	0.054U	0.054U
2,4-dinitrotoluene	0.11U	0.11U	0.11U	0.11U	0.11U	0.11U
Nitrotoluene	0.048U	0.048U	0.048U	0.048U	0.048U	0.048U

U = Compound was analyzed for but not detected.

Table 4-12. Plum Brook Ordnance Works
Surface Water Samples - Metals
Results in mg/liter (ppm)

Compound	Water Quality Criteria	SMCL	PMCL	Method Blank	SW-01	SW-02	SW-03	SW-04	SW-04 Field Duplicate
Arsenic	0		0.03	0.002U	0.003	0.002U	0.003U	0.002U	0.003U
Barium	N/L		5	0.002U	0.058	0.029	0.047	0.079	0.19
Cadmium	10		0.005	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Chromium	N/L		0.1	0.05U	0.01U	0.01U	0.01U	0.01	0.04
Iron	N/L	0.3		0.01U	0.89	0.36	1.1	9.6	40.6
Lead	50		0.02	0.03U	0.03U	0.03U	0.03U	0.03U	0.03U
Manganese	N/L	0.05		U	0.030	0.021	0.039	0.37	0.94
Mercury	10		0.002	NR	0.001U	0.001U	0.001U	0.001U	0.001U
Selenium	10		0.05	0.002U	0.004U	0.004U	0.003U	0.003U	0.004U
Silver	50		0.05	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Sodium	N/L			U	0.2U	6.7	7.1	92.7	102

U - Compound was analyzed for but not detected; value listed is the detection limit for the sample.
NR - Not required.
MCL - Maximum contaminant level.
SMCL - Secondary contaminant level.
PMCL - Proposed contaminant level.
N/L - Not listed.

All regulatory limits given are derived from the Safe Drinking Water Act and the Clean Water Act.

RESPONSE TO COMMENTS BY STATE OF OHIO ENVIRONMENTAL PROTECTION AGENCY (Ohio EPA) ON THE DRAFT IDW DISPOSITION AT PLUM BROOK ORDNANCE WORKS (PBOW)

Reference: *Letter dated November 22, 1995 from Mr. Archie Lunsey II, OhioEPA to Mr. Don Burton, P.E., IT Corporation*

GENERAL COMMENTS

Comment 1: **The premise of the draft Disposition of Investigation Derived Waste of the former Plum Brook Ordnance Works, Sandusky, Ohio involves the deposition of investigation derived waste (IDW) within a designated location on-site. Further, the deposition area shall be located within an area of pre-existing contamination. Upon evaluation of the SSFWP premise, the Ohio EPA recommends that the deposition of IDW be limited to a discrete location in order to minimize the potential for contaminant migration to areas for which no contamination or significant contamination currently exists.**

The area subject to designation as the location for deposition of the IDW should be incorporated within the appropriate section of the SSFWP e.g. graphic representation of the deposition area relative to existing areas of contamination (AOC).

Response: The USACE Nashville District and IT Corporation conducted a site visit to the PBOW site from December 5 through 7. One of the objectives of the site visit was to locate IDW disposal areas on-site. The location that is tentatively selected for IDW disposition is located south of Pentolite Road, west of a ditch, within the area of the Pentolite Road Red Water Pond (PERWP). Shallow soil, surface water, and groundwater samples were collected and analyzed during 1989 investigation by IT and contamination by metals and nitroaromatic compounds was detected in soil samples (IT, January 1991). The area is relatively flat and slightly higher in elevation than the surrounding areas. A map showing the location of this area has been included in the work plan, along with an aerial photograph and analytical results for soil and surface water samples collected during 1989 investigation.

SITE-SPECIFIC FIELD WORK PLAN

Comment 1: **(4.0 On-Site Disposition of IDW) "Figure 4-0" represents a typographic error and should be corrected to read "Figure 4-1".**

Response: On line 2 of page 2, the text "... shown on Figure 4-1." is correct. No correction is needed.

Comment 2: **The "Drum Contents" section of the Field Log for IDW Disposition represents a typographic error and should be corrected to read "Drum Contents". The "Drum Volume" section of the Field Log for IDW Disposition represents a typographic error and should be corrected to read "Drum Volume".**

Response: These two typo errors have been corrected.

Comment 3: **The SSFWP proposes that the disposal of aqueous IDW be accomplished in the following manner: (a.) pouring the aqueous IDW on the ground within the AOC or (b.)pouring the aqueous IDW in a shallow disposal trench within the AOC. The proposed "trench" disposal of aqueous IDW presents an opportunity for contaminant migration such that the aqueous IDW contact with solid IDW within the trench could result in a greater concentration of contamination available for vertical migration. Therefore, the Ohio EPA recommends that the method of IDW disposal be option (a.).**

Response: Aqueous IDW will be disposed of using option (a) per reviewer's recommendation. The work plan has been revised.

SITE-SPECIFIC SAFETY AND HEALTH PLAN

Comment 1: **(3.1 Scope of Work). The SSSHP indicates the solid IDW will be disposed of by spreading the soils on the ground surface; however, Section 4.0 "On-Site Disposition of IDW" of the SSFWP states that "solid IDW, including soil cuttings, drill cuttings, and rock cores, will be disposed of by placing the soils in a shallow trench ...". In light of the protocol delineated within the SSFWP, IT should, as a matter of consistency, revise the SSSHP to conform with the SSFWP.**

Response: Solid IDW will be disposed of by spreading on the ground surface in a designated area. The section 3.1 of the SSSHP has been rechecked to conform with the revised SSFWP.

Comment 2: **(11.3.6 Emergency Contact/Notification Listing). The number for the Ohio EPA Emergency Spill Number (1-800-282-9378) should be incorporated.**

Response: This telephone number has been included in the emergency phone list of the SSSHP per reviewer's request.

Comment 3: **(11.3.8 Direction to the nearest Hospital). The Ohio EPA recommends that a written set of instruction as to how to reach the nearest hospital be incorporated. Further, the written instructions should accompany Appendix C "Site and Hospital Location Map".**

Response: A short instruction has been included in Appendix C of the SSSHP.

RESPONSE TO COMMENTS BY NASA PLUM BROOK STATION ON THE DRAFT IDW DISPOSITION AT PLUM BROOK ORDNANCE WORKS

Reference: *Letter dated December 4, 1995 from Keith Peacook and Amy Bower, NASA Plum Brook Station to Mr. Don Burton, P.E., IT Corporation*

WORK PLAN

Comment 1: Page 1, line 3. Delete 2nd "at the former".

Response: The 2nd "at the former" was deleted from the text.

Comment 2: Page 2, line 6. The acronym "AOC" has been used in the past by the COE to mean "area of concern". Request you confirm with them (Doug Webb) the acceptability of this new usage.

Response: AOC has been eliminated from the text to avoid confusion with the past use of this acronym.

Comment 3: Figure 4-1. Two minor typos, "Drum Contents" and "Drum Volume".

Response: These typo errors have been corrected.

HEALTH AND SAFETY PLAN

Comment 1: Page vii. The acronym NPDES stands for "National Pollution Discharge Elimination System".

Response: The list of acronym has been revised to refer NPDES to "National Pollutant Discharge Elimination System".

Comment 2: Page 1-1. Sect.1.2 - the first line should be amended to read "is specifically located in the Perkins, Milan, Huron, and Oxford Townships". In the last line the word consists should be made past tense (consisted), and another line should be included stating that "NASA currently owns 6,400 acres of the original site".

Response: Section 1.2 has been revised to include the changes as indicated by the reviewers.

Comment 3: Page 1-2. In line 3 insert the ward "Township" after Perkins. In fact, many other parcels of land were sold off besides this one, reducing the original 9,000 acres to the current 6,400 acres. A good catchall phrase to cover this might be to replace the last line with the lines "Over the years several thousand acres of the original PBOW have been sold off by NASA.

The details of these sales are listed in the Site Management Plan".

Response: The word "Township" was added after "Perkins" as suggested. The suggested catchall phrase regarding the land transactions at PBS has been added as suggested.

Comment 4: Page 3-1. In line 4, replace "Effluent Standards" with "Elimination System " (see comment for page vii above).

Response: Change has been made per reviewer's comment.

Comment 5: At the end of the last line in section 3.1 we would like to see direction given that any no longer usable drums be properly disposed of, and that those still usable will have all labelling removed and be marked as "Empty". At that point they should be properly stored so as to maintain them in good condition for future use (note that the existing tarps covering the barrels have become severely shredded).

Response: IT will coordinate with COE Nashville District to seek an appropriate way of disposing of drums after the drum contents have been emptied and washed. IT will segregate usable drums from unusable ones. One possible option might be to find a buyer to haul these drums off site. Another alternative is to keep clean and still usable drums in one of the igloos. Covering these drums with tarps on the ground is only a temporary way of staging these drums.

Comment 6: Page 9-1 In section 9.1.1 it should be mentioned that all contractor personnel, before performing any work at Plum Brook Station, are required to go through a safety orientation. This consists of a short briefing at the guard house, and the viewing of a ten minute orientation video.

Response: Section 9.1.1 has been revised to include the requirement of a safety orientation for IT employees and for IT subcontractors.

Comment 7: Page 10-3. In the last paragraph of section 10.2 it should be noted that in case of any emergency the communications Center (front gate) should be contacted by dialing 911 on any station phone or by use of a portable station radio, one of which will always be issued to the field supervisor during remote operations. The guards at the front gate will contact the proper local authorities for fire and/or medical support.

Response: Noted. Section 10.2 has been revised to include this procedure per reviewer's comment.

Comment 8: Page 11-2. In section 11.3.5, paragraph 3, the end of the first line, the words "to the Communications Center" should be added after the word

intersection. For section 11.3.6 the telephone numbers should be replaced with the phrase "contact the Communications Center and request these services. They will coordinate Station access and response".

Response: Both sections have been revised to incorporate changes as indicated. A written instruction as to how to reach the designated hospital has also been included in Appendix C per Ohio EPA comment.

Comment 9: Page 11-4. In section 11.4.2, item number 3, add the words "through the Station Communications Center" after the word services.

Response: The text has been revised to add the words as indicated.

Comment 10 Appendix C. On this map near the top is a marker for Good Samaritan Hospital. This hospital is now called Firelands Community Hospital.

Response: Noted. Good Samaritan Hospital has been changed on the map to "Firelands Community Hospital".