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NSB KINGS BAY
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CLASS 2 MODIFICATION PERMIT PART B APPLICATION NSB KINGS BAY GA
4/1/1995
ABB ENVIRONMENTAL

NSB Kings Bay Administrative Record
Document Index Number

31547-000
19.02.00.0014

CLASS 2 MODIFICATION PERMIT PART B APPLICATION

NAVAL SUBMARINE BASE KINGS BAY
KINGS BAY, GEORGIA

UNIT IDENTIFICATION CODE (UIC): N42237
CONTRACT NO. N62467-89-D-0317/094

APRIL 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

PRINTED ON RECYCLED PAPER

Georgia Department Natural Resources
205 Butler Street, S. E., Suite 1162, Atlanta, Georgia 30334
Lonice C. Barrett, Commissioner
Environmental Protection Division
Harold F. Reheis, Director
404-656-2833

September 11, 1995

CERTIFIED MAIL - RETURN RECEIPT REQUESTED
Z 369 540 027

Commanding Officer
Naval Submarine Base
1063 USS Tennessee Avenue
Kings Bay, Georgia 31547

Re: Hazardous Waste Facility Permit Modification

Dear Sir:

Your application for modification to the Hazardous Waste Facility Permit for the Naval Submarine Base Kings Bay has been reviewed and approved in accordance with the provisions of Section 391-3-11-.11(7)(d) of the Georgia Rules for Hazardous Waste Management. Enclosed is your copy of the cover page and the one changed page of the Permit, Number HW-014(S)(2), amended as requested. The expiration date of the permit remains as originally issued, September 29, 1999.

The public notice period expired without comment from the public, so no changes have been made to the permit beyond your request.

If you have questions or need further information, please contact Billy Hendricks at (404)656-2833.

Sincerely,

Harold F. Reheis

Harold F. Reheis, Director
Environmental Protection Division

cc: Capt. J.R. Allen, P.E., DPW, Subase
File: Subase (R)
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State of Georgia

Department of Natural Resources

ENVIRONMENTAL PROTECTION DIVISION

AMENDMENT TO

HAZARDOUS WASTE FACILITY PERMIT

Amendment To Permit No. HW-014(S)(2)

Effective Date Of Amendment 9/18/95

In accordance with the provisions of the Georgia Hazardous Waste Management Act and the Rules, Chapter 391-3-11, (as amended through December 26, 1994), adopted pursuant to that Act, Permit No. HW-014(S)(2) issued on 9/29/89 to: Naval Submarine Base, Kings Bay, Camden County, Georgia GA4170090001

for the following:
Storage of 68,200 gallons of hazardous waste in containers.

Is hereby amended as follows:
Redesign hazardous waste storage building and reduce permitted capacity for storage to 59,840 gallons hazardous waste in containers.
Amend Corrective Action Section III.A.2. to delete Site 12, the Army Reserve Disposal Area, Future Dry Dock, and add Site 2, Fire Fighting Pit.

Reason for Amendment:
Request of Permittee

This Permit Amendment is further subject to and conditioned upon the terms, conditions, limitations, standards, or schedules contained in or specified on the attached 1 page(s), which page(s) are a part of this Amendment. This Amendment is hereby made a part of Permit No. HW-014(S)(2) and compliance with this Amendment is hereby ordered.

Director
Environmental Protection Division

State of Georgia

Department of Natural Resources

ENVIRONMENTAL PROTECTION DIVISION

HAZARDOUS WASTE FACILITY PERMIT

Permit No. HW-014(S)(2) **Facility I.D. No.** GA4170090001

In accordance with the provisions of the Georgia Hazardous Waste Management Act and the Rules, Chapter 391-3-11, (as amended through Feb. 1, 1988), adopted pursuant to that Act,

Naval Submarine Base

is issued a Permit for the following:

Storage in containers of 68,200 gallons of hazardous wastes

at the following location:

Building 6020
Naval Submarine Base
Kings Bay, Georgia 31547

This Permit is conditioned upon compliance with all provisions of the Georgia Hazardous Waste Management Act, the Rules, Chapter 391-3-11 (as amended through Feb. 1, 1988) adopted pursuant to that Act, and any other condition of this Permit.

This Permit is subject to revocation, suspension, modification or amendment by the Director for cause including evidence of noncompliance with any of the above; or for any misrepresentation made in the application(s) dated Nov. 5, 1988 supporting data entered therein or attached thereto, or any subsequent submittals or supporting data; or for failure to disclose fully all relevant facts; or when the facility poses a threat to the environment or the health of humans.

This Permit is further subject to and conditioned upon the terms, conditions, limitations, standards, or schedules contained in or specified on the attached 11 page(s), which page(s) are a part of this Permit.

Permit Issuance Date: Sept. 29, 1989
Permit Termination Date: Sept. 29, 1999

J. Leonard Ledbetter
Director
Environmental Protection Division

Georgia Department of Natural Resources

205 Butler Street, S.E., Suite 1252, Atlanta, Georgia 30334
J. Leonard Ledbetter, Commissioner
404/656-3500

September 29, 1989

ST. MARYS PUBLIC LIBRARY
100 HERB BAUER DRIVE
ST. MARYS, GA. 31558

Commanding Officer
Naval Submarine Base
Kings Bay, Georgia 31547

Re: Hazardous Waste Facility Permit
Naval Submarine Base

Dear Sir:

In accordance with Condition I.A.5. of your existing Hazardous Waste Facility Permit, Number HW-014(S), and for the cause of your request for major modification to that Permit, said Permit is hereby revoked and reissued. The new Permit Number is HW-014(S)(2). No comments were received during the public notice period for this permitting action. The final permit reflects minor changes made by the EPD in the wording of the draft permit. This permit is effective upon issuance; however, it is subject to appeal for a period of thirty days following issuance.

The permit contains specific operating and monitoring requirements which must be met. Attached to the permit is a copy of the Georgia Rules for Hazardous Waste Management, which will be applicable during the ten (10) year life of the permit.

Should you have questions concerning this permit, please contact Mr. Billy Hendricks at 404/656-2833.

Sincerely,

J. Leonard Ledbetter

J. Leonard Ledbetter
Commissioner

JLL:bh

Enclosures

Permit Number: HW-014(S)(2)

Naval Submarine Base, Kings Bay, Georgia, GA4170090001 is hereinafter referred to as the Permittee.

SECTION I. GENERAL PERMIT CONDITIONS

A. Scope and Effect of Permit

1. The Permittee is allowed to store hazardous waste in accordance with the conditions of this permit. Any hazardous waste treatment, storage or disposal not authorized in this permit is prohibited. The Permittee must comply with the Georgia Hazardous Waste Management Act and the Rules for Hazardous Waste Management, Chapter 391-3-11, which Rules include certain portions of the Federal Hazardous Waste Regulations (found at 40 CFR 260-264, 266, 268-270, and 124). Where a citation to the Federal Regulations is made in this permit, it refers to the specific regulations adopted by EPD.

2. The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

3. Compliance with this permit does not constitute a defense to any action brought by the Director under Section 18, Emergency Powers, of the Georgia Hazardous Waste Management Act, O.C.G.A. § 12-8-75, as amended.

4. Nothing in this permit shall be construed to preclude the institution of any legal action under Section 3008 of the Federal Resource Conservation and Recovery Act or under the Georgia Hazardous Waste Management Act, O.C.G.A. §§ 12-8-81 - 12-8-82, as amended.

5. This permit may be modified, revoked and reissued, or terminated for cause as specified in Rule 391-3-11.11(7) and §270.41, 270.42 and 270.43. The filing of a request for a permit modification, revocation and reissuance, or termination or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay the applicability of any permit condition.

6. The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

B. Management Requirements

1. The Permittee shall give notice to the Director at least sixty days prior to any planned physical alterations or additions to the

permitted facility or of any planned changes in the process generating the hazardous waste which changes might affect the performance of the permitted facility.

2. The Permittee shall maintain at the facility until closure is completed and certified by an independent registered professional engineer, the following documents and amendments, revisions and modifications to these documents:

   (a) Complete copy of this permit and permit application
   (b) Waste Analysis Plan
   (c) Personnel training documents and records
   (d) Contingency plan
   (e) Closure and post-closure plans
   (f) Operating record
   (g) Inspection schedule log

3. All amendments, revisions and modifications to any plan, equipment, or cost estimates required by this permit shall be submitted to the Director for approval and permit modification as necessary.

4. When the Permittee becomes aware that the Permittee failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the Permittee shall promptly submit such facts or information.

5. The Permittee shall at all times properly operate and maintain all facilities which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of a back-up or auxiliary facility or similar systems only when necessary to achieve compliance with the conditions of this permit.

C. Monitoring and Reporting

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method from Appendix I of 40 CFR 261. Laboratory methods must be those specified in the most recent editions of Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW 846; or Standard Methods for the Examination of Water and Wastewater; (or an equivalent method as specified in the Waste Analysis Plan).

2. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this permit and records of all data used to complete the application for this permit for a period of at least 3 years from the date of the sample, measurement, report or record. These periods are automatically extended during the course of any unresolved enforcement action regarding this facility and also may be extended at any time at the Director's discretion.

3. Records of monitoring information shall include:

   (a) The date, exact place and time of sampling or measurements
   (b) The individual(s) who performed the sampling
   (c) The date(s) analyses were performed
   (d) The individual(s) who performed the analyses
   (e) The analytical techniques or methods used; the method of sample preservation; and quality assurance methods
   (f) The results of such analyses.

4. The Permittee shall report to the Director or his representative orally within 1 hour from the time the Permittee becomes aware of any circumstances resulting from the operation of the hazardous waste management facility (including periods of noncompliance) which may endanger health or the environment. This requirement includes, but is not limited to, any release or discharge to any environmental medium (including releases or discharges contained in a secondary containment structure) of any oil, hazardous material or hazardous waste, or a fire or explosion.

   The description of the occurrence shall include:

   (i) Name, address and telephone number of the owner or operator;
   (ii) Name, address, and telephone number of facility;
   (iii) Date, time and type of incident;
   (iv) Name and quantity of materials involved;
   (v) The extent of injuries, if any;
   (vi) An assessment of actual or potential hazards to the environment and human health outside the facility, where applicable; and
   (vii) Estimated quantity and disposition of released and recovered material that resulted from the incident.

5. Within fifteen days of becoming aware of any reportable incident as in C-4 above, the Permittee shall submit a written report of the incident covering the following:

   (a) Description of occurrence as in C-4 above
   (b) Cause of occurrence
   (c) Period of occurrence, including exact dates and times

(d) Time occurrence expected to continue (if not already corrected)
(e) Steps taken or planned to reduce, eliminate, and prevent recurrence.

6. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

7. The Permittee shall report instances of non-compliance, other than those described in conditions C-4 and C-6, quarterly on April 15 (covering January 1 - March 31), July 16 (covering April 1 - June 30), October 15 (covering July 1 - September 30), and January 16 (covering October 1 - December 31). The report shall cover the information requested in condition C-4 for each incident.

8. All reports or other information requested by the Director shall be signed and certified according to the requirements in §270.11.

D. Responsibilities

1. Right of Entry. The Permittee shall allow the Director of EPD, the Regional Administrator of EPA, and/or their authorized representatives, agents, or employees, upon the presentation of credentials and other documents as may be required by law to:

(a) Enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(d) Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Georgia Hazardous Waste Management Act, any substances or parameters at any location.

2. Transfer of Permits. This permit may be transferred to a new owner or operator only if it is modified or revoked and reissued pursuant to §270.41(b)(2) or §270.42(d). Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of 40 CFR Parts 264 and 270.

3. Duty to Comply. The Permittee shall comply with all conditions of this permit, except to the extent and for the duration such non-compliance is authorized by an emergency permit. Any non-compliance with this permit constitutes a violation of the Georgia Hazardous Waste Management Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application.

4. Duty to Reapply. If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must submit a complete application for a new permit at least 180 days before this permit expires.

5. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

6. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from non-compliance with this permit.

7. Duty to Provide Information. The Permittee shall furnish to the Director, within a reasonable time, any relevant information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with the permit. The Permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

8. Anticipated Non-Compliance. The Permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in non-compliance with permit requirements.

E. Definitions

For purposes of this permit, terms used herein shall have the same meaning as those in 40 CFR Parts 124, 260, 261, 264, 268 and 270, unless this permit specifically provides otherwise; where terms are not defined in the regulations or the permit, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

1. Land Disposal Facility: A facility that uses a surface impoundment, landfill, land treatment or waste pile unit to manage or dispose of hazardous waste pursuant to §12-8-66 of the Georgia Hazardous Waste Management Act, as amended, and §3004 of RCRA, as amended.

2. Hazardous waste or hazardous constituents for the purpose of this permit are those substances listed in 40 CFR Part 261 Appendices VII and VIII and Part 264 Appendix IX as revised or superseded.

3. Solid Waste Management Unit: Includes, but is not limited to, any landfill, surface impoundment, waste pile, land treatment unit, incinerator, injection well, tank (including storage, treatment, and accumulation tanks), container storage unit, wastewater treatment unit, elementary neutralization unit, transfer station, or recycling unit from which hazardous waste or hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and/or hazardous waste.

4. Release: Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of any hazardous waste or hazardous constituents.

5. Contamination: The presence of any hazardous waste or hazardous constituents in a concentration which exceeds the naturally occurring concentration of that waste or constituent in that geographical region.

6. Corrective action for prior or continuing releases from solid waste management units as well as for other releases as described in 4. above: "Corrective action" as provided for in 40 CFR §264.100, and other remedial actions for any environmental media as deemed appropriate by the Director to protect public health or the environment.

F. Conditions Related to Compliance with General Facility Standards (40 CFR Part 264 Subparts B, C, D, E, G, H)

1. The Permittee must follow the procedures and plans described in detail in the permit application dated November 5, 1988, as amended, which are hereby incorporated by reference and include at least the following:

. Waste Analysis Plan	Section C
. Contingency Plan	Section G
. Inspection Schedule	Section F-2
. Closure and Post-Closure Plans	Section I
. Training Program	Section H

2. The following activities must be carried out as prescribed in 40 CFR Part 264 Subparts B, C, D, and E.

- Security - 264.14(b) and (c)
- Repairs and inspection Log - 264.15(c) and (d)
- Annual review of training - 264.16(c)
- General requirements for ignitable, reactive and incompatible wastes - 264.17
- Design and operation - 264.31 and Maintain aisle space - 264.35
- Access to communications or alarm system - 264.34
- Testing and maintenance of equipment - 264.33
- Arrangements with local authorities - 264.37
- Amendment of contingency plan - 264.54

- Operating record - 264.73 and Disposition of records - 264.74
- Reports - 264.75 and 264.77

3. The following activities must be carried out as prescribed in 40 CFR Part 264 Subparts G and H.

   - Closure in accordance with the approved Plan - 264.113
   - Amendment of Closure Plan and Notification of Closure - 264.112(b) and (c)
   - Disposal or decontamination of equipment - 264.114
   - Certification of Closure - 264.115

G. Special Conditions Applicable to Entire Facility

1. The Permittee shall be required to certify no less often than annually that the Permittee has a program in place to reduce the volume and toxicity of hazardous waste that he generates to the degree determined by the Permittee to be economically practicable, and the proposed method of treatment, storage or disposal is that practicable method currently available to the Permittee which minimizes the present and future threat to human health and the environment in accordance with 40 CFR §264.73(b)(9).

2. The Permittee shall comply with all provisions of 40 CFR 268 (Land Disposal Restrictions) for all wastes to which they are applicable.

3. All satellite accumulation areas including those at tenant commands shall be operated in accordance with all requirements of Section 391-3-11-.08 (40 CFR 262 Subpart C). Accumulated waste at any such area shall be removed within three days of completion of accumulation to SUBASE Building 6020, or to the proper 90-day accumulation area, the Temporary Containment Areas (TCAs) at each tenant command.

SECTION II. STORAGE IN CONTAINERS

A. General

The conditions in this section apply only to the container storage area identified as Building 6020, Hazardous Waste Storage and Transfer Facility, described in Section D and depicted in Figures D-1 through D-5 of the permit application dated November 5, 1988, as amended.

B. Conditions Related Solely to Storage in Containers

1. Storage in containers is expressly limited to Building 6020, the Hazardous Waste Container Storage and Transfer Facility described in Section D of the permit application and depicted in Figure D-1.

2. The Permittee is authorized to store a maximum of 59,840 gallons of hazardous waste in containers.

3. If a container holding hazardous waste is not in good condition, or if it begins to leak, the Permittee shall transfer the hazardous waste from such container to a container which is in good condition.

4. Containers must be managed according to §264.173.

5. Spilled or leaked waste and accumulated precipitation must be managed in accordance with §264.175(b)(5).

6. Incompatible wastes and materials must be managed according to §264.177.

7. No lab-packed waste as defined in 264.316(a) through (d) shall be opened, decanted and combined with other wastes or repackaged into larger containers.

SECTION III. CORRECTIVE ACTION FOR RELEASES FROM SOLID WASTE MANAGEMENT UNITS (SWMUs) AND OTHER RELEASES

A. Applicability and Certification

1. The conditions of this Section apply to the determination of need for, and subsequent implementation of, corrective action for releases from all SWMUs and other releases, both those contained within the facility property boundary and, as required by §12-8-66 of the Georgia Hazardous Waste Management Act, those extending beyond the facility property boundary. All submittals made under this Section shall be certified in accordance with 40 CFR 270.11.

2. The conditions of this Section specifically apply to the following SWMUs or other releases identified by the RCRA Facility Assessment (RFA) report which was completed by the Director as of the effective date of this permit as those for which an RFI plan will be required under Condition III.C.1.:

   The following SWMU's as identified in NEESA report 13-086, Initial Assessment Study of Naval Submarine Base Kings Bay, Georgia:

   - Site 2, Fire Fighting Pit
   - Site 5, Army Reserve Disposal Area, Towhee Trail
   - Site 11, Old Camden County Landfill
   - Site 16, Army Reserve Disposal Area near Old Sewage Lagoon 3990

3. The conditions of this Section also apply to any other SWMUs or releases discovered subsequent to the completion of the RFA report referenced in Condition III.A.2. or not otherwise identified in the RFA report.

B. RCRA Facility Assessment (RFA)

1. For those SWMUs and releases identified in Condition III.A.3. above, the Permittee shall prepare a RFA report. The report shall describe the methods and specific actions used to determine whether a prior or continuing release of hazardous waste, hazardous constituents or hazardous waste constituents has occurred. The report must include, at a minimum, the following information and any other appropriate information necessary to determine the need for an RFI as required under Condition III.C.:
   - Type and function of unit;
   - Location of each unit on a topographic map of appropriate scale;
   - General dimensions and capacities;
   - Dates that the unit was operated;
   - Description of the wastes that were placed in the unit; and
   - Description of any known releases or spills (to include groundwater data, soil analyses, and/or surface water data).

2. The report(s) required under Condition III.B.1. shall be completed and submitted to the Director within sixty (60) days of the date of discovery of any SWMU or release.

3. The Director shall review RFA report(s) required under Condition III.B.1. and determine those SWMUs and releases from which residual contamination or continuing releases have resulted, and shall notify the Permittee whether an RFI plan will be required under Condition III.C.2. for those SWMUs or releases.

C. RCRA Facility Investigation (RFI)

1. The Permittee shall complete and submit an RFI plan for those units or releases referenced in Condition III.A.2. within six (6) months of the effective date of this permit. The plan shall include a schedule of implementation and a description of the specific actions necessary to determine the nature and extent of releases identified by the RFA report, including potential migration pathways for those releases (i.e. air, land, surface water, and groundwater), actual or potential receptors and applicable background concentrations. The Permittee must provide sufficient justification that migration through a potential pathway is not likely if a potential migration pathway associated with a release is not included in the plan. Such deletions are subject to the approval of the Director.

2. The Permittee shall complete and submit an RFI plan for those SWMUs or releases referenced in Condition III.B.3. within ninety (90) days of the date of notification under Condition III.B.3. The plan shall include a schedule of implementation and a description of the specific actions necessary to determine the nature and extent of subject releases, including sources, potential migration pathways (i.e. air, land, surface water, groundwater), actual or potential receptors and applicable background concentrations. The Permittee must provide

sufficient justification that migration through a potential pathway is not likely if a potential migration pathway associated with a release is not included in the plan. Such deletions are subject to the approval of the Director.

3. Upon approval by the Director of plan(s) required by Conditions III.C.1. and 2., the Permittee shall conduct the RFI in accordance with the schedule contained in the approved plan.

4. The Permittee shall complete and submit an RFI report in accordance with the schedule contained in the plan required by Conditions III.C.1. and 2. The report shall provide a summary of all activities undertaken during the RFI to implement the approved plan. The report shall provide a complete description of the nature and extent of all releases identified during the RFI including sources, migration pathways, actual or potential receptors and applicable background concentrations. The RFI report shall address all releases which extend beyond the facility property boundary unless the Permittee demonstrates to the Director's satisfaction that, despite the Permittee's best efforts, the Permittee was unable to obtain permission to undertake actions required by the plan(s), or such action is not necessary to protect public health or the environment.

D. Corrective Action

1. The Director shall review the RFI report required under Condition III.C.4. Upon determination that the report is complete, the Director shall specify to the Permittee those SWMUs or releases identified in such RFI report for which corrective action conforming to § 264.101(a) will be required.

2. Upon notification from the Director that corrective action is needed, the Permittee shall submit a corrective action plan in accordance with a schedule to be determined by the Director. The plan shall provide a description of the corrective measures to be taken with regard to those SWMUs or releases identified under Condition III.D.1., including a schedule of implementation for such corrective action.

3. Upon approval by the Director of any plan required by Condition III.D.2., the Permittee shall implement any required corrective action in accordance with the schedule in the approved plan.

4. If required to develop a corrective action plan under Condition III.D.2., the Permittee shall apply for a permit modification pursuant to §270.41 to incorporate the plan into the permit.

E. Interim Measures

1. The Permittee may conduct interim measures to contain, remove or treat contamination resulting from the release of hazardous constituents from a SWMU or release in order to protect public health and the

environment, upon approval by the Director. Such interim measures may be conducted concurrently with investigations required under the terms of this permit.

2. The Permittee shall notify the Director of any proposed interim measures at least thirty (30) days prior to implementation. The notice shall include a description and a schedule of implementation of any proposed interim measures.

3. The Permittee shall give notice to the Director as soon as possible of any planned changes, reductions or additions to the interim measures.

4. Incorporation of interim measures into the corrective action plan shall be done in accordance with Condition III.D.3.

5. Upon completion of interim measures, the Permittee shall complete and submit an interim measures report. The report shall provide the following information:

   i. A description of interim measures implemented;
   ii. A summary of all data or other information obtained during implementation of interim measures; and
   iii. A summary of the effectiveness of the interim measures in achieving the objective of Condition III.E.1.

F. Schedule of Compliance

1. If the Permittee at any time determines that any plan or report required under Condition III.B., C., D., or E. no longer satisfies the requirements of § 264.101 or this permit for prior or continuing releases of hazardous waste, hazardous constituents or hazardous waste constituents he must submit an amended plan or report to the Director within ninety (90) days of such determination.

2. All plans and schedules shall be subject to approval by the Director prior to implementation. The Permittee shall revise all submittals as specified by the Director.

3. For any schedule required by any plan or report, if the time required to complete any interim activity is more than one year, the schedule shall specify interim dates for the submission of reports of progress toward satisfaction of the interim requirements.

4. The results of all plans and reports shall be submitted in accordance with the approved schedule. Extensions of the due date for submittals may be granted by the Director based on the Permittee's demonstration that sufficient justification for the extension exists.

5. Upon approval by the Director all plans and schedules shall be enforceable as conditions of this permit.

NSB Kings Bay Administrative Record
Document Index Number

31547-000
19.02.00.0014

CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

In the preparation of this application for permit modification, the Contractor (ABB Environmental Services, Inc. [ABB-ES]) was required under its contract to use and incorporate data that was collected, interpreted, and assimilated by other contractors and entities not under supervision by ABB-ES. As such, ABB-ES holds no liability, either directly or implied, for any data and/or information gathered and reported by sources other than ABB-ES.

DATE: April 21, 1995

NAME AND TITLE OF CERTIFYING OFFICIAL:

Theodore W. Taylor, P.G.
Project Manager

NAME AND TITLE OF CERTIFYING OFFICIAL:

Laura B. Harris, P.G.
Project Technical Lead

(DFAR 252.227-7036)

DISTRIBUTION

Southern Division, Naval Facilities Engineering Command	1
Naval Submarine Base, Kings Bay, Georgia	7

CLASS 2 MODIFICATION TO THE PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE KINGS BAY KINGS BAY, GEORGIA

Unit Identification Number: N42237

Contract No. N62467-89-D-0317/094

Modification prepared by:

ABB Environmental Services, Inc.
2590 Executive Center Circle, East
Tallahassee, Florida 32301

Prepared for:

Department of the Navy, Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina

April 1995

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Part B Permit Application
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Naval Submarine Base Kings Bay
Kings Bay, Georgia

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LIST OF ACRONYMS

AMCCOM	Army Armament, Munitions, and Chemical Command (United States)
ANSI	American National Standards Institute
APRs	air-purifying respirators
ASTM	American Society for Testing and Materials
bls	below land surface
BOS	Base Operating Services
C	corrosive
°C	degrees Celsius
CB	citizen band
CFR	Code of Federal Regulations
COC	chain of custody
DNR	Department of Natural Resources
DOD	Department of Defense
DOSF	Defense Ordnance Support Facility
DOT	Department of Transportation
DPDO	Defense Property Disposal Office
E	endangered
EOD	explosive ordnance disposal
°F	degrees Fahrenheit
FBM	Fleet Ballistic Missile
FIA	Federal Insurance Administration
g	gram(s)
GA DNR	Georgia Department of Natural Resources
GC	gas chromatograph(y)
GC/EC	gas chromatography and electron capture
GC/MS	gas chromatography and mass spectroscopy
HBX	type of explosve
HEA	Health and Environment Assessment
HMIS	Hazardous Materials Information System
HPLC	high-performance liquid chromatography
HSWA	Hazardous and Solid Waste Amendments
I	ignitable
IAS	Initial Assessment Study
ID	identification
IED	improvised explosive device
in/yr	inches per year
IWTP	industrial waste treatment plan
mg/ℓ	milligrams per liter
mlw	mean low water
MNT	mononitrotoluene
mph	miles per hour
msl	mean sea level

LIST OF ACRONYMS (Continued)

N/A	not applicable
NEESA	Naval Energy and Environmental Support Activity
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
N.O.S.	not otherwise specified
NR	not reported
NSN	National Stock Number
OB/OD	open burning and open detonation
OBA	oxygen breathing apparatus
OP	operating procedure
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
PEP	propellants, explosives, and pyrotechnics
PETN	pentaerythritol tetranitrate
ppm	parts per million
R	reactive
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
RDX	cyclotrimethylenetrinitramine
RFI	RCRA Facility Investigation
RQ	reportable quantity
SAE	Society of Automotive Engineers
SCBA	self-contained breathing apparatus
SOP	Standard Operating Procedure
SPCC	Spill Prevention Containment and Control
SUBASE	Naval Submarine Base
SWFLANT	Strategic Weapons Facility Atlantic
SWMU	solid waste management unit
T	toxic
TC	toxicity characteristic
TCLP	Toxicity Characteristic Leachate Procedure
Th	threatened
TLV	threshold limit value
TNT	trinitrotoluene
TSD	treatment, storage, and disposal
U	unusual
UPS	United Parcel Service
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance
WID	Waste Information Document

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ _____

Commanding Officer Date

SECTION A
PART A APPLICATION

A.1 RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) PART A APPLICATION [40 CODE OF FEDERAL REGULATIONS (CFR) 270.13]. Naval Submarine Base (SUBASE) Kings Bay (GA4170090001), Kings Bay, Georgia, is seeking amendment of the Hazardous and Solid Waste Amendments permit number HW-014(S) issued September 29, 1989. The Part A application is included in this section.

A.2 PART A APPLICATION CHANGES. This subsection describes changes that have been made to the Part A application.

- The Georgia Department of Natural Resources' Part A application forms were used.
- The information in the Waste Information section was revised to be consistent with the list of hazardous wastes in Table C-1 of Section C of the Part B permit application.
- The process design capacity for the Hazardous Waste Container Storage and Transfer Facility was revised to 59,840 gallons.

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PART A APPLICATI

Georgia Department of Natural Resources
Environmental Protection Division
Hazardous Waste Management Program

EPD USE ONLY
RECEIPT DATE:

HANDLER INFORMATION

EPA ID NUMBER: GA4170090001

FACILITY NAME: Naval Submarine Base

Facility Mailing Address: Commanding Officer, 1063 USS Tennessee Avenue
City: Kings Bay State: GA ZIP: 31547-2606

Facility Location Address: 1063 USS Tennessee Avenue County: Camden
City: Kings Bay State: GA ZIP: 31547-2606

Contact: Last Name: Anderson First Name: Michael
Title: Environmental Engineer
Contact Telephone: (912) 673-2001/4620 At mailing or location address? (underline one)
Land Type: F Facility Existence Date (mmddyyyy): 07-01-1978
SIC Codes: Primary: 9711 SIC Code Description: National Security
Secondary:
Facility Latitude (ddmmsss): 30 46 025 Facility Longitude (dddmmsss): 081 32 058

OPERATOR INFORMATION

Name of Operator: Commanding Officer
Status: F Telephone: (912) 673-2001, ext. 4700
Street Address: 1063 USS Tennessee Avenue
City: Kings Bay State: GA ZIP: 31547-2606
Current/Previous: CP Change Date (mmddyy):

OWNER INFORMATION

Name of Owner: Commanding Officer
Status: F Telephone: (912) 673-2001, ext. 4700
Street Address: 1063 USS Tennessee Avenue
City: Kings Bay State: GA ZIP: 31547-5000
Current/Previous: CO Change Date (mmddyy):

REGULATORY INFORMATION

Permit Type: S Permit Number: HW- 014(S)(2) Description: Storage
Facility Indicator: X Regulatory Status: R
Regulatory Status Description: Cross-Reference ID:
See page A-5 for additional permits.

BUSINESS INFORMATION

Brief Description of Business at Facility Site: Maintain and operate facilities for support of Fleet Ballistic Missile Submarines.

Closed Hazardous Waste Management Units:

Topographic Map, Scale Drawing, Photograph, and List of Affected Governments attached? Yes

PROCESS INFORMATION:

Process Code:	Process Total Amount:	UOM:	Process Units:	Description:
S01	59,840	G	01	Storage and transfer facility (1989)
T04	0.721	J	01	Open burning/open detonation facility (1979)

WASTE INFORMATION:

Waste Stream #:	Amount:	UOM:	Waste Amt. In TONS:	Handling Description/ Process Codes:	Waste Codes:

See Appendix A-1.

CERTIFICATION:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violatio

G. E. WILLIAMS, CAPT, USN
COMMANDING OFFICER

Typed name and title | Signature | Date 8-16-95

Regulatory Information (continued)

Permit Type: N
Number: GA0027707
Description: NPDES, discharge to surface water

Permit Type: P
Number: 97110209557
Description: air quality permit

Permit Type: P
Number: 97110209263
Description: air quality permit

Permit Type: S
Number: 2020J1253
Description: operate public water system

Permit Type: S
Number: 020-0008
Description: permit to use groundwater

List of Affected Governments

County Commission:

Artie Jones, Jr.
Chairman
Camden County Commission
P.O. Box 99
Woodbine, GA 31569

City of St. Marys:

Mike Mahaney
City Manager
City of St. Marys
418 Osborne Street
St. Marys, GA 31558

Fire District:

Naval Submarine Base

APPENDIX A-1

DESCRIPTION OF HAZARDOUS WASTES

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
1	ACETYLENE GAS CYLINDERS	24	G	0.100	S01	D001
2	ADHESIVE	239	G	0.998	S01	D001
3	ADHESIVE PRIMER	1	G	0.004	S01	D001
4	AEROSOL CONTAINERS	717	G	2.989	S01	D001
5	BENZOINE TINCTURE	1	G	0.004	S01	D001
6	CALCIUM HYPOCHLORITE	41	G	0.172	S01	D001
7	CLEANING COMPOUND	15	G	0.064	S01	D001
8	CONATHANE	4	G	0.015	S01	D001
9	COPIER FLUID	115	G	0.481	S01	D001
10	CORROSION PREVENTATIVE	4	G	0.016	S01	D001
11	CORROSION PREVENTATIVE LIQUID	82	G	0.341	S01	D001
12	DECONTAMINATION KITS	1	G	0.004	S01	D001
13	DISPERSANT	19	G	0.080	S01	D001
14	DRY CLEANING SOLVENT	3	G	0.012	S01	D001
15	ETHYL ACETATE	1	G	0.005	S01	D001
16	ETHYL ALCOHOL	10	G	0.040	S01	D001
17	ETHYLENE GLYCOL MONOETHYL ETHER	15	G	0.061	S01	D001
18	ETHYLENE GLYCOL MONOETHYL ETHER ACETATE	11	G	0.047	S01	D001
19	GASOLINE	94	G	0.393	S01	D001
20	GASOLINE FILTERS	71	G	0.294	S01	D001
21	GRAM DECOLORIZER	1	G	0.005	S01	D001
22	HYDROGEN PEROXIDE	9	G	0.039	S01	D001
23	HYDROGEN PEROXIDE SOLUTION	105	G	0.439	S01	D001
24	ISOPROPANOL	3	G	0.015	S01	D001
25	ISOPROPANOL/GRAPHITE	7	G	0.029	S01	D001
26	ISOPROPANOL/WATER	2	G	0.008	S01	D001
27	LITHIUM NITRATE	1	G	0.005	S01	D001

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
28	METAL POLISH	2	G	0.007	S01	D001
29	MORPHOLINE	70	G	0.290	S01	D001
30	N-BUTYL ALCOHOL	2	G	0.007	S01	D001
31	NAIL POLISH REMOVER	2	G	0.010	S01	D001
32	PAINT	5657	G	23.589	S01	D001
33	PAINT LIQUID	479	G	1.998	S01	D001
34	PENTANE	2	G	0.009	S01	D001
35	PETROLEUM DISTILLATE	53	G	0.222	S01	D001
36	POLISH (PLASTIC)	6	G	0.026	S01	D001
37	POLYESTER RESIN	50	G	0.210	S01	D001
38	POLYURETHANE	1	G	0.006	S01	D001
39	POTASSIUM NITRATE	2	G	0.007	S01	D001
40	RUBBER PRIMER	3	G	0.015	S01	D001
41	SCINTIVERSE	1	G	0.005	S01	D001
42	SILVER NITRATE SOLUTION	9	G	0.040	S01	D001
43	SODIUM CHLORATE	2	G	0.010	S01	D001
44	SODIUM NITRATE	15	G	0.063	S01	D001
43	SODIUM NITRITE	29	G	0.123	S01	D001
44	SOLDER FLUX	8	G	0.034	S01	D001
45	TEFLON PAINT/WATER	47	G	0.197	S01	D001
46	TETRAHYDROFURAN	4	G	0.018	S01	D001
47	TONER	39	G	0.161	S01	D001
48	VARNISH	419	G	1.747	S01	D001
49	WATCH CLEANING SOLUTION	2	G	0.010	S01	D001
50	ACETIC ACID	2	G	0.010	S01	D001 D002
51	AMMONIUM PERSULFATE	0	G	0.001	S01	D001 D002
52	NITRIC ACID	36	G	0.149	S01	D001 D002
53	TURCOAT ACCELAGOLD	1	G	0.005	S01	D001 D002 D007

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
54	CALCIUM HYPOCHLORITE	10	G	0.040	S01	D001 D003
55	CALCIUM, METALLIC	1	G	0.006	S01	D001 D003
56	OBA CANISTERS	443	G	1.848	S01	D001 D005
57	OXYGEN CANDLES	9	G	0.038	S01	D001 D005
58	PAINT/BARIUM	8	G	0.033	S01	D001 D005
59	ALUMIBOND	4	G	0.019	S01	D001 D007
60	EPOXY PRIMER	2	G	0.008	S01	D001 D007
61	PAINT	513	G	2.141	S01	D001 D007
62	PAINT WASTE (LIQUID)	13	G	0.056	S01	D001 D007
63	TEFLON PAINT/WATER	116	G	0.484	S01	D001 D007
64	AEROSOL CONTAINERS	13	G	0.056	S01	D001 D007 D008
65	PAINT	69	G	0.290	S01	D001 D007 D008
66	PAINT WASTE (LIQUID)	275	G	1.149	S01	D001 D007 D008
67	GUN WASH SLOP	4	G	0.016	S01	D001 D007 D008 D035 F003 F005
68	PAINT	794	G	3.309	S01	D001 D007 D008 F003 F005
69	PAINT WASTE (LIQUID)	140	G	0.584	S01	D001 D007 D008 F003 F005
70	PAINT/LISTED SOLVENTS	149	G	0.622	S01	D001 D007 D008 F003 F005
71	ADHESIVE	3	G	0.012	S01	D001 D008
72	DRY/SOLID FILM LUBRICANT	3	G	0.013	S01	D001 D008
73	PAINT	171	G	0.715	S01	D001 D008
74	PAINT WASTE (LIQUID)	7	G	0.031	S01	D001 D008
75	RED LEAD OXIDE POWDER	6	G	0.025	S01	D001 D008
76	SOLID FILM LUBRICANT	4	G	0.017	S01	D001 D008
77	FILM LUBRICANT (DRY/SOLID)	14	G	0.057	S01	D001 D008 D035
78	SOLID FILM LUBRICANT	2	G	0.007	S01	D001 D008 D035
79	SILVER NITRATE	15	G	0.061	S01	D001 D011
80	SILVER NITRATE SOLUTION	12	G	0.048	S01	D001 D011

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
81	LAB PACK "A"	0	G	0.002	S01	D001 D013 D014 D015 D016 D018 D019 D021 D027 D038 D043
82	SILVEX/METHANOL	1	G	0.005	S01	D001 D017 F027
83	BENZENE	1	G	0.005	S01	D001 D018
84	URETHANE ACCELERATOR	48	G	0.202	S01	D001 D021
85	ADHESIVE	2	G	0.010	S01	D001 D035
86	FIRE BARRIER CAULK	6	G	0.024	S01	D001 D035
87	MEK	13	G	0.056	S01	D001 D035
88	PAINT	18	G	0.074	S01	D001 D035
89	PAINT/MEK	163	G	0.679	S01	D001 D035
90	WOOD FILLER	5	G	0.019	S01	D001 D035
91	PAINT/LISTED SOLVENTS/ MEK	161	G	0.673	S01	D001 D035 F003 F005
92	PAINT/SOLVENTS	105	G	0.438	S01	D001 D035 F003 F005
93	FREON, OIL, AND SOLVENTS	3	G	0.011	S01	D001 F002
94	PAINT REMOVER	6	G	0.024	S01	D001 F002
95	FLUOROETHANE/OIL AND SOLVENTS	4	G	0.018	S01	D001 F002
96	LAYOUT DYE	4	G	0.015	S01	D001 F002 F003
97	COATING REPAIR (XYLAN)	3	G	0.011	S01	D001 F003
98	PAINT/LISTED SOLVENTS	94	G	0.392	S01	D001 F003
99	XYLENE (SPENT)	4	G	0.017	S01	D001 F003
100	TITRATION FLUID	26	G	0.110	S01	D001 F003 D019 D035
101	PAINT WASTE (LIQUID)	2859	G	11.924	S01	D001 F003 F005
102	PAINT/LISTED SOLVENTS	2498	G	10.417	S01	D001 F003 F005
103	PLASTISOL PRIMER	10	G	0.043	S01	D001 F003 F005
104	TOLUENE	1	G	0.005	S01	D001 F005
105	ACETIC ACID	37	G	0.155	S01	D002

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
106	ACIDIC MIXTURE	2	G	0.007	S01	D002
107	AMMONIUM HYDROXIDE	200	G	0.833	S01	D002
108	AROMATIC AMINE	1	G	0.004	S01	D002
109	CITRIC ACID SOLUTION	2	G	0.008	S01	D002
110	CLEANING COMPOUND	7	G	0.031	S01	D002
111	COPPER SOLUTION	2	G	0.007	S01	D002
112	CORROSION INHIBITOR	122	G	0.507	S01	D002
113	CORROSION REMOVER	2	G	0.007	S01	D002
114	DIGESTION SOLUTION	2	G	0.009	S01	D002
115	DIMETHYL GLOXIME	0	G	0.001	S01	D002
116	ETHANOLAMINE	1429	G	5.960	S01	D002
117	FERRIC CHLORIDE/HCI	0	G	0.001	S01	D002
118	FERROUS STAIN REMOVER	12	G	0.051	S01	D002
119	FLASH ARRESTOR WASH WATER	185	G	0.770	S01	D002
120	FLOOR POLISH REMOVER	91	G	0.379	S01	D002
121	HYDROCHLORIC ACID	264	G	1.100	S01	D002
122	HYDROCHLORIC ACID 2,4 DINITROPHENYL- HYDRAZINE	2	G	0.008	S01	D002
123	KODAK ACTIVATOR	6	G	0.025	S01	D002
124	MONOETHANOLAMINE	70	G	0.292	S01	D002
125	NEUTRA RUST	17	G	0.073	S01	D002
126	NICKEL SOLUTION	1	G	0.005	S01	D002
127	PHOSPHORIC ACID	46	G	0.194	S01	D002
128	PORCELAIN CLEANING COMPOUND	61	G	0.253	S01	D002
129	POTASSIUM HYDROXIDE	2284	G	9.526	S01	D002
130	SCALE REMOVER	11	G	0.047	S01	D002
131	SODIUM HYDROXIDE	28	G	0.118	S01	D002
132	SODIUM HYDROXIDE SOLUTION	93	G	0.387	S01	D002

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
133	SODIUM HYPOCHLORITE SOLUTION	38	G	0.157	S01	D002
134	SODIUM METASILICATE SOLUTION	41	G	0.172	S01	D002
135	SODIUM PHOSPHATE SOLUTION	522	G	2.178	S01	D002
136	SODIUM SILICATE SOLUTION	34	G	0.143	S01	D002
137	SULFURIC ACID	71	G	0.296	S01	D002
138	BATTERIES (NI-CAD) WET	290	G	1.208	S01	D002 D006
139	COPPER PLATING SOLUTION	169	G	0.704	S01	D002 D006 D007
140	I.C.P. WASTE (B)	6	G	0.027	S01	D002 D006 D007 D008 D009
141	I.C.P. AQUEOUS WASTE	7	G	0.030	S01	D002 D006 D007 D009
142	ALODINE WASTE	2	G	0.007	S01	D002 D007
143	CHROMIC ACID SOLUTION	4	G	0.017	S01	D002 D007
144	PASA JELL #102	1	G	0.004	S01	D002 D007
145	TURCOAT ACCELAGOLD	3	G	0.013	S01	D002 D007
146	NICKEL PLATING SOLUTION	2	G	0.010	S01	D002 D007 D008
147	BATTERIES	111	G	0.463	S01	D002 D008
148	BATTERIES (LEAD ACID)	4305	G	17.950	S01	D002 D008
149	BATTERIES	281	G	1.171	S01	D002 D009
150	BATTERIES/MERCURY	1	G	0.004	S01	D002 D009
151	MERCURIC NITRATE	70	G	0.293	S01	D002 D009
152	SILVER CELL BATTERIES	8	G	0.033	S01	D002 D011
153	LITHIUM OXYHOLIDE BATTERIES	23	G	0.096	S01	D003
154	PROPELLANTS, ENERGETICS, AND PYROTECHNICS	0.72	J	0.750	X01	D003
155	SOLDER DEBRIS	3	G	0.013	S01	D004 D008 D011
156	PHOTO RECEPTOR DRUM	8	G	0.035	S01	D004 D010
157	BARIUM CHLORIDE	1	G	0.004	S01	D005
158	BARIUM HYDROXIDE	1	G	0.005	S01	D005

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
159	GUN WASH SLOP	14	G	0.059	S01	D005 D007 D008
160	SOLID PAINT	3	G	0.011	S01	D005 D007 D008 D035
161	SOLID PAINT AND CONTAINERS	147	G	0.613	S01	D005 D007 D008 D035
162	PAINT DEBRIS	11415	G	47.599	S01	D005 D007 D008 D035 F002 F003 F005
163	PAINT DEBRIS/SOLVENTS	299	G	1.246	S01	D005 D007 D008 D035 F002 F003 F005
164	BATTERIES (NI-CAD) DRY	80	G	0.334	S01	D006
165	BLAST MEDIA	151	G	0.630	S01	D006
166	GLASS BEADS BLAST MEDIA	118	G	0.490	S01	D006
167	ORDNANCE DEBRIS	6	G	0.024	S01	D006
168	X-RAY RINSE WATER	328	G	1.367	S01	D006
169	CHROMIC ACID DEBRIS	4	G	0.018	S01	D007
170	EPOXY POWDER COATING DEBRIS	32	G	0.134	S01	D007
171	GREASE/CHROMATES	6	G	0.027	S01	D007
172	MAGNESIUM BATTERIES	6	G	0.026	S01	D007
173	PLATING WASTE AND RAGS (ALODINE)	131	G	0.548	S01	D007
174	POTASSIUM CHROMATE	1	G	0.006	S01	D007
175	SAND BLAST MEDIA	126	G	0.528	S01	D007
176	SEALING COMPOUND	3	G	0.012	S01	D007
177	SODIUM HYDROXIDE POWDER	1	G	0.005	S01	D007
178	TEFLON PAINT DEBRIS	6	G	0.023	S01	D007
179	TONER	3	G	0.014	S01	D007
180	ZINC CHROMATE PUTTY	7	G	0.030	S01	D007
181	BLAST MEDIA	35	G	0.146	S01	D007 D008
182	NICKEL PLATING SOLUTION	97	G	0.405	S01	D007 D008
183	OIL FILTERS	1442	G	6.015	S01	D007 D008

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
184	PAINT (SOLID)	5	G	0.022	S01	D007 D008
185	POLYSULFIDE RUBBER COMPOUND DEBRIS	37	G	0.155	S01	D007 D008
186	FIXER WASH WATER	47	G	0.197	S01	D007 D011
187	FIXER/METAL PHOTO	23	G	0.096	S01	D007 D011
188	RESPIRATOR FILTERS	3	G	0.013	S01	D007 D011
189	X-OMAT FIXER	65	G	0.270	S01	D007 D011
190	PAINT REMOVER	24	G	0.101	S01	D007 F002
191	TURCO SUPER CARB	6	G	0.027	S01	D007 F002
192	ANTI-SIEZE COMPOUND	2	G	0.008	S01	D008
193	ANTI-SIEZE/LEAD	2	G	0.009	S01	D008
194	DELCEM (PART B)	4	G	0.019	S01	D008
195	DRY CLEANING SOLVENT/ WIRE ROPE GREASE DEBRIS	27	G	0.112	S01	D008
196	EPOXY POWDER COATING DEBRIS	14	G	0.057	S01	D008
197	GREASE/LEAD	5	G	0.020	S01	D008
198	LEAD BLANKETS	45	G	0.187	S01	D008
199	LEAD DEBRIS	4	G	0.019	S01	D008
200	LEAD FOIL	4	G	0.019	S01	D008
201	N.O.C. LIQUID	19	G	0.081	S01	D008
202	POLYSULFIDE RUBBER COMPOUND	6	G	0.023	S01	D008
203	RED LEAD OXIDE POWDER/MINERAL OIL	15	G	0.064	S01	D008
204	SOLDER DEBRIS	3	G	0.013	S01	D008
205	WIRE ROPE GREASE	102	G	0.427	S01	D008
206	WIRE ROPE GREASE DEBRIS	3986	G	16.620	S01	D008
207	MERCURIC NITRATE	115	G	0.481	S01	D009
208	MERCURIC OXIDE	1	G	0.004	S01	D009
209	MERCURY AMALGAM	5	G	0.022	S01	D009

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
210	MERCURY SWITCHES	2	G	0.007	S01	D009
211	MERCURY THERMOMETERS	2	G	0.008	S01	D009
212	SPILL RESIDUE/ MERCURY CONTAMINATED SOIL	90	G	0.375	S01	D009
213	MERCURY/SILVER PAPER	27	G	0.114	S01	D009 D011
214	SILVER PAPER	12	G	0.049	S01	D009 D011
215	PHOTO RECEPTOR DRUM	2	G	0.009	S01	D010
216	COLOR FIXER	150	G	0.624	S01	D011
217	PHENOLIC RESIN/ SILVER COMPOUND	1	G	0.004	S01	D011
218	SILVER CELL BATTERIES	4	G	0.015	S01	D011
219	SILVER CELL BATTERIES (DRY)	44	G	0.184	S01	D011
220	SILVER CELL WASH	9	G	0.039	S01	D011
221	SILVEX	1	G	0.003	S01	D017 F027
222	ETHYLENE GLYCOL, WATER PAINT THINNER	181	G	0.754	S01	D018 D022 F003 F005
223	MOISTURE TITRATION FLUID	2	G	0.007	S01	D019 D022 F003
224	GENERATOR SOLUTION	1	G	0.004	S01	D019 D035 F003
225	EPOXY CATALYST	73	G	0.305	S01	D021 D035
226	MEK DEBRIS	13	G	0.056	S01	D035
227	MEK/OIL	4	G	0.015	S01	D035
228	FREON AND OIL	25	G	0.103	S01	F001
229	FREON,FLUORINATED AND MOLYKOTE GREASE DEBRIS	13	G	0.053	S01	F001
230	METHYLENE CHLORIDE DEBRIS	23	G	0.097	S01	F001
231	PAINT REMOVER DEBRIS	11	G	0.048	S01	F001
232	TRICH, FREON 113, HYDRAULIC FLUID, & DEBRIS	8	G	0.035	S01	F001
233	TRICHLOROETHANE (SPENT)	208	G	0.868	S01	F001
234	TRICHLOROETHANE DEBRIS	4	G	0.016	S01	F001
235	TRICHLOROETHANE, FREON AND OIL DEBRIS	8	G	0.032	S01	F001

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
236	TRICHLOROETHANE/RAGS	127	G	0.530	S01	F001
237	TRICHLOROETHANE/WATER	11	G	0.047	S01	F001
238	TRICHLOROETHYLENE	2	G	0.008	S01	F001
239	TRICHLOROTRI-FLUOROETHANE/OIL	80	G	0.333	S01	F001
240	TRICHLOROETHANE/MEK DEBRIS	23	G	0.098	S01	F001 D035
241	ADHESIVE	1	G	0.005	S01	F002
242	CLEANER, LUBRICANT AND PRESERVATIVE	1	G	0.006	S01	F002
243	FREON 113 (SPENT)	1	G	0.004	S01	F002
244	METHYLENE CHLORIDE DEBRIS	101	G	0.423	S01	F002
245	METHYLENE CHLORIDE STRIPPER	616	G	2.570	S01	F002
246	METHYLENE CHLORIDE/ WATER	1941	G	8.093	S01	F002
247	POLYURETHANE	6	G	0.027	S01	F002
248	PRIMER (SEALING COMPOUND)	45	G	0.186	S01	F002
249	STRIPPING SOLUTION	3	G	0.012	S01	F002
250	TETRACHLOROETHYLENE	178	G	0.743	S01	F002
251	TETRACHLOROETHYLENE/ DEBRIS	6	G	0.025	S01	F002
252	TRICHLOROETHANE	5	G	0.020	S01	F002
253	TRICHLOROTRI- FLUOROETHANE	580	G	2.418	S01	F002
254	TRICHLOROTRI- FLUOROETHANE DEBRIS	4	G	0.017	S01	F002
255	TRICHLOROTRI- FLUOROETHANE/ OIL	8	G	0.034	S01	F002
256	SEALING COMPOUND, TCE, FREON AND DEBRIS	117	G	0.488	S01	F002 D007
257	ACETONE	13	G	0.053	S01	F003
258	ACETONE AND SPOTCHECK PENETRANT DEBRIS	135	G	0.563	S01	F003
259	ACETONE RAGS	6	G	0.023	S01	F003
260	PENTACHLOROPHENOL	5	G	0.023	S01	F027 D037

Waste Stream #	Waste Description	Amount:[1]	UOM:	Waste Amount in Tons:	Handling Description /Process Codes:	Waste Codes
261	ARSENIC TRIOXIDE	0.5	G	0.002	S01	P012
262	DIMETHOATE SPILL DEBRIS	17	G	0.070	S01	P044
263	ACETONE	6	G	0.026	S01	U002
264	BENZENE	3	G	0.013	S01	U019
265	DI(2-ETHYLHEXYL) PHTHALATE	17	G	0.072	S01	U028
266	MEK/PEROXIDE	1	G	0.005	S01	U029
267	TRICHLORO- FLUOROMETHANE	14	G	0.057	S01	U121
268	R-11	153	G	0.636	S01	U121 U075
269	FORMALDEHYDE	2	G	0.010	S01	U122
270	METHANOL	14	G	0.057	S01	U154
271	TOLUENE	15	G	0.063	S01	U220
272	XYLENE (UNUSED)	11	G	0.046	S01	U239

es:

Amount measured in pounds and then converted to gallons by assuming all compounds have the specific weight of water.

APPENDIX A-2

COMMENTS

Section XIX. Comments:

Section XII, Line Number 1, Item B

The instructions for completing this item of the Part A Application limit the choices of units of measure that can be used to report process design capacity. Using the appropriate units of pounds (lb) per hour (hr), the process design capacity was derived from 1994 operations data, when approximately 1,500 pounds of explosives were treated, and an assumed annual operational time of 2080 hours per year. Based on the above assumptions the annual average process design capacity is:

$$\frac{1{,}500 \text{ pounds explosives}}{\text{Year}} \div \frac{2080 \text{ hours}}{\text{Year}} = 0.721 \text{ pounds per hour}$$

This is not a maximum (not to be exceeded) process design rate. Actual maximum process design capacity for the OB/OD area is 150 pounds of explosive per detonation and 4,000 pounds of explosives per burn, with no limit on the number of detonations or burns performed in a year.

Section XV

Figure A-1, Harriett's Bluff Quadrangle Topographic Map is located in a map pocket at the back of this document.

Section XVI

Hazardous Waste Container Storage and Transfer Facility Drawings:

Figure D-1, Site Plan of Hazardous Waste Container Storage and Transfer Facility is located on page D-2 of section D of this document.

Figure D-2, Floor Plan, Hazardous Waste Container Storage and Transfer Facility is located on page D-3 of section D of this document.

OB/OD Facility Drawings:

Figure D-8, Construction Plan for the OB/OD Crew Shelter is located at the back of this document.

Figure D-9, Engineering Drawing for the OB/OD Facility is located at the back of this document.

Section XVII

Hazardous Waste Container Storage and Transfer Facility photographs are located in Appendix A-3.

OB/OD Facility aerial photograph is located in Appendix A-3.

- Maximum treatment rate for Open Burning/Open Detonation (OB/OD) Area
Using units of pounds (lb) per hour (hr), the process design capacity was derived from 1994 operations data, when approximately 1,500 pounds of explosives were treated, and an assumed annual operational time of 2080 hours per year. Based on the above assumptions the annual average process design capacity is:

$$\frac{1{,}500 \text{ pounds explosives}}{\text{Year}} \div \frac{2080 \text{ hours}}{\text{Year}} = 0.721 \text{ pounds per hour}$$

This is not a maximum (not to be exceeded) process design rate. Actual maximum process design capacity for the OB/OD area is 150 pounds of explosive per detonation and 4,000 pounds of explosives per burn, with no limit on the number of detonations or burns performed in a year.

- Topographic Map, Scale Drawings, and Photographs

Figure A-1, Harriett's Bluff Quadrangle Topographic Map is located in a map pocket at the back of this document.

Hazardous Waste Container Storage and Transfer Facility Drawings:

Figure D-1, Site Plan of Hazardous Waste Container Storage and Transfer Facility is located on page D-2 of section D of this document.

Figure D-2, Floor Plan, Hazardous Waste Container Storage and Transfer Facility is located on page D-3 of section D of this document.

OB/OD Facility Drawings:

Figure D-8, Construction Plan for the OB/OD Crew Shelter is located at the back of this document.

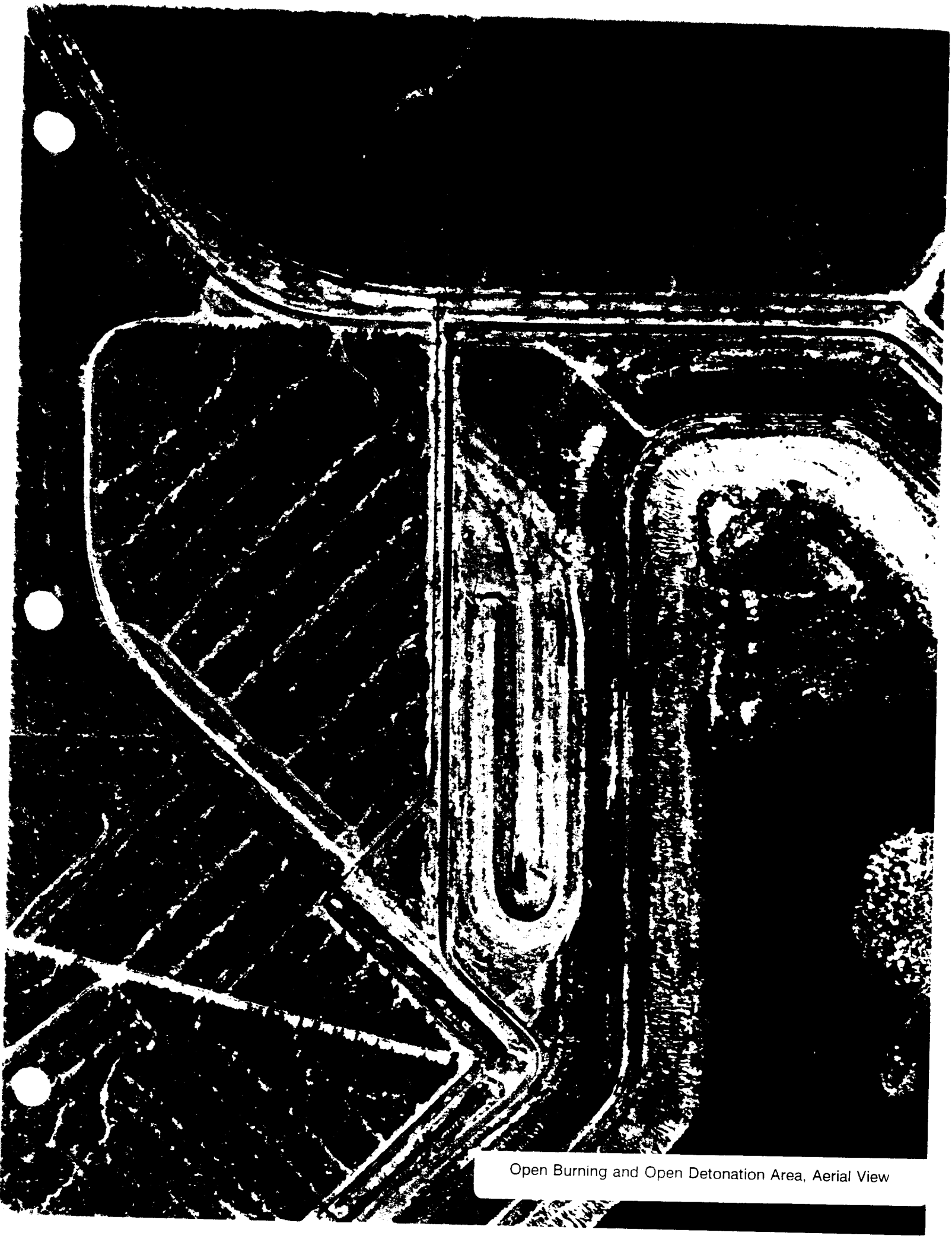
Figure D-9, Engineering Drawing for the OB/OD Facility is located at the back of this document.

Hazardous Waste Container Storage and Transfer Facility photographs are located in Appendix A-3.

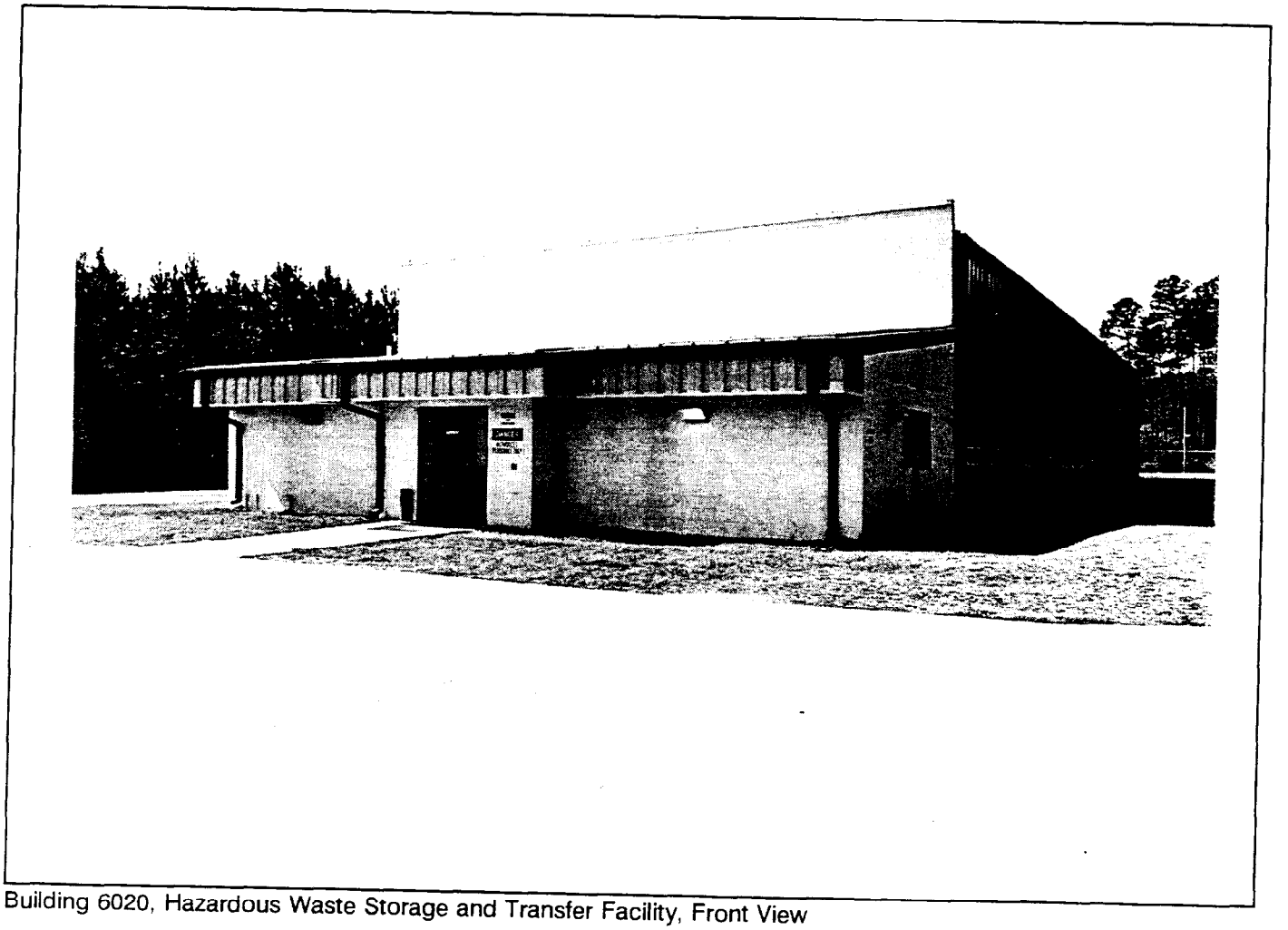
OB/OD Facility aerial photograph is located in Appendix A-3.

APPENDIX A-3

PHOTOGRAPHS



Open Burning and Open Detonation Area, Aerial View



Building 6020, Hazardous Waste Storage and Transfer Facility, Front View

Building 6020, Hazardous Waste Storage and Transfer Facility, Rear View

SECTION B
FACILITY DESCRIPTION

The information in this section is submitted in accordance with the requirements of 40 CFR 270.14(b).

B.1 GENERAL DESCRIPTION [40 CFR 270.14(b)(1)]. SUBASE Kings Bay is located in the southeast corner of Georgia approximately 8 miles north of the Georgia-Florida border. The closest community to the facility is the city of St. Marys that borders the southern boundary of the Base. Figure B-1 presents a vicinity map depicting SUBASE Kings Bay with respect to the city of St. Marys. A facility map of the Base is included on Figure B-2, located in a pocket at the back of this application.

The site address of SUBASE Kings Bay is:

Naval Submarine Base
Kings Bay, Georgia 31547

The mailing address of SUBASE Kings Bay is:

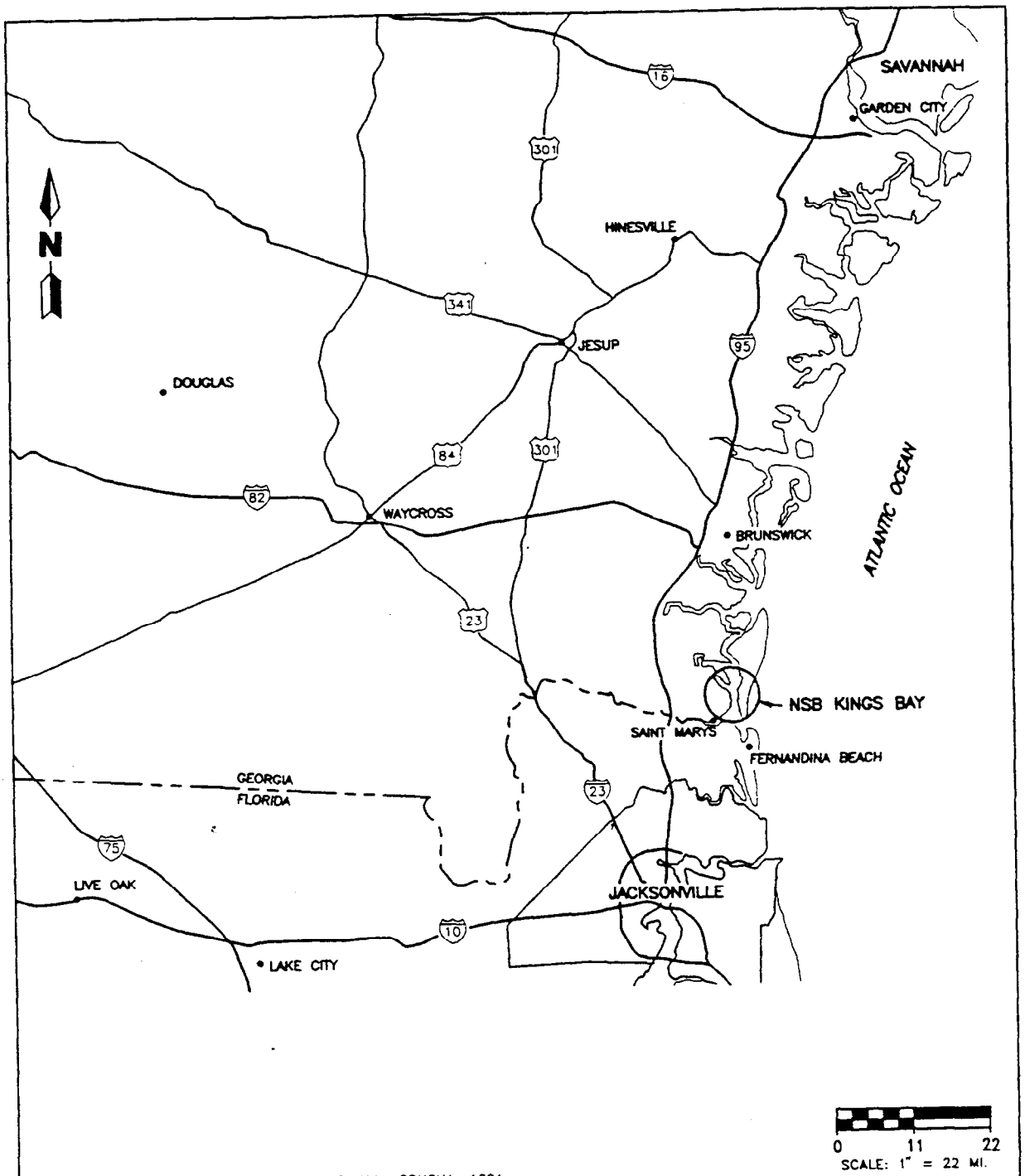
Commanding Officer
Naval Submarine Base
1063 USS Tennessee Avenue
Kings Bay Georgia 31547-2606

The mission of the Naval Submarine Base Kings Bay, Georgia, is to provide support to the Fleet Ballistic Missile (FBM) system and to maintain and operate facilities for administration and personnel support for operations of the submarine force.

Also, within capabilities, Kings Bay provides logistics support to other activities of the Navy.

FBM submarines, the Navy's strategic nuclear force, are equipped with ballistic missiles for attack and with torpedoes for defense. As the most survivable component of the United States strategic missile forces, these submarines must be capable of executing a broad range of options upon receipt of directions from the national command authority. The FBM submarines are highly survivable and reliable no matter how or when hostilities might be initiated. These qualities provide the basis for the FBM submarine force's significant contribution to the overall strategic balance in the world today.

The Base Commanding Officer has responsibility for operation of more than $150 million worth of facilities and cognizance over activities on the more than 16,000 acres of property at Kings Bay. In addition to the Base's primary mission of support of submarine operations, support is provided to a growing number of tenant commands.



SOURCE: MODIFIED FROM GEORGIA ROADMAP, H.M. GOUSHA, 1991.

FIGURE B-1

REGIONAL LOCATION MAP

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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KB Site 11 [PART_B.per]#038
mlv.04.95

The coordinator designated for hazardous waste management at SUBASE Kings Bay is:

Mr. Mike Anderson
Environmental Engineer
Public Works Department
(912) 673-4620

Hazardous wastes generated at SUBASE Kings Bay include primarily waste paints and solvents, metal cleaning compounds, and aqueous metal containing wastes. In addition, small amounts of waste explosives are generated as a result of munitions exceeding their "shelf life" or being damaged.

In 1992, SUBASE Kings Bay amended this Part B application to include an open burning and open detonation (OB/OD) facility for the thermal treatment of waste explosives that are generated through naval support operations. The facility is an existing structureless U-shaped unit approximately 500 feet long and 200 feet wide with a small reinforced-concrete enclosed safety bunker (crew shelter) located at the open end. The berm walls of this unit have been constructed to an elevation of approximately 20 feet and serve as a protective barrier. This facility is designated as a Class C demolition range with a 150-pound explosive limit per detonation. Waste explosives are open detonated on the ground without secondary containment, and those explosives that cannot be open detonated are treated through open burning within a burn drum equipped with a secondary containment device. The location of the OB/OD facility in relation to the rest of SUBASE Kings Bay is shown on Figure B-2. This figure is located in a pocket at the back of this permit application.

SUBASE Kings Bay is amending this Part B application to address two former solid waste management units (SWMUs). One of the SWMUs, Site 12, Army Reserve Disposal Area, Current Dry Dock, was remediated during construction of the dry dock and has been approved for No Further Action. A second SWMU, Site 2, Former Fire-fighting Training Pit, is located within Site 12 and will require investigation.

Three other SWMUs at SUBASE Kings Bay are under investigation. These three SWMUs are Site 5, Army Reserve Disposal Area, Towhee Trail; Site 11, Old Camden County Landfill; and Site 16, Army Reserve Disposal Area, Motor Missile Magazines. A description of each SWMU is provided in Section K.

B.2 TOPOGRAPHIC MAP [40 CFR 270.14(b)(19)]. A topographic map for the area within 1,000 feet of the proposed hazardous waste container storage and transfer facility is provided on Figure B-3.1 which is located in a pocket at the back of this application. In addition, Figure B-3.2 is a topographic map of the area within 1,000 feet of the OB/OD facility.

B.2.1 Land Uses Land uses along the perimeter of SUBASE Kings Bay include the city of St. Marys on the southern border; undeveloped wooded areas, residential areas, and an elementary school on the western border; Crooked River State Park on the northern border; and Kings Bay and the Cumberland Sound along the eastern border. Land uses within 1,000 feet of the proposed hazardous waste container storage and transfer facility and the OB/OD facility are shown on Figures B-3.1 and B-3.2, respectively.

B.2.2 Hazardous Waste Management Facility Boundary The location of the hazardous waste container storage and transfer facility is identified on Figure B-3.1.

The OB/OD area includes a safety margin of 1,250 feet. The facility boundary is illustrated on Figure B-3.2.

B.2.3 Wind Rose Figure B-4 presents an annual wind rose of meteorological data collected at the Jacksonville, Florida, airport, which is located approximately 25 miles south of SUBASE Kings Bay.

B.2.4 Access Control The Base is surrounded by a security fence and access is controlled at the main gate that is on USS Henry L. Stimpson Drive and at the contractor gate on USS Ben Franklin Drive. A third gate is located at the southern border on USS Daniel Webster Road and is only for pre-authorized access. A fourth gate on USS Andrew Jackson Drive has limited use for access to Crooked River Elementary School.

Base personnel must show identification to be permitted to enter the SUBASE. Visitors must obtain and display temporary identification. The access gates and perimeter fence are identified on Figure B-2.

Access to the hazardous waste container storage and transfer facility is controlled within the Base by a fence that surrounds the building. This fence is identified on Figure B-3.1.

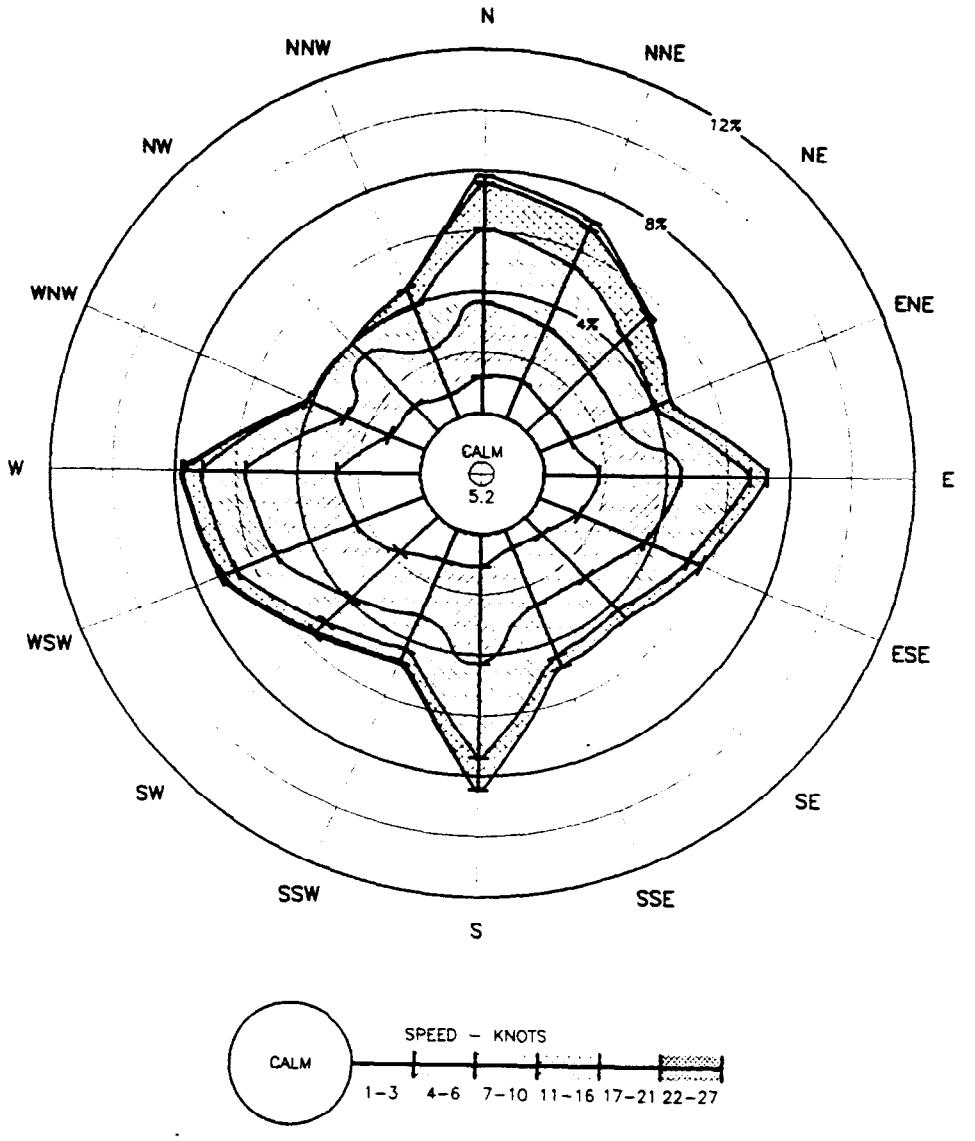
The OB/OD facility is located in a restricted area of SUBASE Kings Bay and a level 5 security badge is required for access to the unit. The facility is accessed by USS John C. Calhoun Road, which runs north to south and parallels the OB/OD facility. This is the only access road to the facility and guard stations are posted at USS Henry L. Stimpson Road and at the north end of John C. Calhoun Road for security control. Access to the hazardous waste facility and the OB/OD facility are discussed in greater detail in Section F.

B.2.5 Injection and Withdrawal Wells There are no injection wells located at SUBASE Kings Bay. There are 10 wells at the SUBASE having depths ranging from 300 to over 1,000 feet. Five of the 10 wells are used for withdrawal of groundwater. Three other wells are for observation and two are unused. The five water supply wells are shown on Figure B-2. No wells are located within 1,000 feet of the hazardous waste container storage and transfer facility, nor the OB/OD facility.

B.2.6 Building; Treatment, Storage, and Disposal Areas; and Other Structures Figure B-2 is the Base master plan map, which identifies both existing and proposed buildings and structures. The buildings and structures within 1,000 feet of the hazardous waste facility are identified on Figure B-3.1.

As can be seen from Figure B-3.2, there are no existing structures or facilities that treat, store, or dispose of hazardous waste within 1,000 feet of the OB/OD facility. However, SUBASE Kings Bay is currently operating a tertiary water treatment facility near the OB/OD facility as part of their sewage treatment process. The water treatment facility consists of channels where secondary treatment water is allowed to filter back into the ground. The tertiary water treatment canals are depicted on Figure B-2.

B.2.7 Recreational Areas There are no recreational areas within 1,000 feet of the hazardous waste facility or the OB/OD facility.



SOURCE: NATIONAL CLIMATIC DATA CENTER.

FIGURE B-4

WIND ROSE FOR
JACKSONVILLE, FLORIDA,
1973 TO 1982, ALL MONTHS

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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B.2.8 Runoff Control System In the vicinity of the hazardous waste container storage and transfer facility, runoff is drained by surface channels. The facility is enclosed to prevent contamination of runoff.

The OB/OD facility has two functions: (1) to open detonate waste explosives on the ground without secondary containment and (2) to open burn waste explosives in a containment device. Due to the extreme explosive nature of the open detonation process, there are no runoff control devices, in the form of secondary containment, in place. It has been determined that containment devices would be destroyed in the explosion and might result in personal injury. However, contaminated runoff is controlled during open burning exercises by conducting the open burn in a burn drum equipped with a secondary containment device. Further details regarding the open burning device are provided in Section D. This device is designed of materials sufficient to withstand intense temperatures and to contain any initiating liquids, such as diesel fuel or kerosene, and serves to contain contaminated ash residues.

B.2.9 Access and Internal Roads Figure B-2 identifies the roads within the boundary of SUBASE Kings Bay. Roads within 1,000 feet of the hazardous waste facility and the OB/OD facility are identified on Figure B-3.2.

B.2.10 Storm, Sanitary, and Process Sewers There are no storm or process sewers within the vicinity of the hazardous waste facility. The sanitary sewer system within 1,000 feet of the hazardous waste facility is identified on Figure B-3.1.

B.2.11 Loading and Unloading Areas A loading and unloading area for the hazardous waste facility will be provided at the south end of the storage building.

Waste explosives are stored in a temporary storage magazine until they are designated for disposal. The temporary storage magazine is depicted on Figure B-2. There are no engineered loading ramps or structures associated with the unit, except for the storage magazine itself.

B.2.12 Fire Control Facilities The fire hydrants nearest the hazardous waste facility are shown on Figure B-3.1. There is also a fire hydrant located approximately 500 feet from the OB/OD facility. In addition, SUBASE Kings Bay operates its own fire station that is capable of responding to all types of fire that may be encountered at the hazardous waste facility or the OB/OD facility. The fire station is located in Building 2004 on USS Daniel Webster Road. The fire hydrants and the fire station are depicted on Figure B-2.

B.2.13 Surface Water There are no surface water bodies within 1,000 feet of the hazardous waste facility. The only surface water within 1,000 feet of the OB/OD facility is Marianna Creek. Standing water is common at the dredge disposal area to the east of the OB/OD area. This standing water accumulates as a result of drainage from saturated dredge spoils.

B.2.14 Flood Control and Drainage Barriers Drainage in the area of the hazardous waste facility is provided by three 24-inch by 38-inch, reinforced concrete pipes. There are no flood control or drainage barriers associated with the OB/OD facility.

B.3 LOCATION INFORMATION [40 CFR 270.14(b)(11)].

B.3.1 Seismic Standard SUBASE Kings Bay is not located in an area included in 40 CFR 264 Appendix VI; therefore, the seismic standard does not apply.

B.3.2 Floodplain Standard No Federal Insurance Administration (FIA) map is available for the part of Georgia occupied by SUBASE Kings Bay. A drainage and flood flow study was performed by Boyle Engineering Corporation in January 1982. The results of that study for the area within 1,000 feet of the hazardous waste facility are presented as Figure B-5.1, which is located in a pocket at the back of this application. This study demonstrates that the hazardous waste facility is above the 100-year floodplain. Figure B-5.2 shows the 100-year floodplain for the vicinity of the OB/OD facility.

The study recommends that the minimum floor elevation for buildings in the area of the hazardous waste facility be 24.5 feet mean low water (mlw). The mean low water at Kings Bay is 3.45 feet below mean sea level (msl). The finished floor elevation of the storage area of the hazardous waste facility is 30.0 feet mlw and the finished floor elevation of the office area is 26.5 feet mlw, thereby meeting the recommended elevation.

B.4 TRAFFIC INFORMATION [40 CFR 270.14(b)(10)].

B.4.1 Traffic Patterns and Volumes Primary access to SUBASE Kings Bay is through the security gate on USS Henry L. Stimpson Drive. All hazardous waste transport vehicles will enter via the Franklin Gate after being cleared by security and travel USS Benjamin Franklin Drive to USS Daniel Webster Road. The transport vehicles will proceed on USS Daniel Webster Road to the Defense Property Disposal Office (DPDO) Access Road, which leads to the hazardous waste facility access road.

Explosives are stored in the temporary storage magazine located on George C. Marshall Road until they are designated as a waste and thermally treated at the OB/OD facility. Hazardous waste transport vehicles will load the waste at the magazine and transport it north on George C. Marshall Road to the OB/OD facility located on John C. Calhoun Road. This is the only expected route of travel for the hazardous waste transport vehicles.

Within the Base boundaries, vehicle traffic consists primarily of automobiles and light trucks that are mostly Navy vehicles. A recent traffic count at the St. Marys gate on USS Daniel Webster Road showed a daily volume of 2,755 vehicles entering the gate. Speed limits throughout the Base vary from 5 miles per hour (mph) to 45 mph.

B.4.2 Traffic Control The majority of traffic at the SUBASE is routed along USS Daniel Webster Road and USS Henry L. Stimpson Drive. Traffic lights on these major routes provide traffic control.

B.4.3 Load-bearing Capacity All main roads are capable of bearing loads up to 70,000 pounds gross weight.

Access roads, including John C. Calhoun Road, are designed for an 18,000-pound-per axle load, consisting of at least 12 inches of compacted subgrade and a 12-inch course of gravel.

SECTION C
WASTE CHARACTERISTICS

The information in this section is submitted in accordance with the requirements of 40 CFR 270.14(b)(2) and (3) and 264.13(a), (b), and (c).

C.1 HAZARDOUS WASTE GENERATION [40 CFR 270.14(b)(2)]. Hazardous wastes are generated at SUBASE Kings Bay as a result of ship, weapons, and Base maintenance activities. SUBASE is undergoing considerable expansion at present. Additional waste-generating Navy commands are expected to occupy the Base within the life of this permit. Each command uses a Waste Information Document (WID) (Appendix C-1) to convey information about their wastes to the hazardous waste facility.

The Navy uses a wide variety of commercial chemical products at SUBASE Kings Bay. although most of these products are consumed during usage, they may also become wastes due to expiration of shelf-life or changes in the Navy's requirements. Therefore, many of these commercial products are included in the lists of hazardous wastes that may be stored in the hazardous waste container storage and transfer facility.

C.1.1 Open Burning and Open Detonation (OB/OD) Wastes In addition to the aforementioned hazardous wastes, SUBASE Kings Bay generates waste explosives that are designated as hazardous waste due to their reactive characteristics.

The OB/OD facility at SUBASE Kings Bay serves the purpose of treating various types of munitions and weaponry used by elements of the U.S. Navy. Hazardous waste is generated when these munitions are declared waste and turned over to the explosive ordnance disposal (EOD) for treatment. This declaration may arise as a result of any of the following.

1. The age of the item exceeds maximum "shelf life."
2. The item appears to have been damaged.
3. The item shows evidence of deterioration such as rust.
4. The item has been declared surplus.

The OB/OD facility has the potential for treating a variety of reactive hazardous wastes. The following types of ammunition and explosives are authorized for treatment through open burning:

a. black powder;
b. dynamite in bulk (limited quantities);
c. floating smoke pots (red phosphorus-filled) and similar ammunition;
d. group C chemical ammunition;
e. high explosives (bulk);
f. incendiary bomb clusters AN-M8 and AN-M2;
g. incendiary bombs, gasoline-gel, and/or gasoline-waste cotton filled;
h. nitrocellulose;
i. primers;
j. pyrotechnics;
k. rocket motor propellants;
l. smokeless powder;
m. trinitrotoluene (TNT) demolition blocks; and
n. tracer mix and other pyrotechnic mixtures.

OB/OD exercises are conducted at the same facility. The types of reactive wastes that have been authorized for open detonation are:

a. detonators,
b. dynamite in bulk (large quantities),
c. explosive-loaded grenades,
d. high explosive bombs,
e. mortar ammunition,
f. projectiles, and
g. rocket and missile warheads.

Appendix C-2 includes a summary of explosives and munitions that may be treated through open burning or open detonation as specified above. In addition, Appendix C-3 identifies the chemical composition of explosives that are treated through open detonation and, to a lesser extent, those that are treated through open burning. During earlier treatment operations, SUBASE Kings Bay did not keep operating records that reflect the quantities or types of explosives treated. Therefore, as a worst case scenario, it is assumed that the OB/OD facility has the capacity to treat any of those explosives discussed in Appendices C-2 and C-3.

The primary hazard characteristic of the waste residues remaining after thermal treatment originates from heavy metals and possibly traces of the propellants, explosives, and pyrotechnics (PEP) material. Due to the explosive nature of these residues generated at the OB/OD site, residual ash may be resubmitted for OB/OD operations.

In the open burning operation, the current Standard Operating Procedure (SOP) (see Appendix D-1) includes requirements to weigh the waste materials prior to burning and to weigh any ash residues that may have been generated by treatment. The OB burning drum and the secondary containment pan will be emptied following each burn, and any ash residues that may have been generated will be either containerized and delivered to the hazardous waste storage facility for analysis or resubmitted for OB/OD treatment.

Effectiveness of treatment may be evaluated by sampling and analyzing the waste residue for the RCRA characteristics of reactivity and Toxicity Characteristic Leachate Procedure (TCLP) toxicity. Any residual ash is considered reactive until proven otherwise because it is the product of the treatment of a reactive waste. The ash sample is initially submitted to the reactivity test to determine if hazardous quantities of the PEP remain. If positive test results are obtained from the reactivity test, it is an indication of an incomplete burn and the waste residue is resubmitted for OB/OD. The residual ash will be tested for the characteristic of reactivity by using one or both of the test methods developed by the U.S. Bureau of Mines. These tests are: (1) the Gap Test and (2) the Detonation, Deflagration, and Transition Test.

The TCLP toxicity test is conducted on the ash after negative results are obtained from the reactivity test. The rationale for this is to minimize the potential for laboratory hazards associated with testing an explosive sample. Residual ash is sampled and analyzed for the following heavy metals that exhibit the characteristic of TCLP toxicity: barium, cadmium, mercury, and lead.

Figure C-1 shows the waste analysis flow path for residual ash generated in the thermal treatment process.

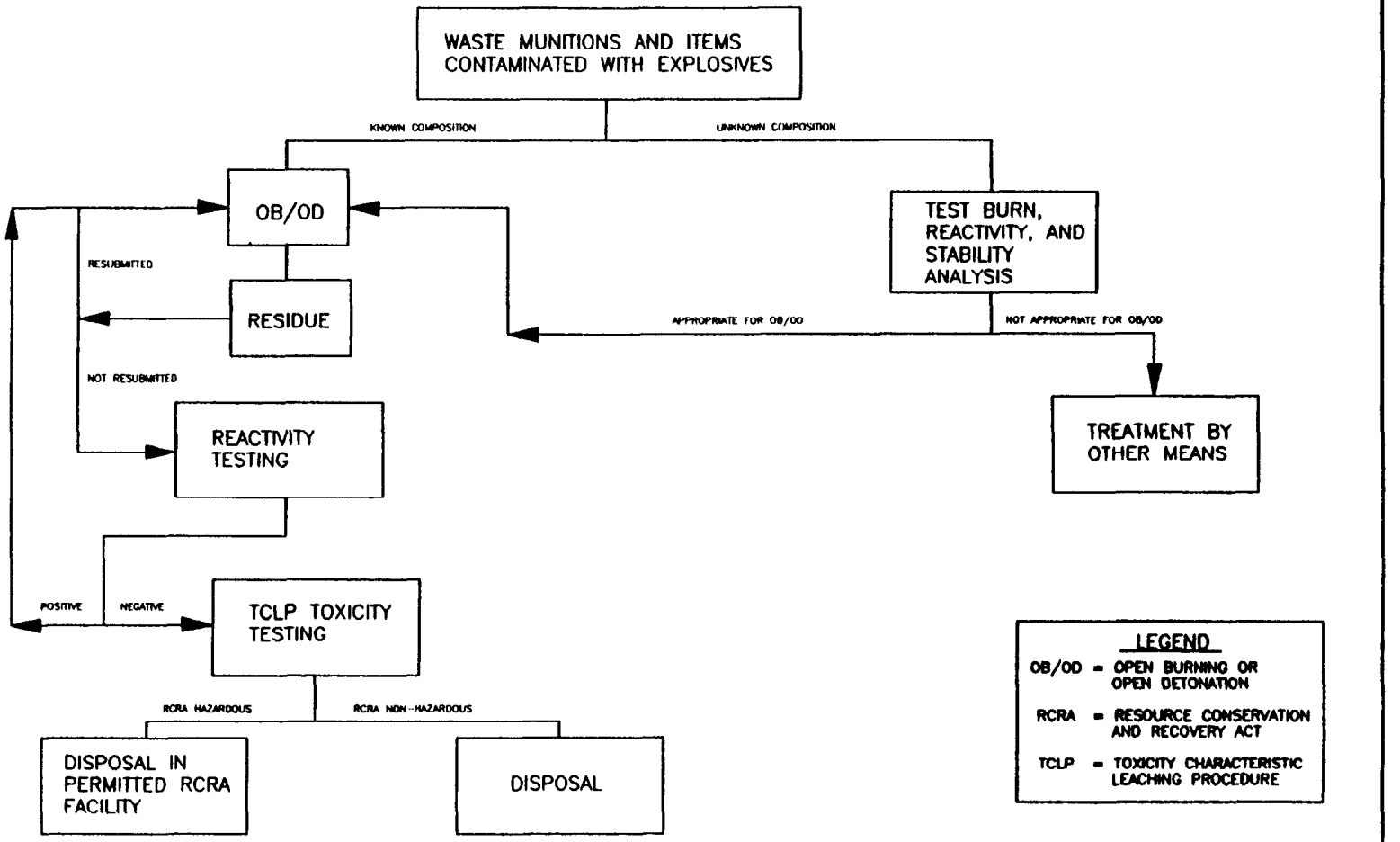

FIGURE C-1

THERMAL TREATMENT FLOW DIAGRAM

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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In the open detonation operation, the immediate area surrounding the unit is inspected for any unburned PEP fragments following each detonation. All fragments are resubmitted for open detonation. This procedure ensures that any treatment residues that may have been generated and collected for analysis and disposal are not of an explosive nature.

To evaluate effectiveness of treatment for the open detonation operation, a program of annual soil sampling will be implemented. The soil sampling program is discussed in Section E of this application.

The OB/OD of explosive hazardous materials may release constituents to the atmosphere that must be considered. The primary pollutants of concern are those for which ambient air quality standards have been established via the Clean Air Act. The following pollutants are considered: carbon monoxide, nitrogen oxides, sulfur oxides, and hydrocarbons. Through computer modeling, the U.S. Navy has generated tables of the expected chemical byproducts that may result from OB/OD exercises. These tables are included as Appendix C-4. The approximate site specific quantities of these emission products is further discussed in Section L.

In addition to the methods described above, SUBASE intends to use the results of the U.S. Army Armament, Munitions, and Chemical Command (AMCCOM) OB/OD Emissions and Residues Characterization Study as a means of evaluating effectiveness of treatment. The Army study has been conducted over the last several years. The study provides data available for the majority of explosive materials treated at SUBASE Kings Bay through OB/OD and addresses air emissions, chemical and energy conversion, and residues. A copy of the conclusions section of this report is included in Appendix C-5. In addition, the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) document, provided in Appendix C-6, provides a more detailed description of this study.

SUBASE Kings Bay may, on occasion, receive explosive hazardous wastes from the local communities or from local law enforcement agencies. In such cases, the treatment operation is considered an emergency and is exempt from the RCRA guidelines. Therefore, these emergency disposal operations are not included in this permit application.

<u>C.1.2 Hazardous Waste Container Storage and Transfer Facility</u> Table C-1 is a list of hazardous wastes that are generated at SUBASE Kings Bay, or are expected to be generated by incoming commands, and potentially stored at the hazardous waste container storage and transfer facility. The data in Table C-1 were compiled by reference to the 1994 annual report for hazardous waste generated at the SUBASE. Variations in the types of waste stored at the hazardous waste container storage and transfer facility, relative to those types of wastes managed during 1994, are not expected.

The containers of hazardous waste are grouped for storage according to whether the waste is flammable, acidic, alkaline, chlorinated hydrocarbon, oxidizer, or reactive.

<u>C.1.3 Examination of Alternatives to OB/OD</u> The Department of Defense (DOD) has an ongoing program to evaluate alternatives to the OB/OD thermal treatment process. USATHAMA has been conducting an analysis and review of alternative treatment technologies; the preliminary results of this review are included in Appendix C-6.

Table C-1
Hazardous Waste Generation At Naval Submarine Base (SUBASE) Kings Bay

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste Description	USEPA Waste Number	USEPA Waste Code
Acetic acid	D001 and D002	I, C
Acetone	F003 and U002	I
Acetone and spot check penetrant debris	F003	I
Acetone rags	F003	I
Acetylene gas cylinders	D001	I
Acidic mixture	D002	C
Adhesive	D001, D008, D035, and F002	I, TC, T
Adhesive primer	D001	I
Aerosol containers	D001, D007, and D008	I, TC
Alodine waste	D002 and D007	C, TC
Alumibond	D001 and D007	I, TC
Ammonium hydroxide	D002	C
Ammonium persulfate	D001 and D002	I, C
Anti-sieze compound	D008	TC
Anti-sieze, lead	D008	TC
Aromatic amine	D002	C
Arsenic trioxide	P012	T
Barium chloride	D005	TC
Barium hydroxide	D005	TC
Batteries	D002, D008, and D009	C, TC
Batteries (lead acid)	D002 and D008	C, TC
Batteries (nickel cadmium) dry	D006	TC
Batteries (nickel cadmium) wet	D002 and D006	C, TC
Batteries (mercury)	D002 and D009	C, TC
Benzene	D001, D018, and U019	I, TC, T
Benzoine tincture	D001	I
Blast media	D006, D007, and D008	TC
Calcium hypochlorite	D001 and D003	I, R
Calcium, metallic	D001 and D003	I, R
Chromic acid debris	D007	TC
Chromic acid solution	D002 and D007	C, TC
Citric acid solution	D002	C
Cleaner, lubricant, and preservative	F002	T
Cleaning compound	D001 and D002	I, C

See notes at end of table.

Table C-1 (Continued)
Hazardous Waste Generation At SUBASE Kings Bay

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste Description	USEPA Waste Number	USEPA Waste Code
Coating repair (xylan)	D001 and F003	I
Color fixer	D011	TC
Conathane	D001	I
Copier fluid	D001	I
Copper plating solution	D002, D006, and D007	C, TC
Copper solution	D002	C
Corrosion inhibitor	D002	C
Corrosion preventative	D001	I
Corrosion preventative (liquid)	D001	I
Corrosion remover	D002	C
Decontamination kits	D001	I
Delcem (part B)	D008	TC
di(2-Ethylhexyl)phthalate	U028	T
Digestion solution	D002	C
Dimethoate spill debris	P044	T
Dimethyl gloxime	D002	C
Dispersant	D001	I
Dry cleaning solvent	D001	I
Dry cleaning solvent and wire rope grease debris	D008	TC
Epoxy catalyst	D021 and D035	TC
Epoxy powder coating debris	D007 and D008	TC
Epoxy primer	D001 and D007	I, TC
Ethanolamine	D002	C
Ethyl acetate	D001	I
Ethyl alcohol	D001	I
Ethylene glycol monoethyl ether	D001	I
Ethylene glycol monoethyl ether acetate	D001	I
Ethylene glycol, water paint thinner	D018, D022, F003, and F005	TC, I, T
Ferric chloride (HCl)	D002	C
Ferrous stain remover	D002	C
Film lubricant (dry, solid)	D001, D008, and D035	I, TC
Fire barrier caulk	D001 and D035	I, TC
Fixer wash water	D007 and D011	TC
Fixer, metal photograph	D007 and D011	TC

See notes at end of table.

Table C-1 (Continued)
Hazardous Waste Generation At SUBASE Kings Bay

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste Description	USEPA Waste Number	USEPA Waste Code
Flash arrestor wash water	D002	C
Floor polish remover	D002	C
Formaldehyde	U122	T
Freon 113 (spent)	F002	T
Freon and oil	F001	T
Freon, fluorinated and molykote grease debris	F001	T
Freon, oil and solvents	D001 and F002	I, T
Gasoline	D001	I
Gasoline filters	D001	I
Generator solution	D019, D035, and F003	TC, I
Glass beads blast media	D006	TC
Gram decolorizer	D001	I
Grease, lead	D008	TC
Gun wash slop	D001, D005, D007, D008, D035, F003, and F005	I, TC, T
Hydrochloric acid	D002	C
Hydrochloric acid, 2,4-dinitrophenyl-hydrazine	D002	C
Hydrogen peroxide	D001	I
Hydrogen peroxide solution	D001	I
I.C.P. aqueous waste	D002, D006, D007, and D009	C, TC
I.C.P. waste (B)	D002, D006, D007, D008, and D009	C, TC
Isopropanol	D001	I
Isopropanol, graphite	D001	I
Isopropanol, water	D001	I
Kodak activator	D002	C
Laboratory pack "A"	D001, D013, D014, D015, D016, D018, D019, D021, D027, D038, and D043	I, TC
Layout dye	D001, F002, and F003	T, I
Lead acid batteries	D002 and D008	C, TC
Lead blankets	D008	TC
Lead debris	D008	TC
Lead foil	D008	TC
Lithium nitrate	D001	I
Lithium oxyholide batteries	D003	R
Magnesium batteries	D007	TC

See notes at end of table.

Table C-1 (Continued)
Hazardous Waste Generation At SUBASE Kings Bay

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste Description	USEPA Waste Number	USEPA Waste Code
MEK debris	D035	TC
MEK, peroxide	U029	T
Mercuric nitrate	D002 and D009	C, TC
Mercuric oxide	D009	TC
Mercury amalgam	D009	TC
Mercury switches	D009	TC
Mercury thermometers	D009	TC
Mercury, silver paper	D009 and D011	TC
Metal polish	D001	I
Methanol	U154	I
Methyl ethyl ketone	D001 and D035	I, TC
Methyl ethyl ketone, oil	D035	TC
Methylene chloride debris	F001 and F002	T
Methylene chloride stripper	F002	T
Methylene chloride, water	F002	T
Moisture titration fluid	D019, D022, and F003	TC, I
Monoethanolamine	D002	C
Morpholine	D001	I
n-Butyl alcohol	D001	I
N.O.C. liquid	D008	TC
Nail polish remover	D001	I
Neutra rust	D002	C
Nickel-cadmium batteries	D002 and D006	C, TC
Nickel plating solution	D002, D007, and D008	C, TC
Nickel solution	D002	C
Nitric acid	D001 and D002	I, C
Oxygen breathing apparatus canisters	D001 and D005	I, TC
Oil filters	D007 and D008	TC
Ordnance debris	D006	TC
Oxygen candles	D001 and D005	I, TC
Paint	D001, D007, D008, F003, and F005	I, TC, T
Paint debris	D005, D007, D008, D035, F002, F003, and F005	TC, I, T
Paint debris, solvents	D005, D007, D008, D035, F002, F003, and F005	TC, I, T

See notes at end of table.

Table C-1 (Continued)
Hazardous Waste Generation At SUBASE Kings Bay

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste Description	USEPA Waste Number	USEPA Waste Code
Paint liquid	D001	I
Paint remover	D001, D007, and F002	I, TC, T
Paint remover debris	F001	T
Paint waste-liquid	D001, D007, D008, F003, and F005	I, TC, T
Paint, barium	D001 and D005	I, TC
Paint, listed solvents	D001, D007, D035, D008, F003, and F005	I, TC, T
Paint, listed solvents, MEK	D001, D035, F003, and F005	I, TC, T
Paint, MEK	D001 and D035	I, TC
Pasa jell #102	D002 and D007	C, TC
Pentachlorophenol	F027 and D037	TC, H
Pentane	D001	I
Petroleum distillate	D001	I
Phenolic resin, silver compound	D011	TC
Phosphoric acid	D002	C
Photograph receptor drum	D004 and D010	TC
Plastisol primer	D001, F003, and F005	I, T
Plating waste and rags (alodine)	D007	TC
Polish (plastic)	D001	I
Polyester resin	D001	I
Polysulfide rubber compound	D007 and D008	TC
Polysulfide rubber compound debris	D007 and D008	TC
Polyurethane	D001 and F002	I, T
Porcelain cleaning compound	D002	C
Potassium chromate	D007	TC
Potassium hydroxide	D002	C
Potassium nitrate	D001	I
Primer (sealing compound)	F002	T
R-11	U121 and U075	T
Red lead oxide powder	D001 and D008	I, TC
Red lead oxide powder, mineral oil	D008	TC
Respirator filters	D007 and D011	TC
Rubber primer	D001	I
Sand blast media	D007	TC
Scale remover	D002	C

See notes at end of table.

Table C-1 (Continued)
Hazardous Waste Generation At SUBASE Kings Bay

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste Description	USEPA Waste Number	USEPA Waste Code
Scintiverse	D001	I
Sealing compound	D007	TC
Sealing compound, TCE, freon, and debris	F002 and D007	TC, T
Silver cell batteries	D002 and D011	C, TC
Silver cell batteries (dry)	D011	TC
Silver cell wash	D011	TC
Silver nitrate	D001 and D011	I, TC
Silver nitrate solution	D001	I
Silver paper	D009 and D011	TC
Silvex	D017 and F027	TC, H
Silvex, methanol	D001, D017, and F027	I, TC, H
Sodium chlorate	D001	I
Sodium hydroxide powder	D007	TC
Sodium hydroxide solution	D002	C
Sodium hypochlorite solution	D002	C
Sodium metasilicate solution	D002	C
Sodium nitrate	D001	I
Sodium phosphate solution	D002	C
Sodium silicate solution	D002	C
Solder debris	D004, D008, and D011	TC
Solder flux	D001	I
Solid film lubrication	D001, D008, and D035	I, TC
Solid paint	D005, D007, D008, and D035	TC
Solid paint containers	D005, D007, D008, and D035	TC
Spill residue, mercury contaminated soil	D009	TC
Stripping solution	F002	T
Sulfuric acid	D002	C
Teflon paint, water	D001 and D007	I, TC
Tetrachloroethene	F002	T
Tetrachloroethene, debris	F002	T
Tetrahydrofuran	D001	I
Titration fluid	D001, F003, D019, and D035	I, TC
Toluene	D001, F005, and U220	I, T
Toner	D001 and D007	I, TC

See notes at end of table.

Table C-1 (Continued)
Hazardous Waste Generation At SUBASE Kings Bay

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste Description	USEPA Waste Number	USEPA Waste Code
Trich, freon 113, hydraulic fluid, and debris	F001	T
Trichloro-fluoromethane	U121	T
Trichloroethane	F002	T
Trichloroethane (spent)	F001	T
Trichloroethane debris	F001	T
Trichloroethane, freon, and oil debris	F001	T
Trichloroethane, MEK debris	F001 and D035	TC, T
Trichloroethane, rags	F001	T
Trichloroethane, water	F001	T
Trichloroethene	F001	T
Trichlorotri-fluoroethane	F002	T
Trichlorotri-fluoroethane debris	F002	T
Trichlorotri-fluoroethane, oil	F001 and F002	T
Trichlorotri-fluoroethane (oil and solvents)	D001 and F002	I, T
Turco super carb	D007 and F002	TC, T
Turcoat accelagold	D001, D002, and D007	I, C, TC
Urethane accelerator	D001 and D021	I, TC
Varnish	D001	I
Waste explosives	D003	R
Watch cleaning solution	D001	I
Wire rope grease	D008	TC
Wire rope grease debris	D008	TC
Wood filler	D001 and D035	I, TC
X-omat fixer	D007 and D011	TC
X-ray rinse water	D006	TC
Xylene (spent)	D001 and F003	I
Xylene (unused)	U239	I, T
Zinc chromate putty	D007	TC

USEPA = U.S. Environmental Protection Agency.
I = ignitable.
TC = toxicity characteristic.
NOS = not otherwise specified.
I.C.P. =
N.O.C. =
TCE = trichloroethene.
R = reactive.
C = corrosive.
T = toxic.
HCl = hydrogen chloride.
MEK = methyl ethyl ketone.
R-11 = type of explosive.

Several issues addressed within the USATHAMA technology review pertain primarily to technologies used at U.S. Army facilities; for many of these, there are no equivalent technologies currently available within the Navy. Therefore, SUBASE Kings Bay does not have access to these technologies. However, SUBASE Kings Bay does participate in many of the alternative programs described within the document. These points of similarity and dissimilarity are described below.

1. SUBASE Kings Bay is actively involved within the DOD Conventional Ammunition Demilitarization Program. Under this program, a significant quantity of the munitions that are declared to be unserviceable, obsolete, or surplus are either recycled, reworked to meet alternate specifications, or included in the Foreign Military Sales Program. At SUBASE Kings Bay, the majority of PEPs are recycled through utilization in training exercises for EOD personnel or SUBASE fire department personnel. In these instances, the materials are not classified as wastes and are, therefore, exempt from RCRA requirements. Also, items such as damaged munitions that are demolished are considered to be under emergency conditions; these situations are also exempt from RCRA requirements. As a result, only a small part of the SUBASE Kings Bay munitions are considered to be hazardous wastes that are demilitarized through thermal treatment.

2. Several alternate technologies to OB/OD are presented that have been used or are presently being developed by DOD. The availability to the U.S. Navy and current status of each are presented in the following.

   a. Separation and Disassembly Technologies. These technologies include hot water washout, steam out, and autoclave treatment. The only Navy facility that possesses such equipment is the Keyport Naval Weapons Station in the State of Washington. Transportation of munitions to this facility from SUBASE Kings Bay would be dangerous to both the transporters and to the communities along the transit route. Also, these methods place workers at a higher risk than with OB/OD and have a tendency to create additional quantities of hazardous wastes, such as explosive-contaminated wastewaters. These wastes require further treatment and tend to be counterproductive in terms of the safety requirements and waste minimization goals established by the DOD.

   b. Incineration. The Army uses several types of incineration technology in the treatment of waste munitions and propellants. The Navy currently has no incinerators designed for this purpose. Very few of these Army facilities have received final RCRA permits due to problems associated with the units. The Army units tend to experience a phenomenon called flashback, in which minor detonations occur within the units. The flashbacks generally cause internal damage within the incinerators and can result in broken welds and seams that lead to excessive air emissions. As a result, the Navy does not view this technology as sufficiently developed to adequately treat these types of wastes.

c. Electrochemical reduction and chemical conversion are not applicable to wastes at SUBASE Kings Bay. The Western Area Demilitarization Facility is at such a distance from SUBASE Kings Bay that use of this facility is not feasible.

3. Hazardous Waste Minimization. SUBASE Kings Bay currently has a program of hazardous waste minimization in effect. This program includes periodic audits of the facility and the implementation of a hazardous waste minimization plan. The recycling programs previously mentioned are an integral part of the waste minimization efforts.

4. Several Research and Development (R&D) programs are presently being conducted within DOD to develop methods to supplement or replace OB/OD technologies. These include such methods as supplemental fuel, improved means of water and solvent washout, extraction, biodegradation, alternate incinerator designs, etc. None of these technologies are sufficiently developed enough to be available for implementation at SUBASE Kings Bay.

Appendix C-6 provides a much more detailed discussion of the alternatives available for OB/OD. None of these technologies are available to SUBASE Kings Bay at the present time. Also, it must be noted that many military ordnance items, particularly bombs, are designed so that they cannot be easily and safely disassembled. This design practice is employed to prevent any unexploded ordnance (UXO) that has been used in combat from being reused by hostile forces against allied forces. Attempts to disassemble these types of items for sampling and analysis would be extremely dangerous. The only feasible means of disposing of these items is through open detonation.

No chemical agents are treated at SUBASE King Bay. Pyrotechnics such as smokes, phosphorus, and flares are thermally treated through open burning. The only alternate treatment for these types of materials other than open burning is incineration. As stated previously, the U.S. Navy currently has no demilitarization furnaces or incinerators. Also, U.S. Army incinerators that are used for treatment of these materials tend to regularly experience minor detonations that damage the units and result in incomplete treatment. Due to these difficulties, as well as the potential of the materials to detonate during handling, transportation of these materials to offsite facilities is not considered a feasible option.

C.2 WASTE ANALYSIS PLAN [40 CFR 270.14(b)(3)]. The following plan provides guidance used for determining the physical and chemical characteristics of hazardous wastes and industrial wastes at Kings Bay. The characteristics of each waste are determined prior to initiating storage, treatment, or disposal procedures. While the plan requires that these characteristics be determined, it is not often necessary to conduct actual laboratory analysis if maximum use is made of existing data for materials used at SUBASE Kings Bay. Implementation of the plan is the responsibility of the Public Works Department and the "originator" of the waste. (The word "originator" is used to refer to individual commands and/or departments within SUBASE Kings Bay who generate industrial or hazardous wastes.) The plan details the steps to be taken to characterize wastes to provide labeling and handling information to originators and to determine the most appropriate handling and disposal method for the waste.

The categories of waste that are treated at the SUBASE Kings Bay OB/OD facility consist primarily of military energetic materials and ordnance that have exceeded their shelf life, have been damaged, have been used for their intended purpose and are no longer useful, or have been declared surplus. Waste ordnance and pyrotechnics treated at SUBASE Kings Bay are generated at the various naval commands at SUBASE Kings Bay and neighboring Navy facilities. These materials are submitted to EOD for thermal treatment through OB/OD.

Appropriate treatment of these materials is based upon published information, including existing serial numbers, stock numbers, or inventory lot numbers. Information is also available in historical data and ordnance publications. These reference materials are maintained by EOD Group Two, Detachment Kings Bay, which performs all thermal treatment activities at the facility.

If there is a question as to the suitability of a particular material for OB/OD, other data are gathered to resolve the issue. A small test burn of the material, if possible, may provide adequate information on the applicability of OB/OD for the waste. A test burn is also performed to determine acceptability of OB/OD materials for which little or no historical data exists.

It is not feasible in the aforementioned cases to do a complete chemical analysis of the material in question due to its presumed hazardous nature. Due to their inherent explosive nature, all such materials are considered to have the potential to detonate. In addition, the majority of items are submitted for OB/OD due to the age of the item; explosives are known to become less stable with age. Therefore, sampling waste explosives poses a significant health risk due to premature detonation of the ordnance as a result of sampling attempts. Also, a detailed waste analysis is not necessary to ensure successful treatment by OB/OD, as the constituents of PEP, as well as its ballistic properties, are well known prior to treatment. The AMCCOM study in Appendix C-5 indicates that OB/OD is effective as treatment of these materials; also, Appendix C-7 contains physical properties of PEP materials demilitarized at this site which, in conjunction with Appendix C-3, further demonstrate that OB/OD will successfully treat these wastes. Therefore, full hazard characteristic analyses are not performed to avoid danger associated with excess handling of such materials and to eliminate costly and potentially dangerous time delays. The materials are visually inspected prior to treatment to ensure that only appropriate PEP are subjected to thermal treatment. Nonexplosive wastes are returned to the generator.

A flow diagram demonstrating the routes through which materials are received for OB/OD treatment by EOD is included as Figure C-2.

The purpose of the Waste Analysis Plan for OB/OD materials is to gather information that will aid the facility in (1) characterizing the residue remaining after OB/OD, and (2) subsequent handling, storage, and disposal of the residue. The OB/OD Waste Analysis Plan flow scheme is shown on Figure C-1.

It is vitally important that wastes be properly characterized. Inaccurate information concerning the chemistry of waste could lead to violations of State or Federal rules, safety problems for workers handling the wastes, and/or improper treatment at the Base's treatment plants.

<u>C.2.1 Initial Waste Characterization</u> A WID is used to transfer data about a waste from the originator to Public Works. A copy of this form and instructions

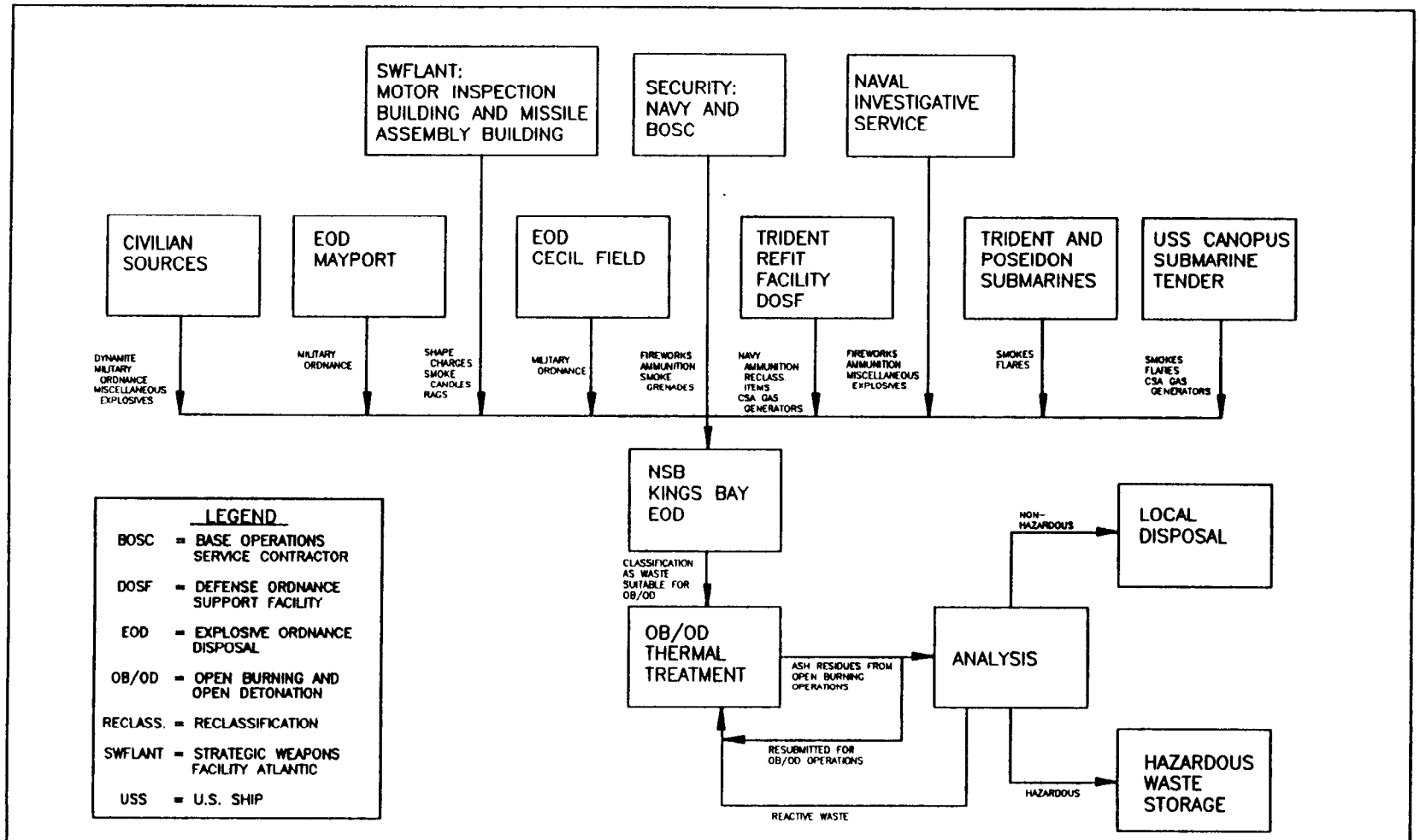

FIGURE C-2

WASTE MUNITIONS AND EXPLOSIVES FLOW DIAGRAM

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE KINGS BAY, GEORGIA

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on completing it are contained in Appendix C-1. Under routine conditions, the originator will provide the common and chemical names of the waste and its constituents and a National Stock Number (NSN) when available. Upon receipt of a WID containing an NSN, the Hazardous Materials Information System (HMIS) maintained on the facility's compact disk-based computer system should be consulted for further information about this material. The HMIS is a microfiche database containing physical and chemical characteristics of the product purchased by the DOD. The database is updated frequently. These data are supplemented with laboratory analyses when the waste is a "process waste" or when the HMIS is inadequate. Table C-2 is a summary of the data available in the HMIS. The HMIS contains specific information on the material. This information and its uses are informally summarized in Table C-3.

The data from the HMIS should then be transferred to the back of the WID to provide the originator with information needed to properly handle and temporarily store the waste. The data given to the originator need to include all applicable U.S. Environmental Protection Agency (USEPA) hazardous waste numbers, specific handling instructions, the type container in which the waste is to be collected, hazard class, UN/NA number, proper Department of Transportation (DOT) shipping name, and ultimate disposition of the waste and any additional information required to safely and legally accumulate the waste. The USEPA waste numbers must be determined by reference to the lists and characteristics of hazardous waste that are contained in the SUBASE Kings Bay Hazardous and Industrial Waste Management Plan.

In some cases the WID will not contain an NSN, particularly for process wastes such as sludges, mixtures, and locally purchased items. It is also possible that the HMIS will omit some information. Additional sources of information must be consulted in these cases. The additional sources include the following.

1. Material Safety Data Sheets prepared by the manufacturer for the material(s) in the waste. Navy instructions require that such a sheet be obtained from the vendor (even for locally purchased items).

2. Fire Protection Manual on Hazardous Materials (National Fire Protection Association [NFPA]). This Includes data on many products by brand name and has an incompatibility section that is extremely helpful.

3. Dangerous Properties of Industrial Materials. This provides extensive toxicological data and is cross indexed by known synonyms. It also contains incompatibility data, flash point data, and may contain DOT hazard information.

4. The Hazardous Materials Shipping Table found at 49 CFR 172 contains lists of materials recognized as hazardous by DOT and associated hazard class and packaging requirements.

5. The Hazardous and Industrial Waste Management Plan for SUBASE Kings Bay contains many waste streams and associated hazard data.

6. The lists of hazardous wastes published by USEPA at 40 CFR 261 should also be consulted.

Table C-2
Information Available from the Hazardous Materials Information System (HMIS) on Chemical Products

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

National stock number	Part number and trade name
Proprietary (yes or no)	Manufacturer and telephone number
Item name and unit of issue	Quantity
Radioactivity data	Chemical name(s) and formula
Hazardous components	DOT requirements
Chemical name	Class
NIOSH number	Label
Percent in product	ID number
TLV	
RQ	
Health and physical property data	Storage and handling data
Boiling point	Extinguishing media
Flash point	Unusual fire hazards
Explosion limits	Protective equipment
Vapor density	Ventilation
Specific gravity	Handling precautions
Solubility in water	Other precautions
Appearance and odor	Incompatibilities
First aid	Conditions to avoid
Hazardous decomposition products	

Notes: NIOSH = National Institute for Occupational Safety and Health.
TLV = threshold limit value.
RQ = reportable quantity.
DOT = Department of Transportation.
ID = identification.

Table C-3
General Usage of Hazardous Materials Information System (HMIS) Information

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Data from HMIS	Use of Data
Hazardous components	Compare the names of hazardous components with the lists of hazardous wastes to determine whether a listed waste is present. Also whether or not any components contain lead, cadmium, or other "regulated" chemicals that may cause the waste to be considered hazardous.
Flash point	If flash point is below 140 °F, waste is hazardous (D001).
pH	If pH is less than 2.0 or greater than 12.5, the waste is hazardous (D002).
DOT requirements	The HMIS will specify the DOT shipping name, hazard class, and approved container(s).
Storage and handling data	Note any special precautions shown such as handling precautions, special protective equipment required, incompatibilities, etc.

Notes: The Hazardous Materials Information System (HMIS) may also contain additional helpful information, such as: fire-fighting procedures, appearance, odor, shipping quantity, solubility, explosive limits, etc.

°F = degrees Fahrenheit.
DOT = Department of Transportation.

If these reference materials do not contain the needed information, laboratory testing of the waste will be necessary. A representative sample of the waste should be collected and the analytical protocol described below for unknown wastes should be followed. The protocol can be reduced based on the information that is available. For instance, a water-based waste need not be tested for flash point, a paint sludge waste need not be tested for pesticides, etc. Therefore, testing may be reduced based upon a reasonable knowledge that one or more parameters are not relevant to the waste stream.

C.2.2 **Characterization of an Unknown Waste** Personnel at EOD are specifically trained in the handling and treatment of waste explosives. As such, they are familiar with such wastes and unknown waste explosives are not expected to be treated under normal conditions. However, under emergency treatment conditions, unknown explosives may be disposed. These unknowns may be received from the local communities, local law enforcement agencies, or upon special request by the Navy. As mentioned before, due the extreme risks associated with sampling attempts, these items will not be analyzed and will be treated only after receiving authorization from NAVSEASYSCOM.

Occasionally there may be drums of unidentified waste at SUBASE Kings Bay. The material may be unidentified due to the loss of container markings or to other causes. The characterization procedure will be followed to determine whether the material is a hazardous waste. This procedure can also be used to determine if an unwashed empty container should be treated as hazardous waste. Use extreme caution when handling unknown wastes. It is generally expedient to assume unknowns are hazardous until proven otherwise.

The characterization procedure will also be followed when an originator submits a waste characterization request form to Public Works. This request form is designed to allow the originator to provide as much information as is known about the waste to reduce testing requirements. An example of the Waste Characterization Request form is shown in Appendix C-1. The characterization procedure is as follows.

1. Record all marks on the drum, particularly an NSN, product name, or chemical name.

2. If an NSN is found, locate the NSN in the HMIS microfiche. The microfiche record will detail specific information (color, appearance, pH, and specific gravity) that should be compared to the unknown material. This may eliminate the need for expensive testing. For instance, if the microfiche record indicates the material should have a pH of 4.0 and a density of 1.3, a laboratory can inexpensively and quickly check these parameters. If they match, then the unknown is the same as the NSN on the drum. If no NSN is present, but a product name is located on the drum, use the same procedure checking the product cross reference to the HMIS. If only a chemical name is present, information on chemicals can be found in *Dangerous Properties of Industrial Materials*, Irving Sax, editor (available from Van Nostrand Reinhold Company) and the *Fire Protection Guide to Hazardous Materials* (available from NFPA, Boston, Massachusetts). Material Safety Data Sheets on file with the Safety Office or Supply Department may also be used.

3. If in Step 2 the material has been determined to be the same as the drum markings, use the HMIS or other sources to determine the following (a yes answer to any one question means the material is a hazardous waste).

   a. Is the pH less than 2.0?

   b. Is the pH greater than 12.5?

   c. Is the flash point less than 140 degrees Fahrenheit (°F)?

   d. Is the material an oxidizer?

   e. Does the material react violently with water?

   f. Does the material contain toxicity characteristic heavy metals or organic compounds (laboratory test may be needed for TCLP to determine whether the waste is hazardous)?

   g. Does the material contain any chemical listed in 40 CFR 261.31?

   h. Is the material a <u>pure</u> form of any chemical listed in 40 CFR 261.33(e) or 40 CFR 261.33(f)?

4. If the material does not match the container markings, it is necessary to test it to determine whether the material is a hazardous waste. First, the waste will be analyzed for "Characteristics of Hazardous Waste" to determine proper storage. Second, the wastes will be analyzed to identify the material by either gas chromatography and mass spectroscopy (GC/MS) or high-performance liquid chromatography (HPLC) to determine proper disposal.

It is possible that additional tests may be required on some drums. For instance, a check for polychlorinated biphenyls (PCBs) may be necessary on oily wastes prior to disposal.

All laboratory tests will be conducted using regulatory approved and required analytical protocols and will be certified by the analyst. Procedures to be followed include those in USEPA Publication SW-846, *Tests Methods for Evaluating Solid Waste Physical/Chemical Methods (1986)*, and DOT methods referenced in 49 CFR 171.8.

Upon receipt of test results, the WID can be completed and the waste information transferred to the originator.

<u>C.2.3 Analysis Parameters and Rationale</u> The Waste Analysis Plan is designed to maximize the use of originator, manufacturer, and literature-supplied data and minimize the need for analytical testing. However, analytical testing will be required periodically. When required, these data must be obtained under procedures consistent with USEPA regulations. The following section provides guidance on analytical sampling and testing.

Table C-4 is a list of hazardous wastes generated at SUBASE Kings Bay and the analytical parameters and rationale for each. This table also presents information on waste explosives generated at SUBASE Kings Bay. The sampling and analytical parameters for soil samples collected as part of the facility closure will be discussed in Section I, entitled Closure Plan, Post-Closure Plan, and Financial Requirements.

C.2.4 Analytical Testing Methods Table C-5 identifies the test methods to be employed in the analysis plan.

The laboratory employed to perform analysis must certify its use of these procedures including the applicable quality assurance and quality control requirements of the methods.

C.2.5 Sampling Procedures Many waste streams are heterogeneous; therefore, care must be taken to obtain a representative sample. In sampling wastes, consideration will be given to the uniformity of the waste in a container and to variations in production that may cause the waste to vary. Table C-6 is a summary of waste sampling methods for different types of wastes. Liquids and sludges are the most common form of hazardous waste. However, occasionally other forms shown on Table C-6 may be encountered. Recommended sampling access points for different waste containers and soil are listed in Table C-7. Recommended numbers of samples to be taken for different type of wastes and soil are given in Table C-8.

In most cases, for hazardous wastes that are placed in containers ranging in capacity from 5 to 85 gallons, the sampling method employed is a Coliwasa sampler. However, because the residual ash resulting from open burning will have a fine powdery consistency, a Sampling Thief or similar device approved by the administrator will be used to collect representative samples. Instructions for drum sampling using the Coliwasa and the Sampling Thief are presented in Tables C-9 and C-10, respectively.

When using a Coliwasa, a single sample (top to bottom) will be taken from a container, unless the waste is heterogeneous and/or contains one or more layers. In these cases, multiple samples should be taken, one sample from each layer. Samples from multiple containers of the same waste will be composited for analyses (except for heterogeneous or layered wastes). Samples to be analyzed for volatile organics should be grab samples and should not be composited. To ensure a uniform sample, drums will be agitated prior to sampling, if possible.

When using a Sampling Thief to collect samples of residual ash resulting from open burning exercises, three samples shall be taken from each drum of waste and combined to form one composite sample. Strict chain of custody (COC) will be maintained for those samples taken for regulatory agencies. Each person who handles the sample will, upon receipt, sign and date the identification tag. When COC procedures are followed, Section One of USEPA Publication SW-846 (1986) must be followed to ensure adequate COC. The sample container must be compatible with the waste. Except for some solvents and oils, a plastic (1 quart) bottle is best. Corrosive samples must not be placed in metal containers.

Only all-cargo aircraft, tracks, United Parcel Service (UPS), or other non-passenger vehicles will be used to ship hazardous waste samples to laboratories. USEPA procedures (SW-846) for sample preservation must be followed and USEPA and

Table C-4
Waste Analysis Protocol

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste	Parameter(s)	Rationale
Acetic acid	pH	Check pH less than 2.0
Acetone	None	Listed waste
Adhesive and adhesive primers	Flash point	Check flash point.
	TCLP	To determine metals and organics content
Alkaline sludge	pH	Check pH greater than 12.5
Alodine	pH	Check pH less than 2.0
	TCLP	To determine chromium content
Alodine dried debris	TCLP	To determine metals content
Aluminum conversion coating sludge	None	Listed waste
Ammonium hydroxide	pH	Check pH greater than 12.5
Anti-seize compound	TCLP	To determine metals and organics content
Barium containing debris	TCLP	To determine barium content
Battery acid (sulfuric acid)	pH	Check pH less than 2.0
	TCLP	To determine lead content
Benzene (solvent)	None	Listed solvent
Benzene contaminated waste	TCLP	To determine benzene content
Beryllium	None	Listed waste
Bromine water	pH	Check pH less than 2.0
Cadmium batteries	TCLP	To determine cadmium content
Calcium hypochlorite	None	DOT oxidizer
Carbon tetrachloride contaminated waste	TCLP	To determine organics content
Chlordane contaminated waste	TCLP	To determine organics content
Chlorobenzene contaminated waste	TCLP	To determine organics content
Chloroform contaminated waste	TCLP	To determine organics content
Chromic acid	pH	Check pH less than 2.0
	TCLP	To determine chromium content
Chromium plating solution	pH	Check pH less than 2.0
	TCLP	To determine chromium content
Copper acetoarsenite (Paris green)	TCLP	To determine arsenic content
Corrosion preventative	Flash point	Check flash point
Cresols (solvent)	None	Listed solvent
Cresol contaminated waste	TCLP	To determine organics content
Cyanide plating bath solutions	None	Listed waste
Cyanide plating bath residues	None	Listed waste
Cyanide salts n.o.s.	None	Listed waste

See notes at end of table.

Table C-4 (Continued)
Waste Analysis Protocol

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste	Parameter(s)	Rationale
Descaling compound	pH	Check pH less than 2.0
1,4-Dichlorobenzene contaminated waste	TCLP	To determine organics content
1,2-Dichloroethane contaminated waste	TCLP	To determine organics content
1,1-Dichloroethylene contaminated waste	TCLP	To determine organics content
Dichlorodifluoromethane	None	Listed waste
2,4-Dinitrotoluene contaminated waste	TCLP	To determine organics content
Epoxy paint remover	TCLP	To determine metals content
Formic acid	pH	Check pH less than 2.0
Gasoline	Flash point	Check flash point
Heptachlor contaminated waste	TCLP	To determine organics content
Hexachlorobenzene contaminated waste	TCLP	To determine organics content
Hexachlorobutadiene contaminated waste	TCLP	To determine organics content
Hexachloroethane contaminated waste	TCLP	To determine organics content
Hydrochloric acid	pH	Check pH less than 2.0
Hydrofluoric acid	pH	Check pH less than 2.0
Hydrogen peroxide	None	DOT oxidizer
Insulating varnish	Flash point	Check flash point
	TCLP	To determine organics content
Isobutanol	None	Listed solvent
Isopropyl alcohol	Flash point	Check flash point
Kerosene	Flash point	Check flash point
Lead residue	TCLP	To determine metals content
Lindane	TCLP	To determine organics content
Lithium hydroxide	pH	Check pH greater than 12.5
Mercuric nitrate solution	TCLP	To determine metals content
Mercury	TCLP	To determine metals content
Methanol	None	Listed solvent
Methylene chloride	None	Listed solvent
Methyl ethyl ketone (solvent)	None	Listed solvent
Methyl ethyl ketone contaminated waste	TCLP	To determine organics content
Methyl isobutyl ketone	None	Listed waste
Monoethanolamine	pH	Check pH less than 2.0
Naphtha	Flash point	Check flash point
Nickel cyanide	None	Listed waste
Nickel solution, electrode-less	TCLP	To determine metals content
Nitric acid solution	pH	Check pH less than 2.0

See notes at end of table.

Table C-4 (Continued)
Waste Analysis Protocol

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste	Parameter(s)	Rationale
Nitrobenzene contaminated waste	TCLP	To determine organics content
n-butyl alcohol	None	Listed solvent
Otto fuel waste	None	Reactive
Oxygen breathing apparatus canister	TCLP	To determine metals content
Paints	TCLP	To determine metals and organics content
Paint stripper	pH	Check pH less than 2.0 or pH greater than 12.5.
Paint thinner	TCLP	To determine trace organics content
Penetrating fluid	Flash point	Check flash point
	TCLP	To determine organics content
Pentachlorophenol contaminated waste	TCLP	To determine organics content
Phosphoric acid	pH	Check pH less than 2.0
Plastisol	Flash point	Check flash point
	TCLP	To determine organics content
Potassium hydroxide	pH	Check pH greater than 12.5
Pyridine contaminated waste	TCLP	To determine organics content
Scale removing compound	pH	Check pH less than 2.0
Silver solutions	TCLP	To determine metals content
Sludges from IWTP	TCLP	To determine metals and organics content
Sodium chromate	TCLP	To determine metals content
Sodium hydroxide	pH	Check pH greater than 12.5
Stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process	None	Listed waste
Sulfamic acid	pH	Check pH less than 2.0
Sulfuric acid	pH	Check pH less than 2.0
Tetrachloroethene	None	Listed waste
Tetrachloroethene contaminated waste	TCLP	To determine organics content
Toluene	None	Listed solvent
1,1,1-Trichloroethane	None	Listed solvent
Trichloroethlene	None	Listed solvent
Trichloroethlene contaminated waste	TCLP	To determine organics content
Trichlorofluoromethane	None	Listed solvent
1,2,2-Trifluoroethane	None	Listed solvent
Trichlorophenol contaminated waste	TCLP	To determine organics content
Vinyl chloride contaminated waste	TCLP	To determine organics content
Waste acids, mixed	pH	Check pH less than 2.0

See notes at end of table.

Table C-4 (Continued)
Waste Analysis Protocol

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste	Parameter(s)	Rationale
Waste caustics, mixed	pH	Check pH greater than 12.5
Xylene	None	Listed solvent
Waste explosives	None	These items are known to be reactive (D003) and contain known metals.
Residual ash generated from open burning	Reactivity	Reactive residues
	TCLP	To determine metals content

Notes: TCLP = Toxicity Characteristic Leachate Procedure.
DOT = Department of Transportation.
N.O.S. = not otherwise specified.
IWTP = industrial waste treatment plant.

Table C-5
Test Methods

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Parameter	Procedure	Reference
pH	Electrometric	Method 9040, USEPA SW-846
Flash point	Pensky-Martens closed cup test	Method 1010, USEPA SW-846
TCLP	Toxicity Characteristic Leachate Procedure	Method 1311, USEPA SW-846
Arsenic	Atomic adsorption	Method 7060/7061, USEPA SW-846
Barium	Atomic adsorption	Method 7080/7081, USEPA SW-846
Cadmium	Atomic adsorption	Method 7090/7091, USEPA SW-846
Chromium	Atomic adsorption	Method 7190/7191, USEPA SW-846
Lead	Atomic adsorption	Method 7420/7421, USEPA SW-846
Mercury	Atomic adsorption	Method 7470, USEPA SW-846
Silver	Atomic adsorption	Method 7760/7761, USEPA SW-846
Lindane	GC/EC	Method 8080, USEPA SW-846
Cyanide, total	Colorimetric	Method 9010, USEPA SW-846
Reactivity	U.S. Gap Test	U.S. Bureau of Mines
	Detonation, Deflagration, and Transition Test	U.S. Bureau of Mines
Benzene	GC/MS or GC	Method 8240/8020, USEPA SW-846
Carbon tetrachloride	GC/MS or GC	Method 8240/8010, USEPA SW-846
Chlordane	GC/MS or GC	Method 8080/8250, USEPA SW-846
Chlorobenzene	GC/MS or GC	Method 8240/8020, USEPA SW-846
Chloroform	GC/MS or GC	Method 8240/8010, USEPA SW-846
Cresols	GC/MS or GC	Method 8250/8040, USEPA SW-846
1,4-Dichlorobenzene	GC/MS or GC	Method 8250/8010, USEPA SW-846
1,2-Dichloroethane	GC/MS or GC	Method 8240/8010, USEPA SW-846
1,1-Dichloroethylene	GC/MS or GC	Method 8240/8010, USEPA SW-846
2,2-Dinitrotoluene	GC/MS or GC	Method 8250/8090, USEPA SW-846
Heptachlor	GC/MS or GC	Method 8250/8080, USEPA SW-846
Hexachlorobenzene	GC/MS or GC	Method 8250/8120, USEPA SW-846
Hexachlorobutadiene	GC/MS or GC	Method 8250/8120, USEPA SW-846
Hexachloroethane	GC/MS or GC	Method 8240/8010, USEPA SW-846
Methyl ethyl ketone	GC/MS or GC	Method 8240/8015, USEPA SW-846
Nitrobenzene	GC/MS or GC	Method 8250/8090, USEPA SW-846

See notes at end of table.

Table C-5 (Continued)
Test Methods

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Parameter	Procedure	Reference
Pentachlorophenol	GC/MS or GC	Method 8250/8040, USEPA SW-846
Pyridine	GC/MS or GC	Method 8250/8090, USEPA SW-846
Tetrachloroethene	GC/MS or GC	Method 8240/8010, USEPA SW-846
Toxaphene	GC/MS or GC	Method 8250/8080, USEPA SW-846
Trichloroethlene	GC/MS or GC	Method 8240/8010, USEPA SW-846
Trichlorophenols	GC/MS or GC	Method 8250/8040, USEPA SW-846
Vinyl chloride	GC/MS or GC	Method 8240/8020, USEPA SW-846

Notes: USEPA = U.S. Environmental Protection Agency.
TCLP = Toxicity Characteristic Leachate Procedure.
GC/EC = gas chromatography and electron capture.
GC/MS = gas chromatography and mass spectroscopy.
GC = gas chromatograph(y).

Table C-6
Samplers Recommended for Various Types of Wastes

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste Type	Recommended Sampler[1]	Limitations
Liquids, sludges, and slurries in drums, vacuum trucks, barrels, and similar containers.	Coliwasa	Not for containers 1.5 meters (5 feet) deep.
	Plastic	Not for wastes containing ketones, nitrobenzene, dimethylformamide, mesitly oxide, or tetrahydrofuran.
	Glass	Not for wastes containing hydrofluoric acid and concentrated alkali solutions.
Powdered or granular solids in bags, drums, barrels, and similar containers.	Grain sampler	Limited application for sampling moist and sticky solids with a diameter 0.6 centimeter (1/2 inch).
	Sampling trier	May incur difficulty in retaining core sample of very dry granular materials during sampling.
Dry sludges deeper than 8 centimeters (3 inches).	Soil auger	Does not collect undisturbed core sample.
	Veihmeyer™ sampler	Difficult to use on stony, rocky, or very wet soil.
Wastes in storage tanks	Weighted bottle sampler	May be difficult to use on very viscous liquids.

[1] Glass sampler and sample container must be used when organics are to be determined.

Table C-7
Sampling Points Recommended for Most Waste Containers

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Container Type	Sampling Point
Drum, bung on one end	Withdraw sample through the bung opening.
Drum, bung on side	Lay drum on side with bung up. Withdraw sample through the bung opening.
Barrel, fiber drum, buckets, sacks, and bags.	Withdraw samples through the top of barrels, fiber drums, buckets, and similar containers. Withdraw samples through fill openings of bags and sacks. Withdraw samples through the center of the containers and to different points diagonally opposite the point of entry.
Vacuum truck and similar containers	Withdraw sample through open hatch. Sample all other hatches.
Soil	Divide the surface area into an imaginary grid. The number of grids is determined by the desired number of samples to be collected that, when combined, should give a representative sample of the wastes. Sample each grid.

Table C-8
Number of Samples to be Collected

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Case No.	Information Desired	Waste Type	Container Type	Number of Samples to be Collected
1	Average concentration	Liquid	Drum, vacuum truck, and similar container types.	One collected with Coliwasa.
2	Average concentration	Solid (powder or granular).	Bag, drum, bin, and sack	One composite sample of several samples collected at different sampling areas.
3	Average concentration	Soil	Not applicable	One composite sample of several samples collected at different sampling areas.
4	Concentration range	Liquid	Drum, vacuum truck, and storage tank	Three to ten separate samples, each from a different depth of the liquid.
5	Concentration range	Solid (powder or granular).	Bag, drum, and bin	Three to five samples from different sampling points.
6	Concentration range	Soil	Not applicable	Three to twenty separate samples from different sampling areas.
7	Average concentration for legal evidence.	All types	All containers	Three identical samples or one composite sample divided into three identical samples if homogenous.
8	Average concentration	Liquid	Storage tank	Same as Case No. 2.
9	Concentration range	Liquid	Storage tank	Same as Case No. 4.

Table C-9
Procedure for Sampling Waste in Drums

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

1. Choose the plastic or glass Coliwasa for the liquid waste to be sampled, referring to Table C-6.
2. Make sure that the sampler is clean.
3. Check to make sure that the sampler is functioning properly. Adjust the locking mechanism if necessary to make sure the neoprene rubber stopper provides a tight closure.
4. Wear appropriate protective clothing and observe required sampling precautions.
5. Put the sampler in the open position by placing the stopper rod handle in the Tee-position and pushing the rod down until the handle sits against the sampler's locking block.
6. Slowly lower the sampler into the liquid waste. (Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to remain about the same. If the level of the liquid in the sampler tube is lower than outside the sampler and the sampling rate is too fast, it will result in a non-representative sample.)
7. When the sampler stopper hits the bottom of the waste container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the Tee handle until it is upright and one end rests tightly on the locking block.
8. Slowly withdraw the sampler from the waste container with one hand while wiping the sampler tube with a disposable cloth or rag with the other hand.
9. Carefully discharge all of the sample into a suitable sample container by slowly opening the sampler. This is done by slowly pulling the lower end of the Tee handle away from the locking block while the lower end of the sampler is positioned in a sample container.
10. Cap the sample container, attach label, seal, record in field log book, and complete sample analysis request sheet.
11. Unscrew the Tee handle of the sampler and disengage the locking block. Clean sampler onsite or store the contaminated parts of the sampler in a plastic storage tube for subsequent cleaning. Store used rags in plastic bags for subsequent disposal.
12. Deliver the sample to the laboratory for analysis.

Table C-10
Procedures for Sampling Residual Ash Generated from the Open Burning of Waste Explosives

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

1. Choose the stainless-steel or brass Sampling Thief for the sampling of residual ash.
2. Make sure that the sampler is clean.
3. Check to make sure that the sampler is functioning properly and that the inner tube can rotate freely to open and close the sampler.
4. Wear appropriate protective clothing and observe required sampling precautions.
5. Ensure that the Thief Sampler is in the closed position before any sampling is performed.
6. Slowly lower the Sampling Thief into the barrel of waste ash until it reaches the bottom of the barrel.
7. Slowly rotate the top of the handle in a clockwise fashion to open the Thief Sampler. This will allow the residual material to enter the Thief Sampler.
8. Close the Sampling Thief by rotating the top of the handle in a counter clockwise fashion to secure the sample.
9. Slowly retrieve the Thief Sampler from the barrel with one hand while wiping the sampler with a disposable cloth or rag with the other hand.
10. Carefully discharge all of the sample into a suitable sample container by slowly opening the sampler. This is done by again rotating the upper handle in a clockwise fashion.
11. Cap the sample container, attach label, seal, record in field log book, and complete sample analysis request sheet.
12. Disassemble the sampler, if appropriate, and decontaminate with an appropriate cleaning solution, or store the contaminated parts in a plastic storage tube for subsequent cleaning. Store used rags in a plastic bag for subsequent disposal.
13. Deliver the sample to the laboratory for analysis.

DOT regulations for transporting hazardous materials and wastes must be met. Laboratories must certify that their procedures are USEPA approved and, in that certification, reference either 40 CFR 261 or test methods manual USEPA Method SW-846 (USEPA, 1986).

C.2.6 Frequency of Analysis As part of the instructions given to originators on WID, Public Works should ask the originator to submit a revised WID for any waste that undergoes a change after the original submittal. These changes can occur as a result of changes in raw materials, process variations, indiscriminate mixing, etc. At least once each year, Public Works should review all WIDs, provide originators with a list of their wastes, and request updated information.

Analyses should be performed whenever a significant change in process or materials used occurs. Table C-11 summarizes analytical protocols and frequency.

Table C-11
Analytical Testing

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Waste	Analysis	Frequency
Unused and partially used	Data from HMIS	As generated
Sludges and spill debris	Test per Table C-3	As generated
Process wastes	Test per Table C-3	On process change or material change
Open burning residual ash	Test per Table C-3	Upon generating a 55-gallon drum of waste

Note: HMIS = Hazardous Materials Information System.

C.3 ADDITIONAL REQUIREMENTS FOR IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES [40 CFR 264.17 (c)]. All incompatible wastes must be identified so that they may be segregated when stored in the permitted storage facility. Identification of incompatible wastes should be made by Public Works during evaluation of the WID. The HMIS and reference books will provide this information. When returning the WID to originators, Public Works should specify incompatibility as a handling precaution (i.e., waste trichloroethane must be segregated from caustic wastes).

Table C-12 is a brief summary table of incompatibilities. This table must be supplemented by reference to the HMIS and other sources. Data on reactive and ignitable waste are obtained from the sources identified in Section C.2 and are used to ensure compliance with the requirements for storage of ignitable and reactive wastes.

All waste explosives handled at the OB/OD facility are considered to be reactive wastes and are handled accordingly. Specific procedures regarding safety and SOPs for the OB/OD facility are described in more detail in Sections D and F.

C.4 ADDITIONAL WASTE ANALYSIS REQUIREMENTS FOR LAND DISPOSAL RESTRICTIONS [40 CFR 264.13 (B)(6) and 40 CFR 268.7 and Subpart C]. All waste streams shown in Table C-1 and additional wastes that may be generated will be evaluated in

accordance with 40 CFR 268.7(a) to determine if the waste is restricted from land disposal. The determination will include evaluation for underlying hazardous constituents that have land disposal restrictions.

This evaluation will consist of two parts. Initially, the waste's chemical constituents will be determined by reference to HMIS (see Table C-2). The HMIS will identify the constituents in the waste that will be compared to the lists of wastes prohibited from land disposal by 40 CFR 268, Subpart C.

If the chemical constituents of the waste are not shown in the HMIS and/or the waste is a process waste for which there is no entry in the HMIS (for example, mixed paint waste), the waste will be analyzed using the test method described in Appendix I of 40 CFR 268, TCLP.

Table C-12
Incompatibility Chart

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

The mixing of any item identified in Column A with a Column B item in the same group may case a chemical reaction, fire, or explosion, or generate toxic fumes.

Column A	Column B
Group I	
Ammonium hydroxide Anhydrous ammonia Potassium hydroxide electrolyte batteries Ammonium bisulfate Ammonium hydrogen sulfate Lithium hydroxide Potassium hydroxide Sodium hydroxide	Acetic acid Acid electrolyte batteries Chromic acid Hydrochloric acid Hydrofluoric acid Lithium bromide Nickel chloride and hydrogen chloride mixture Nitric acid Phosphoric acid Sulfuric acid
Group II	
Water Aqueous solutions Alcohols	Any concentrated Group I waste Aluminum phosphide[1] Bromine
Group III	
Beryllium dust Group I, Column A waste	Dichlorofluoromethane Methylene chloride Carbon tetrachloride Chloroform Ethylene chloride Freon Tetrachloroethylene Trichloroethlene
Group IV	
All oxidizers Nitric acid Chromic acid Sulfuric acid Hydrazine[2]	Group I, Column A waste Group II, Column B waste All flammable materials Oxidizable materials Amines Hydrochloric acid
Group V	
Cyanides	Group I, Column B wastes Group IV, Column A wastes

[1] Aluminum phosphide should be considered incompatible with all liquid wastes. Store in air-tight container.
[2] Concentrated hydrazine should be considered incompatible with all other waste.

APPENDIX C-1

WASTE INFORMATION DOCUMENT
WASTE CHARACTERIZATION REQUEST,
AND INSTRUCTION

ASTE INFORMATION DOCUMENT (WID) AS OF / /

Originator Serial _____ WID NO. - -

SHOP	CONTACT	CODE	COMMAND	BUILDING	PHONE EXT
_____	_____	_____	_____	_____	_____

WASTE IDENTIFICATION

Shipping Name:
Description:

Physical State: Layer(s) Waste Water: Dioxin Listed:

Flammability:	Corrosive:	Toxic:	Reactive:	Tissue Accum:
FlashPt(F)	pH	%	w/	Carcinogen

Treatment Standards: ERG: Guide:
CAS#: Generation Codes: Rpt Qty:

Container: Ship Via:

eneration Estimate: P /Month P /Yr

PROCESS DESCRIPTION:

COMPONENT	PERCENT	RANGE	PARTS PER MILLION
	%		ppm
	%		ppm
	%		ppm
	%		ppm
	%		ppm

Disposal Reason: ___ EXCEEDED SHELF LIFE ___ SERVED PURPOSE ___ UNUSED
____ Other Reason:

CERTIFICATION: I certify the above named materials are the only compounds included in the waste stream described and no other substance is present.

ignature:	Code:	Date:

Pg. 2 Completed by BOSC, Copies to Originator & IWTP (if applicable)
Waste Class:
EPA Waste Numbers:
Reason for Classification:
Handling Instructions:
CONTAINER REQUIREMENTS DOT CNTNR: PLACCARDS:
WID NO. - -
Description:
1348-1 Information:
Item Nomenclature:
DOT Proper Shipping Name:
UN CLASSIFICATION:
UN/NA Number:
Additional Requirements: NONE
Land Ban Material:
Special Precautions and/or Instructions: (Handling lines 6-10 if any)
Signature (BOSC Environmental Specialist)

WID INSTRUCTIONS

The WID number will be assigned by BOSC. Item 4 must be completed by the originator. Attach a Material Safety Data Sheet for each known component of the waste, (Figure 3-1). Where information is unknown or not applicable indicate accordingly.

1. DATE - BOSC - assigned

2. ORIGINATOR SERIAL NUMBER - self explanatory

3. WID SERIAL NUMBER - BOSC - assigned

4. ORIGINATOR SHOP, ETC. INFORMATION: Originating Work Center data provided to BOSC HW coordinator.

5. WASTE IDENTIFICATION

   a. Shipping Name - Official shipping name required by 49 CFR 171; Description-use description in 49 CFR 172.

   b. Physical State- self-explanatory

   c. Flammability, Corrosive, Toxic, Reactive, Tissue Accum, Etc., See MSDS data.

   d. Treatment Standards, ERG, Guide, : - self-explanatory

   e. CAS # - Chemical Abstract System number. Generation Codes, Rpt Qty; Provide when available.

   f. Container - Indicate type and size container in which the hazardous material product came in (i.e., 55-gallon metal drum, plastic container, fiberboard box).

   g. Generation Estimate - Indicate the most frequent rate of generation (quantity per day, week, month, year)

   h. Frequency of Generation - How often and length of time generated (i.e., 8 hrs/day, 7 days/week; 1 day/month; sporadic; one time only)

   i. Expected Annual Generation - self-explanatory

   j. Process Description - Describe what material will be in the containers and explain the process which produces wastes in a manner of sufficient detail to assure an accurate and complete waste identification.

   k. Component - Provide percentages of hazardous and nonhazardous materials to be placed in containers as a result of the waste generation process.

6. REASON FOR DISPOSAL, Exceeded shelf life, served purpose, unused, other reason—self-explanatory

FIGURE 3-2

WID INSTRUCTIONS

7. CERTIFICATION: WID must be signed by Originating Command Waste Coordinator.

8.-10 SIGNATURE COMMAND CODE/ DATE: Self-explanatory

Following is provided by BOSC:

11. WASTE CLASSIFICATION: Refer to Section 5.1 (Waste Analysis Plan) of the Waste Management Plan

12. EPA WASTE NUMBER(S): e.g., D001, F005; refer to Section 5.1 (Waste Analysis Plan) of the Waste Management Plan

13. REASON FOR HAZARD CLASSIFICATION: e.g., ignitable, reactive; refer to Section 5.1 (Waste Analysis Plan) of the Waste Management Plan

14. HANDLING INSTRUCTIONS: e.g., store in originator TCA; store in originator TCA, contact BOSC for transport to HW storage facility; acceptable for disposal in dumpster

15. CONTAINER, PLACARD, AND LABELING REQUIREMENTS: Refer to Section 3.2.2 for containers. WID Numbers are self-explanatory. Description is the name which describes the material and is completely consistent with section 3.2.2. Use WID number matching front page of WID.

16. 1348-1 INFORMATION: refer to Section 8.0 (Shipping and Transportation) of the Waste Management Plan. Item nomenclature per 1348-1 requirements.

17. DOT Proper Shipping Name: Per 49 CFR 172.

18. UN Classification: Per 49 CFR 172.

19. UN/NA Number: Per 49 CFR 172.

20. ADDITIONAL REQUIREMENTS and SPECIAL PRECAUTIONS AND/OR INSTRUCTIONS: e.g., waste(s) and/or material(s) which are incompatible with waste; special safety equipment required for the waste; emergency response procedures

21. SIGNATURE: BOSC Environmental Specialist Signature.

FIGURE 3-2

WASTE CHARACTERIZATION REQUEST (WCR)

1. DATE:

ORIGINATOR INFORMATION

a. SHOP	b. CONTACT	c. CODE	d. COMMAND	e. BUILDING	f. PHONE EXT.

3.

WASTE INFORMATION

a. WASTE NAME: COMMON _____

CHEMICAL(S) _____

b. PHYSICAL FORM: *(Check)* ☐ LIQUID ☐ SOLID ☐ SLUDGE ☐ OTHER *(Specify)*

c. NATIONAL STOCK NUMBER:	d. QUANTITY ON HAND:

e. WASTE SOURCE: *(Describe Process If Known)*

4. ADDITIONAL INFORMATION:

5. SIGNATURE:

6. CODE:

APPENDIX C-2

GENERAL DESCRIPTION OF WASTE EXPLOSIVES

A. BLACK POWDER

A.1 GENERAL DESCRIPTION

Black powder is a low explosive, composed essentially of a mixture of potassium nitrate or sodium nitrate, charcoal, and sulphur. The proportions of ingredients are approximately 75 percent nitrate, 15 percent charcoal, and 10 percent sulphur. The military uses it in the form of grains or granules of varying sizes and degree of fineness, depending on its specific purpose or function. The grains are usually glazed and graphited to improve the power's resistance to moisture and to give it a low coefficient of friction so that the grains will slide one upon the other for more compact loading. Black powder, originally called gun powder, is the oldest of the explosives and one of the most dangerous.

A.2 CLASSES AND USES

The various classes of black powder and the primary uses of each are described below.

A.2.a. Black Powder (Potassium Nitrate)

Black powder with a potassium nitrate base is divided into the following classes:

Class 1. Used in Jet Assisted Take-Off (JATO) and rocket igniters, artillery primers and igniter pads.

Class 2. Used in JATO and rocket igniters, primers, and propelling charges.

Class 3. Used in JATO and rocket igniters, expelling charges for base ejection shells, and pyrotechnic items.

Class 4 and 5. Used in JATO and rocket igniters, relay pellets, igniting charges for illuminating pyrotechnics, charges in target practice shells, expelling charges for base ejection shells, and igniter charges in primer detonators, fuse delay elements, and tracer igniters.

Class 6 and 7. Used in JATO and rocket igniters, relay pellets, and delay and igniter charges in primer detonators, delay elements, practice hand grenade fuzes, and squibs.

Class 8. Used in propellant charges for rocket signals.

A.2.b. Black Powder (Sodium Nitrate)

Black powder with a sodium nitrate base is divided into the following classes:

Class A. Used in saluting charges.
Class B. Used in practice bombs.
Class C. Used in torpedo impulse charges.

B. HIGH EXPLOSIVES

B.1. GENERAL DESCRIPTION

The various types of high explosives which are commonly used and stored by the military are described in the following paragraphs:

B.1.a. Trinitrotoluene (TNT)

TNT is a light brown or white colored material whose appearance varies with the degree of purity. It is insoluble in water but soluble in ether, acetone, alcohol, and similar solvents. Although TNT is less sensitive to friction and impact than many other explosives, it can be detonated by moderate force when confined between metal surfaces such as on threads of bolts. In thin, unconfined layers it usually burns without explosion. Burning or rapid heating under confinement may cause detonation. TNT is stable and does not form sensitive compounds with metals. It will, however, become very sensitive in the presence of alkalies. TNT exhibits well recognized toxic properties.

B.1.b. Cyclotrimethylenetrinitramine (RDX)

RDX is a white crystalline solid usually used in mixtures with other explosives, oils, or waxes and is rarely used alone. It has a high degree of stability in storage and is considered the most powerful and brisant of the military high explosives.

B.1.c. Amatol

Amatol is not a manufactured product but is a mixture of molten TNT and ammonium nitrate which is made at the time of loading. The most generally used amatol consists of 50 percent TNT and 50 percent ammonium nitrate. Amatols containing up to 80 percent ammonium nitrate have been used.

Ammonium nitrate is a crystalline powder varying from almost white to brown. It usually cannot be detonated by heat or friction but may be exploded by a sufficiently heavy initiation by booster explosives. It may be exploded by relatively light initiation if it has been sensitized by certain impurities, including many carbonaceous materials. Ammonium nitrate is not flammable at normal temperatures. In fires involving large quantities of ammonium nitrate, the material becomes an explosive hazard which is accentuated by conditions of partial confinement and build up of a certain degree of pressure in the gases of decomposition. When ammonium nitrate is in contact with copper bearing metals, it may form sensitive compounds.

B.1.d. Explosive D

Explosive D (ammonium picrate) is a high explosive usually derived by nitration of phenol followed by ammonification of the picric acid which is produced. In bulk density, explosive D appears in the form of finely divided crystals. Explosive D stains human hair and skin yellow, due to the yellow dye content in the picric acid. If not entirely free of traces of unammoniated picric acid, explosive D will react with certain metals such as lead, potassium, copper, and iron to form sensitive compounds and must, therefore, be protected from direct contact with these metals.

B.1.e. Picratol

Picratol is a castable mixture consisting of 52 percent explosive D and 48 percent TNT which is made by heating TNT to about 90 degrees Celsius (°C) in a steam-jacket melt kettle. The explosive D is added slowly, without preheating, and the mixture is agitated until it is uniform in composition.

B.1.f. Pentaerythritol (PETN)

PETN is more sensitive than either tetryl or RDX. In its pure form, PETN is a white crystalline material, but it may be light gray in color due to impurities. It must be shipped wet with not less than 40 percent by weight of water in metal barrels or drums or wooden barrels or kegs in which the material is packed in

cloth or rubber bags. It is extremely sensitive to initiation and as such is considered an initiating agent.

B.1.g. Pentolite

Pentolite is a castable mixture of PETN and TNT usually in a 50/50 proportion. Pentolite may have a tendency to separate into its ingredients and, consequently, it should be handled as carefully as PETN.

B.1.h. N-tetranitro-N-methylaniline (Tetryl)

Tetryl is a fine yellow crystalline material which is insoluble in water but soluble in acetone, benzene, and other similar solvents. It is toxic when taken internally or by skin contact and special precautions are necessary to protect personnel. It is stable at all temperatures normally encountered in storage.

B.1.i. Tetrytol

Tetrytol is a castable mixture of tetryl and TNT usually in the proportion of 70 percent tetryl and 30 percent TNT. It is used to obtain a tetryl mixture that may be cast for boosters and demolition charges.

B.1.j. Nitroguanidine

Nitroguanidine is a powerful high explosive which, when incorporated in propellants in appreciable quantities, results in a propellant that burns in a gun with temperatures so cool that little muzzle flash is produced.

B.1.k. RDX Composition

RDX compositions are mixtures of RDX, other explosive ingredients, and desensitizers or plasticizers. Three RDX compositions are described below.

1. Composition A: During World War II, the British introduced an explosive composition consisting of 91 percent RDX and 9 percent beeswax. This was designated as Composition A. When the United States standardized Composition A, the beeswax was replaced with wax derived from petroleum. Subsequent changes in the method of adding the desensitizer led to designation of the explosive as Composition A-2. More recently the composition has been designated as Composition A-3 because of later changes in the granulation of RDX and the method of manufacture. The wax is applied to coat the particles of RDX and act as a binding agent when the composition is pressed. Composition A-4 and A-5 consisting of 97.0 and 98.5 percent RDX, respectively, with desensitizer added, have been developed but these explosives are not widely used.

2. Composition B: This consists of castable mixtures of RDX and TNT; in some instances desensitizing agents are added to the mixture. The following are formulations of Composition B.

   Composition B. 60 percent RDX and 40 percent TNT with 1 percent wax added.

   Composition B-2. 60 percent RDX and 40 percent TNT.

   Composition B-3. Percentages of RDX and TNT vary but no desensitizer is added.

Composition B-4. 60 percent RDX, 39.5 percent TNT, and .5 percent calcium silicate.

Composition B, desensitized. There are two formulations of desensitized Composition B: (1) 60 percent RDX and 40 percent TNT with 5 percent wax and 2 percent vinyl seal added, and (2) 55.2 percent RDX, 40 percent TNT, 1.2 percent vistanex, and 3.6 percent albacer wax.

3. Composition C. The Composition C explosives are plastic demolition explosives consisting of RDX, other explosives, plasticizers, and so forth. The following are formulations of Composition C (although C-3 and C-4 are the only formulations presently being used, C-1 and C-2 may still be encountered).

Composition C-1. 88.3 percent RDX and 11.7 percent nonexplosive oily plasticizer containing 0.6 percent lecithin.

Composition C-2. 78.7 percent RDX, 5.0 percent TNT, 12 percent DNT, 2.7 percent MNT, 0.6 percent NC, and 1.0 percent solvent.

Composition C-3. 77 percent RDX, 3 percent tetryl, 4 percent TNT, 10 percent DNT, 5 percent MNT, and 1 percent NC.

Composition C-4. 91 percent RDX, 2.1 percent plyisobutylene, 1.6 percent motor oil, and 5.3 percent sebacate.

B.1.l. Cyclotols

The cyclotols were developed by the British between World Wars I and II and standardized in the United States early in World War II. Cyclotol is prepared by adding water-wet RDX to molten TNT in a steam-jacketed kettle at a temperature of 100 °C. Some water is poured off and the heating and stirring are continued until all moisture is evaporated. The composition is cooled to a satisfactory pouring temperature. It is cast directly into ammunition components or in the form of chips when the cyclotol is to be stored for use later. There are three formulations of cyclotol being used, 75/25, 70/30, and 65/35 with the first numbering being the percent of RDX and the second number being the percent of TNT. Cyclotols used at military installations are procured commercially. Cyclotols are used for loading shaped-charge bombs, special fragmentation projectiles, and grenades.

B.1.m. Cyclotetramethylene tetranitromine (HMX)

HMX was discovered as an impurity in the nitration of hexamethylene tetramine to form RDX. Its sensitivity is about the same as RDX. Although it is almost as powerful as RDX, it is seldom used alone in military applications but is mixed with a compound such as TNT. The military uses HMX as an ingredient in plastic bonded explosives.

B.1.n. Octols

The octols, which were developed by the United States, are prepared by slowly adding water-wet HMX to molten TNT in a steam-jacketed kettle at a temperature of 100 °C. The mixture is heated and cooled to a satisfactory pouring temperature and cast directly into ammunition components or prepared in the form of chips when the octol is to be stored for use later. There are two formulations of octol being used, 75/25 and 70/30, with the first number being

the percent of HMX and the second number the percent of TNT. Octols used at military installations for loading HE projectiles and bombs are procured commercially.

B.1.o. Aluminized Explosives

Aluminum is added to explosives to increase its explosive power. Some recent studies to determine the optimum amount of aluminum for the TNT/aluminum mixture have shown that the blast effect reaches the maximum when the aluminum content is 30 percent. The brisance, as measured by the sand test, passes through a maximum of about 17 percent aluminum. The rate of detonation of cast charges is continuously decreased by addition of aluminum up to 40 percent. For all practical purposes, the addition of 18 percent to 20 percent of aluminum to TNT produces maximum performance of the TNT.

Six aluminized explosives are described in the following sections:

1. HBX. HBX-1 and HBX-3 are binary explosives which were developed by the United States during World War II. The relatively insensitive mixtures were made by adding 5 percent desensitized to Torpex II for high blast explosive applications. They are castable mixtures of RDX, TNT, powdered aluminum, D-2 wax, and calcium chloride.

   HBX can be made by adding the calculated amount of TNT to Composition B to obtain the desired proportion of RDX/TNT. After the TNT/Composition B is melted, the appropriate amounts of the other ingredients are added to complete the mixture. HBX is used in guided missile warheads and underwater ordnance.

   The exact formulations for various compounds are:

	Percent HBX-1	Percent HBX-3
RDX	40	31
TNT	38	29
Powdered aluminum	17	35
D-2 wax	5	5
Calcium chloride (added)	0.5	0.5
Loading density	1.69	1.69

2. H6. This is a binary explosive developed by the United States. It is a castable mixture consisting of 45 percent RDX, 30 percent TNT, 20 percent powdered aluminum, and 5 percent D-2 wax with 0.5 percent calcium chloride added. It is prepared by adding the powdered aluminum, D-2 wax, and calcium chloride to previously melted Composition B. It is stable in storage, is more brisant than TNT, and is normally cast at a density of 1.74. H6 is used as a bursting charge in general purpose bombs, guided missile warheads, and underwater ordnance.

3. Tritonal. This is a binary explosive developed by the United States during World War II. It is a castable mixture consisting of 80 percent TNT and 20 percent powdered aluminum. It is prepared by adding the TNT and aluminum separately to a steam-jacketed melt kettle equipped with an agitator. Heating is continued until the

TNT is molten and the mixture is at the right viscosity for pouring (about 85 °C). Tritonal is used as the bursting charge for general purpose bombs.

4. Minol-2. This is also a binary explosive developed by the British during World War II. It is a castable mixture consisting of 40 percent TNT, 40 percent ammonium nitrate, and 20 percent powdered aluminum. It is prepared by adding ammonium nitrate and powdered aluminum to TNT that has been previously melted and which is maintained at a temperature of 90 °C. It is comparable to TNT and tritonal in sensitivity to initiation but is more sensitive to shock and less brisant. It is unstable in the presence of moisture since the ammonium nitrate and aluminum react with each other. It is normally cast at a density of 1.68. Minol-2 is used as a bursting charge where TNT is in short supply.

5. DBX. This is known as "Depth Bomb Explosive." It is a binary explosive developed by the United States and Great Britain during World War II. It is a castable mixture consisting of 40 percent TNT, 21 percent RDX, 21 percent ammonium nitrate, and 18 percent powdered aluminum. It can be prepared by adding 21 percent ammonium nitrate and 18 percent aluminum to 19 percent TNT which has been previously melted at about 100 °C. It is normally cast at a density of between 1.61 and 1.69 and is used as a bursting charge in depth charges.

6. Torpex. This is a binary explosive developed by the British during World War II. It is a castable mixture consisting of 42 percent RDX, 40 percent TNT, and 18 percent powdered aluminum. Waxed Torpex-2 and Torpex-3 with wax and calcium chloride were subsequently developed. Torpex mixtures have been declared obsolete and are no longer used due to their sensitivity.

B.1.p. Composition D-2

This is a desensitizing wax used in many of the high explosive mixtures which have been discussed in this section. Composition D-2 contains 84 percent paraffin and other waxes, 14 percent nitrocellulose, and 2 percent lecithin.

B.1.q. Plastic Bonded Explosives

Plastic bonded explosives are conventional high explosives which contain a plastic bonding agent such as nylon. They will stand higher temperatures than conventional high explosives and not be affected. They can be either press or cast-loaded depending on the type composition.

B.1.r. Picric Acid

Picric acid is a nitrated product of phenol. With or without the addition of various materials intended to lower its melting point, it has been used as a military high explosive, to a greater or lesser extent, by almost all countries. The chemical name for picric acid is trinitrophenol.

C. INITIATING EXPLOSIVES

C.1. GENERAL DESCRIPTION

Complete detonation is accomplished by adding an initiating device to the explosive. Detonating substances used for this purpose are initiating mixtures consisting of an initiating explosive (also known as a primary explosive), such as lead azide or lead styphnate, thoroughly mixed with other materials. These mixtures will detonate by the application of impact, friction, heat, or electrical current and will impart a percussion blow suitable to detonate a high explosive. Initiating explosives detonate, whether they are confined or not. They differ considerably in sensitivity to heat, and the amount of heat they give off, and in brisance.

C.2 TYPES OF INITIATING EXPLOSIVES

Types of initiating explosives commonly stored and used by the military are described in the following sections.

C.2.a. Lead Azide

Lead azide is a crystalline, cream-colored compound which is practically insoluble in water. When lead azide is stored in water, however, care must be taken to assure that the water is free of bacteria forming impurities which may react with the dextrinated lead azide to form a gas. Lead azide should not be exposed to copper, zinc, or alloys containing such metals because of the possible formation of the other azides which are more sensitive than the original lead azide.

C.2.b. Lead Styphnate

There are two forms of lead styphnate--that which appears as six-sided monohydrate crystals and that which appears as small rectangular crystals. Its color varies from yellow to brown. Lead styphnate is particularly sensitive to fire and the discharge of static electricity and, when dry, can be readily detonated by static discharges from the human body. The longer and narrower the crystals, the more susceptible the material is to static electricity. Lead styphnate does not react with metals and it is less sensitive to shock and friction than mercury fulminate or lead azide. Lead styphnate is only slightly soluble in water and methyl alcohol and may be neutralized by a solution of sodium carbonate.

C.2.c. Mercury Fulminate

Mercury fulminate is white when pure, but ordinarily it has a faint brownish-yellow or grayish tint. It is a heavy, practically nonhygroscopic, crystalline solid. When dry, it is very sensitive to heat, friction, spark, flame, and shock. Mercury fulminate either wet or dry shall not come in contact with certain materials such as aluminum, magnesium, zinc, brass, or bronze.

C.2.d. Tetracene

Tetracene is a colorless or pale yellow material. It is soluble in strong hydrochloric acid but practically insoluble in alcohol, water, benzene, ether, and carbon tetrachloride. It explodes readily from flame and produces a large volume of black smoke. It is lightly more sensitive to impact than mercury fulminate. Tetracene has the disadvantage of becoming easily dead-pressed.

C.2.e. Diazodinitrophenol (DDNP)

DDNP is a yellowish-brown powder which is soluble in acetic acid and most solvents, but is insoluble in water. A solution of cold sodium hydroxide may be used to destroy it. It is desensitized by immersion in water and does not react with water at normal temperatures. It is less sensitive to impact but more powerful than mercury fulminate or lead azide.

D. SMOKELESS POWDER

D.1. GENERAL DESCRIPTION

Smokeless powder is produced in many different types. Originally it was developed as a propellant for gun ammunition, and this remains a principle used today. In later years special types have developed as propellants for rockets and missiles. Smokeless powder is a hard, plastic substance, the color and appearance of which may vary from chalk white through pale yellow and translucent to black and completely opaque. Recently developed types are almost white and opaque.

D.2. TYPES OF CHARACTERISTIC OF BASE

Smokeless powder generally is considered to be of three types: single-base, double-base, and multibase. In single-base powder, nitrocellulose is the only explosive ingredient. Double-base powder contains both nitrocellulose and nitroglycerine as explosive ingredients. One multibase powder is cordite propellant which contains nitrocellulose, nitroglycerine, and nitroguanidine.

D.3. TYPES OF INDEX DESIGNATION

Index numbers are given serially to powder that has been manufactured and proofed. The numbers aid in the identification of each index and also give an approximate indication as to the age of the powder. Each index of powder is assigned an index number consisting of a group of letters which designate the type of powder and a number which indicates the sequence of manufacture. Following are the index designation letters and their meanings. The letters SP refer to smokeless powder not containing stabilizers as distinguished from the earlier propellants, black powders, and brown powders (BP). SPR indicates a type of powder to which rosaniline dye was added to give it a violet color and to indicate that its stability was acceptable until the color changed to red by formation of decomposition acids within the grain. This procedure was not successful and the powder is no longer used. The letters D and C indicate the stabilizer diphenylamine and centralite, respectively.

D.3.a. SPD

Smokeless powder stabilized by the addition of diphenylamine. All powder since index 883 has been stabilized. This is standard "pyro" composition powder.

D.3.b. SPDW

Reworked powder made from ground stabilized SPD smokeless powder and regranulated.

D.3.c. SPDB

A blend of stabilized SPD smokeless powder. The blend letters are assigned to a lot made to utilize small remnants for service or target practice purposes.

A blend of large-web and small-web powder may be made to produce an equivalent intermediate web to satisfy desired ballistics.

D.3.d. SPDN

Nonhygroscopic powder stabilized with diphenylamine and with the further addition of certain nonvolatile solvents to reduce hygroscopicity and increase service life. This type of designation is also used for blends of nonhygroscopic stabilized smokeless powder.

D.3.e. SPDF

Flashless powder; SPD powder made flashless by incorporation in the grains during manufacture of certain compounds which reduce muzzle flash.

D.3.f. SPCG (Cordite N)

A flashless, cool burning multibase powder of the cordite (N) type, containing centralite as a stabilizer and plasticizer. SPCG contains nitrocellulose, nitroglycerine, and nitroguanidine. SPCG is opaque, chalk white in color, and becomes slightly yellow with age.

D.3.g. Ballisite

Ballisite is a double-base smokeless powder which is used as the propelling charge for mortar ammunition and for some shotgun shells. It is used in greater measure as the propellant for rocket motors and as boosters and sustainers for guided missiles.

D.3.h. Nitrocellulose

Nitrocellulose includes various types of nitrated cotton or wood pulp depending on the nitrogen content. Nitrocellulose when dry is extremely sensitive to shock and friction and readily accumulates static charges. It is highly flammable and explosive and burns rapidly but produces very little smoke and leaves no residue. When impure, it is subject to spontaneous ignition.

E. SOLID PROPELLANTS

E.1. GENERAL DESCRIPTION

Cast propellants are used normally in missiles and rockets of 5-inch diameter and larger. Cast propellant grains are produced from both single-base and double-base casting powders. These casting powders are in granulation similar to small-arms powders but each has its own composition as follows:

E.1.a. Single-Base Powder

In single-base powder, nitrocellulose forms the principal explosive ingredient. The nitrocellulose is transformed by a solvent into a colloid for granulation. Modifiers and stabilizers are included to obtain suitable form, desired burning characteristics, and stability. Single-base powder produces a larger volume of gas but less heat than double-base powder.

E.1.b. Double-Base Powder

In characteristic double-base powder, nitroglycerine and nitrocellulose are the principal explosive ingredients. The nitrocellulose is transformed by the nitroglycerine and other added ingredients into a colloid for granulation.

F. GUN AMMUNITION

F.1. PROJECTILES

Projectiles are of various types and may be base fuzed, nose fuzed, or both. Commonly designated types are described in the following sections.

F.1.a. Loaded Projectiles
These consist of all types of projectiles, 22-millimeter (mm) and larger caliber, which contain special materials or any of the following.

1. Explosive in any form or quantity as a filler.

2. Pyrotechnic composition for illuminating, screening, signaling, or incendiary purposes.

3. Smoke-making composition.

4. Chaff load with expelling charge.

5. Anti-personnel grenades with ejection charge.

6. Fuse containing explosives.

F.1.b. Blind Loaded and Plugged (BL&P) Projectiles
These are loaded with an inert filler and closed with plugs or dummy fuzes.

F.1.c. Blind Loaded with Tracer (BL&T) Projectiles
These have an inert load, but a tracer is inserted in a hole in the base of the projectile.

F.1.d. Solid Projectiles
These consist of solid metal without cavity.

F.1.e. Empty Projectiles
These are projectiles having cavities which are capable of being closed and which do not contain explosive, inert, or other kinds of fillers. This type does not include slugs, proof-shot, or solid target projectiles or unfused illuminating projectiles which contain illuminating elements. The latter types of projectiles are regarded as loaded projectiles.

F.1.f. Rocket Assisted Projectile (RAP)
The RAP projectile has been developed for 5 inch/38, 5 inch/54, and 155-mm guns to provide additional range without redesign of the existing weapons. The projectile consists of a solid-propellant rocket motor with a delayed ignition element, an explosive filled warhead, and either a controlled VT or a point detonation fuse.

F.2. FIXED AMMUNITION

Fixed ammunition includes all recoilless rifle and gun ammunition, larger than .60 caliber, in which the projectile and primer are firmly secured in a cartridge case containing the propelling charge so that the round is loaded into the gun as a unit in one operation. Examples of fixed ammunition are 20-mm, 30-mm, 40-mm, 76-mm, and 3 inch/50 cartridges.

F.3. ARTILLERY AMMUNITION

Artillery ammunition is divided into four general types. They include fixed artillery ammunition, semifixed artillery ammunition, separate loading artillery ammunition, and separated artillery ammunition. Each of the four types are discussed in the following sections.

F.3.a. Fixed Artillery Ammunition

In this type, the round is fixed, that is, not adjustable. It is loaded into the weapon in one operation and the primer is fitted into the base of the cartridge.

F.3.b. Semifixed Artillery Ammunition

A round of semifixed artillery ammunition is characterized by the loose fit of the cartridge munition as it is loaded into the weapon in operation. The propelling charge is divided into sections, each consisting of propellant powder in a bag. To adjust the propelling charge, the projectile is lifted from the cartridge case, and the projectile is reassembled in the cartridge case. As in fixed ammunition, the primer is assembled in the base of the cartridge case. In certain rounds for the 105-mm howitzer, even though the charge is fixed, the cartridge case is a free fit over the projectile to facilitate packing for shipment.

F.3.c. Separate Loading Artillery Ammunition

Separate loading artillery ammunition requires two or more operations to be loaded into the weapon. The propellant, primer, and projectile are loaded in separate operations. The propellant is contained in cartridge bags and may be in one section but usually is divided into two or more sections with each section assembled in a bag.

F.3.d. Separated Artillery Ammunition

In this type, the propelling charge is contained in a primed cartridge case, but the projectile can be fitted into the cartridge. The propelling charge and the projectile are loaded into the gun in one operation.

G. BOMB TYPE AMMUNITION

Typical bomb-type ammunition include aircraft bombs, underwater mines (submarine, surface vessel, and aircraft launched), destructors, depth charges, torpedo warheads, and other thin walled containers which are loaded with relatively large bursting charges of cast explosives.

G.1. TNT Exudate

Bomb type ammunition containing cast TNT is known to exude, at times, a sticky, viscous liquid which varies from pale yellow to brown in color. This TNT exudate is found most frequently in old ammunition stocks whose TNT charges contain relatively large quantities of impurities as compared to stocks produced in late years. Its production is accelerated with increase temperature. TNT exudate mixed with a combustible material, such as wood chips, saw dust, or cotton waste, will form a low explosive which is highly flammable and ignites easily from a small flame. It can be exploded in a manner similar to a low grade of dynamite, but the main danger is its fire hazard.

H. ROCKET TYPE AMMUNITION

H.1. Guided Missiles

A guided missile is an unmanned self-propelled vehicle with or without a warhead, designed to move in a trajectory or flight path all or partially above the earth's surface, whose trajectory or course while in flight is capable of being controlled remotely by homing systems or by inertial or programmed guidance from within.

H.2. Rockets

A rocket consists essentially of an inert, chaff loaded, incendiary or explosive loaded warhead, a motor, and a flight stabilizer. The warhead usually contains an explosive filler and a fuse which produces the desired effect at the target. The motor contains the propellant. The stabilizer for a fin-stabilized rocket consists of fins attached to the motor. For a spin-stabilized rocket, it consists of multiple canted nozzles.

H.3. JATO Units

JATO units are cylindrical motors, similar to rocket motors. They use a propellant of the double-base type where in the individual grains are cast or extruded in a variety of configurations. They use electrically fired ignitiers. They vary in size from those designated to assist large multi-engine planes on take off to those designated to assist the launching of small target drones. In the large JATO units, propellant weight may approximate 150 pounds, while the small units used to launch drones may have about 9.5 pounds.

I. MISCELLANEOUS EXPLOSIVES

I.1. Explosive Initiating Devices, Boosters, and Tracers

Fuzes, primers, and detonators are included in the collective term, "explosive initiating devices." Explosive initiating devices, boosters, and tracers are components designed for assembly and use with larger ammunition components such as projectiles, bombs, and ammunition charges.

J. LAND FORCES AMMUNITION

J.1. Grenades

Grenades are either explosive or chemical and are intended for use at relatively short range. They are very effective for augmenting primary weapons. They are also very effective in the form of smoke and tear gas grenades for dispersing crowds. There are two basic types of grenades: hand grenades designed to be thrown by hand, and rifle grenades designed to be projected by rifle or other launcher. Hand grenades are of four types: explosive (fragmentation and offensive) grenades, chemical grenades, practice grenades, and training grenades. Practice grenades contain a charge of black powder while the training grenades are inert. All hand grenades except training grenades are fitted with a delay action fuse.

J.2. Land Mines

There are two main types of land mines: antitank (AT), for use against armored cars and tanks, and antipersonnel (AP), for use against personnel. They are further classified as service, practice, or dummy.

J.2.a Antitank (AT) Mines

Antitank mines consist of a high explosive charge designed to be laid on, below, or planted flush with the ground. The mine is detonated by a mechanical or chemical device when actuated by the weight of the vehicle. Antitank mines may be of metallic construction or, to counteract the use of magnetic mine detectors, the material may be plastic, ceramic, hard paper, or other nonmetallic material.

J.2.b. Antipersonnel (AP) Mines

Antipersonnel mines consist of a high explosive charge designed to be used as booby traps, on or in-ground laying, or ambush. Types include bounding, bounding-fragmentation, blast, and directional. A complete mine consists of the mine itself, the firing device, and any accessories such as trip wires.

J.3. Mortar Ammunition

The types of mortar ammunition are: high explosive, smoke, illuminating, antipersonnel, practice, and training. The complete round is loaded into the mortar as a unit. It consists of a shell body, a fin assembly, an ignition cartridge, and a primer. The propellant charge is adjustable and consists of a number of propellant increments, usually sealed in individual bags. The propellant increments are attached to the fin shaft or within the fin blades. The ignition cartridge is inserted in the perforated base end of the fin shaft; the primer is screwed into the shaft after the ignition cartridge has been inserted.

J.4. Ground Type Rockets

Ground type rockets are used by the Army, Navy, and Marine Corps. They may be fitted with high explosives, chemical, practice, or target rocket warheads. High explosive is employed for antitank use. Both high explosive and chemical warheads are employed for barrage use.

K. PYROTECHNICS

Pyrotechnics are mixtures of oxidizing agents and combustibles to which materials such as agents for coloring flames or smokes, flame brighteners, deterrents, binders, stabilizers, and accelerators may be added for a particular purpose. Pyrotechnics consist of fireworks adapted to military purposes and are divided into signaling, simulators, smoke screening, incendiary, and illuminating types.

L. INERTING MATERIALS

L.1. Inert Ammunition Components

Inert ammunition components are the essential materials which, when assembled together and loaded, comprise finished rounds. The proper functioning of and, to a large extent, the safety in storage and use of ammunition is dependent upon the condition and suitability of the respective ammunition components.

L.2. Drilling Ammunition

Drill ammunition includes any type of ammunition or any component of any type of assembled without explosives or with inert materials, in simulation of regular ammunition. Drill ammunition is used for training and testing purposes only.

APPENDIX C-3

CHEMICAL COMPOSITION OF WASTE EXPLOSIVES

Appendix C-3
Chemical Composition of Explosively Destroyed Compounds

Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Compound	Chemical Composition	
Black Powder	Potassium Nitrate	74.0%
	Charcoal	15.6%
	Sulfur	10.4%
Trinitrotoluene (TNT)	$C_7H_5N_3O_6$	
Composition B	60/40 Cyclotol	
	RDX	60.0%
	TNT	39.0%
	Wax	17.0%
Pentaerythrite tetranitrate (PETN)	Carbon	19.0%
	Hydrogen	2.5%
	Nitrogen	17.7%
	Oxygen	60.8%
Composition C-4	RDX	91.00%
	Polysobulylene	2.1%
	Motor Oil	1.6%
	di-(2-Elhylhexyl) Sebacate	5.3%
RDX (cyclonite) (cyclotrimethylete-trinitramine)	Carbon	16.3%
	Hydrogen	2.7%
	Nitrogen	37.8%
	Oxygen	43.2%
Lead azide	Nitrogen	28.8%
	Lead	71.2%
Lead styphnate	Carbon	15.4%
	Hydrogen	.65%
	Nitrogen	9.0%
	Oxygen	30.8%
	Lead	44.2%
Composition A-3	RDX	91.0%
	Wax	9.0%
Explosive A-4	RDX	97.0%
	Wax	3.0%
HBX-1,3 & 6	RDX	39.6%
	TNT	37.8%
	Aluminum	17.1%
	Densitizer Composition D-2	5.0%
	CACL	.5%
PBX	RDX	
	Polystyrene	
	Dioctyl pthalate	
Nitroguanidine (picrate)	Carbon	11.5%
	Hydrogen	3.9%
	Nitrogen	53.8%
	Oxygen	30.8%

See notes at end of table.

Appendix C-3 (Continued)
Chemical Composition of Explosively Destroyed Compounds

Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Compound	Chemical Composition	
Military dynamite-medium velocity	RDX	75.0%
	TNT	15.0%
	Starch	5.0%
	SAE No. 10 oil	4.0%
	Polysobutylene	1.0%
Military and dynamite-low velocity	RDX and dye	17.5%
	TNT	67.8%
	Tripentaery-thritol	8.6%
	Binder[1]	4.1%
	Cellulose Acetate	2.0%

[1] The binder is vistac No. 1 consisting of polybutene and Diotyseabacate.

Notes: RDX = cyclotrimethylenetrinitramine.
TNT = trinitrotoluene.
HBX-1, 3, and 6 =
CACL =
PBX =
SAE =

APPENDIX C-4

CHEMICAL BY-PRODUCTS RESULTING FROM THE OPEN BURNING AND OPEN DETONATION OF WASTE EXPLOSIVES

OPEN BURNING SIMULATION

TABLE 1 OPEN BURNING SIMULATION OF MATERIAL C-4			
RATIO OF MATERIAL C-4 TO AIR			
Combustion Products $\frac{g}{100\ gm}$	$\frac{100}{0}$	$\frac{50}{50}$	$\frac{25}{75}$
CO	41.1518	26.6440	0.0000
N_2	34.4283	113.2815	349.3828
CO_2	16.0265	40.4570	82.3220
H_2O	4.6955	17.8398	33.7172
H_2	3.0967	1.7766	0.0000
CH_4	.5972	0.0000	0.0000
NH_3	.0044	.0002	0.0000
CNH	.0002	0.0000	0.0000
O_2	0.0000	0.0000	34.1265
NO_2	0.0000	0.0000	0.0002
NO	0.0000	0.0000	0.0019

TABLE 2 OPEN BURNING SIMULATION OF COMP. A-3			
RATIO OF COMP A-3 TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO	41.114	36.184	1.02E-07
CO_2	16.120	41.226	81.249
H_2	2.953	1.153	8.04E-09
H_2O	5.187	18.491	32.013
N_2	34.429	113.282	270.978
NH_3	0.00334	0.00060	–
CNH	.0002	0.00001	–
CH_2O	1.74E-05	2.85E-06	–
H	1.34E-08	3.69E-07	2.22E-12
NH_2	2.18E-10	1.89E-09	–
CNHO	1.26E-05	5.69E-06	–
CH_3	1.16E-07	1.61E-09	–
HO	1.17E-10	6.04E-08	5.30E-05
C_2H_4	1.49E-06	2.14E-11	–
C_2H_2	1.72E-08	1.32E-11	–
C_3H_6	1.05E-10	–	–
C_2H_6	7.85E-07	–	–
CHO	2.48E-09	8.89E-09	–
C_3H_6	6.67E-12	–	–
NO	–	1.04E-09	1.01E-02
NHO_3	–	–	6.05E-09
NO_3	–	–	1.78E-11
HO_3	–	–	9.77E-08
NHO_2	–	–	1.11E-06
O	–	–	3.27E-08
O_3	–	–	9.79E-11
O_2	–	–	15.749
H_2O_2	–	–	6.19E-08
NHO	–	–	5.21E-11

TABLE 3 OPEN BURNING SIMULATION OF AMATOL 80-20			
	RATIO OF AMATOL 80-20		
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
N_2	31.697	110.550	266.250
CO_2	27.126	27.127	27.127
CO	9.95E-06	3.39E-09	0.000
O_2	1.195	22.348	64.647
H_2	1.64E-06	0.000	0.000
H_2O	39.976	39.976	39.976
NO	4.77E-03	4.58 E05	8.62E-10
O	4.39E-07	0.000	0.000
HO	4.15E-04	5.52E-09	0.000
HO_2	2.68E-07	5.47E-11	0.000
H_2O_2	2.70E-07	2.95E-10	0.000
NHO_2	3.57E-07	1.32E-07	1.13E-09
H	9.03E-10	0.000	0.000
NHO	7.22E-10	0.000	0.000
NO_3	1.65E-12	0.000	0.000
NHO_3	3.62E-10	3.08E-08	7.58E-07
O_3	4.91E-11	0.000	0.000
NO_2	0.000	4.70E-05	2.27E-06

TABLE 4 OPEN BURNING SIMULATION OF MATERIAL PBX (PLASTIC BONDED EXPLOSIVE)			
	RATIO OF PBX TO AIR		
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO	43.543	39.246	0.000
N_2	32.158	111.008	347.559
CO_2	12.082	36.786	98.681
H_2O	3.692	10.044	35.473
H_2	3.338	2.823	0.000
CH_4	0.867	0.086	0.000
NH_3	0.005	0.004	0.000
O_2	0.000	0.000	18.276
NO	0.000	0.000	0.007
O_2	0.000	0.000	46.112
NO	0.000	0.000	0.001

TABLE 5 OPEN BURNING SIMULATION OF EXPLOSIVE C-3			
RATIO OF EXPLOSIVE C-3 TO AIR			
Combustion Products $\frac{g}{100\ gm}$	$\frac{100}{0}$	$\frac{50}{50}$	$\frac{25}{75}$
CO	39.888	20.255	0.000
N_2	33.039	111.890	348.440
CO_2	18.077	48.926	80.747
H_2O	7.015	18.200	24.697
H_2	1.978	0.727	0.000
CH_4	0.001	0.000	0.000

TABLE 6 OPEN BURNING SIMULATION OF RDX EXPLOSIVE			
RATIO OF RDX EXPLOSIVE TO AIR			
Combustion Products gm	g / 100	100 / 0	50 / 50	25 / 75
N_2	37.8374	116.6874	353.2383
CO	23.0023	.5979	.0000
CO_2	22.8415	58.5039	59.4390
H_2O	15.3090	24.1963	24.3318
H_2	1.0096	.0151	.0000
HO	.0001	.0009	.0000
O_2	.0000	.0001	62.9900
NO	.0000	.0006	.0001
NO_2	.0000	.0000	.0000

TABLE 7 OPEN BURNING SIMULATION OF PETN EXPLOSIVE			
RATIO OF PETN EXPLOSIVE TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO_2	47.0626	69.6041	69.6044
H_2O	20.6046	22.7952	22.7942
N_2	17.7220	96.5448	333.1240
CO	14.3469	.0002	.0000
H_2	.2430	.0000	.0000
HO	.0166	.0031	.0000
NO	.0024	.0000	.0000
H	.0011	.0000	.0000
O_2	.0008	10.9948	24.4773
O	.0001	.0000	.0000
NO	.0000	.0613	.0000
NO_2	.0000	.0000	.0000

TABLE 8 OPEN BURNING SIMULATION OF SMOKELESS POWDER			
RATIO OF SMOKELESS POWDER TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO	39.412	18.991	4.77E-10
H_2	1.814	0.624	4.76E-11
CO_2	37.137	46.822	99.093
H_2O	9.069	19.724	25.303
N_2	12.555	91.406	249.105
CH_4	0.0112	1.27E-06	–
NH_3	0.00087	0.00012	–
CNH	.0004	–	–
CH_2O	1.13E-05	9.20E-07	–
CNHO	6.48E-06	2.63E-06	–
H	2.88E-08	–	–
CH_3	2.28E-08	1.37E-10	–
C_2H_4	3.30E-08	–	–
C_2H_6	6.17E-09	–	–
CHO	4.25E-09	8.53E-09	–
HO	9.87E-10	3.23E-07	2.55E-06
C_2H_2	1.88E-10	1.47E-09	–
NO	3.01E-12	9.69E-09	2.33E-03
O_2	–	2.06E-12	26.495
NHO_2	–	–	6.16E-07
HO_2	–	–	9.24E-09
NO_2	–	–	2.09E-04
H_2O_2	–	–	8.72E-09
NHO_3	–	–	1.28E-08
O	–	–	3.75E-10
O_3	–	–	1.49E-11
NO_3	–	–	9.86E-12

TABLE 9 OPEN BURNING SIMULATION OF PHOSPHOROUS			
RATIO OF PHOSPHOROUS TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
P_4	78.306	56.882	6.29E-03
P_3N_5 (s)	29.584	–	–
P_4O_6	8.549	48.446	145.293
PN	8.05E-03	11.561	21.307
P_2	1.98E-03	7.860	3.422
N_2	1.197	75.250	229.916
PO	–	0.00000	5.12E-02
P	–	0.00000	6.25E-04
PO_2	–	0.00000	4.93E-03
O_2	–	–	5.02E-11
NO	–	–	8.72E-07
O	–	–	2.79E-08
N	–	–	6.19E-10

TABLE 10 OPEN BURNING SIMULATION OF FLASH POWDER			
RATIO OF FLASH POWDER TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
BaCl	16.529	16.528	0.000
S_2	15.735	3.445	0.000
S	6.691	0.177	0.000
K	4.836	3.734	0.000
KCl	4.221	6.316	0.004
N_2	2.670	81.520	318.079
SO	2.078	4.728	0.000
AlS	1.956	0.000	0.000
AlCl	1.366	0.000	0.000
Al_2O	0.708	0.000	0.000
Al	0.702	0.000	0.000
Cl	0.151	0.001	0.000
SO_2	0.131	36.044	49.946
AlOCl	0.096	0.000	0.000
AlO	0.081	0.000	0.000
S_2O	0.056	0.226	0.000
$AlCl_2$	0.038	0.000	0.000
NS	0.020	0.002	0.000
O	0.019	0.001	0.000
NO	0.008	0.019	0.003
KO	0.007	0.012	0.000
Al_2O_2	0.002	0.000	0.000
O_2	0.001	0.004	56.612
$BaCl_2$	0.000	0.000	0.001
Ba	0.000	0.000	0.001
SO_3	0.000	0.001	0.000

TABLE 11 OPEN BURNING SIMULATION OF BLACK POWDER			
RATIO OF BLACK POWDER TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO_2	16.635	32.227	32.105
S_2	7.637	–	–
N_2	10.391	89.235	246.941
H_2O	1.777	3.770	0.580
CO	10.300	6.86E-06	–
H_2S	1.714	–	–
K_2CO_3 (1)	46.842	50.879	–
K_2CO_3 (s)	–	–	51.261
KHO	2.470	0.1301	5.04E-11
H_2	0.080	9.04E-08	–
HS	5.13E-02	–	–
CS_2	1.10E-02	–	–
H	2.72E-06	2.13E-10	–
HO	2.77E-06	2.13E-10	–
CNHO	7.7E-07	–	–
CH_4	1.12E-08	–	–
O	1.61E-10	7.41E-07	–
NHO	1.01E-11	4.42E-10	–
K	9.47E-02	2.79E-05	–
$K_2H_2O_2$	9.47E-02	9.81E-05	–
S	3.07E-04	–	–
K_2	1.74E-04	–	–
KO	4.82E-06	2.02E-05	–
CH_2O	2.41E-07	–	–
SO_3	4.48E-08	0.659	–
$K_2C_2N_2$	3.55E-10	–	–
S_8	1.25E-11	–	–
CSO	0.938	–	–
S_2O	5.16E-02	–	–
CS	2.73E-04	–	–

TABLE 12 OPEN BURNING SIMULATION OF TNT			
RATIO OF TNT TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO	57.4357	61.4025	.0000
N_2	10.4999	97.3492	333.0965
CO_2	10.0577	34.8207	135.3325
H_2	1.9633	1.7765	.0000
H_2O	1.7593	3.4040	19.8291
CH_4	.2315	.2426	.0000
NH_3	.0015	.0026	.0000
CNH	.0004	.0002	.0000
O_2	.0000	.0000	10.6290
NO	.0000	.0000	.0121

TABLE 13 OPEN BURNING SIMULATION OF TOVEX			
RATIO OF TOVEX TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	40 / 60
H_2O	47.254	45.356	31.157
N_2	29.125	107.975	213.109
O_2	15.297	36.449	64.650
CO_2	2.088	2.087	2.085

TABLE 14 OPEN BURNING SIMULATION OF COMP B			
RATIO OF COMP B TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO	48.4579	28.2903	.000
N_2	29.0035	108.6550	345.2051
CO_2	15.7407	47.5344	92.0142
H_2O	3.7625	14.4943	23.3935
H_2	2.1840	.9958	.0000
CH_4	.0495	.0000	.0000
NH_3	.0016	.0003	.0000
CNH	.0002	.0000	.0000
HO	.0000	.0000	.0000
O_2	.0000	.0000	39.3855
NO	.0000	.0000	.0014
NO_2	.0000	.0000	.0002

TABLE 15 OPEN BURNING SIMULATION OF H6			
RATIO OF H6-1 TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO	45.0210	48.6565	.0000
N_2	15.7633	101.3153	337.8318
H_2	2.4731	2.0162	.0000
CNH	.3616	.0001	.0000
$CaCl_2$	.3508	.4225	.0353
Al(Cl)	.0595	.0000	.0000
CaCl	.0403	.0025	.0000
HCl	.0321	.0401	.0005
Ca	.0243	.0001	.0000
C_2H_2	.0185	.0000	.0000
CH_4	.0033	.0000	.0000
H	.0022	.0000	.0000
$AlCl_2$	.0020	.0000	.0000
Al	.0017	.0000	.0000
H_2O	.0016	4.2335	22.2700
CO_2	.0012	5.6665	82.1160
Al_2O	.0007	.0000	.0000
CaHO	.0006	.0365	.0004
AlH	.0003	.0000	.0000
CH_3	.0002	.0000	.0000
NH_3	.0001	.0002	.0000
HO	.0000	.0000	.0012
O_2	.0000	.0000	19.6069
$AlCl_2$	.0000	.0000	.0000
NO	.0000	.0000	.0750
Al_2O_3	.0000	.0000	.0000
H	.0000	.0002	.0000
$Al(Cl)_3$	.0000	.0000	.0000
NO_2	.0000	.0000	.0000

TABLE 16 OPEN BURNING SIMULATION OF HBX-1			
RATIO OF HBX-1 TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO	43.6463	52.2548	.0000
N_2	18.0629	100.9055	332.4292
H_2	2.5141	2.0295	.0000
CNH	.3714	.0002	.0000
$CaCl_2$	.3695	.4506	.0401
$Al(cl)_3$	.0490	.0000	.0000
CaCl	.0456	.0009	.0000
HCl	.0392	.0251	.0004
Ca	.0216	.0000	.0000
C_2H_2	.0172	.0000	.0000
CH_4	.0035	.0000	.0000
H	.0020	.0000	.0000
$AlCl_2$	.0017	.0000	.0000
H_2O	.0016	4.4922	22.6381
Al	.0013	.0000	.0000
CO_2	.0012	7.8521	89.9553
CAHO	.0006	.0193	.0003
Al_2O_3	.0005	.0000	.0000
CH_3	.0002	.0000	.0000
AlH	.0002	.0000	.0000
NH_3	.0001	.0003	.0000
HO	.0000	.0000	.0009
O_2	.0000	.0000	17.4581
Al_2Cl_3	.0000	.0000	.0000
NO	.0000	.0000	.0605
H	.0000	.0000	.0000
Al_2NO_3	.0000	.0000	.0000
$Al(cl)_3$	.0000	.0000	.0000
NO_2	.0000	.0000	.0000

TABLE 17 OPEN BURNING SIMULATION OF HBX3			
RATIO OF HBX3 TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	25 / 75
CO	44.481	46.157	0.008
Al_2O_3	2.246	0.032	0.000
H_2	2.075	2.085	0.000
Al	1.027	0.039	0.000
N_2	0.339	89.785	332.353
CNH	0.130	0.196	0.000
AlH	0.101	.003	.000
C_2H_2	0.085	0.001	0.000
H	0.010	0.008	0.000
CH_4	0.001	0.000	0.000
H_2O	0.001	0.003	18.762
CO_2	0.000	0.002	72.830
O_2	0.000	0.000	9.583
NO	0.000	0.000	0.306
HO	0.000	0.000	0.022

TABLE 18 OPEN BURNING SIMULATION OF HMX			
RATIO OF HMX TO AIR			
Combustion Products	g / 100gm	100 / 0	50 / 50	25 / 75
N_2	37.8374	116.6075	353.2383
CO	23.7072	.5935	.0000
CO_2	22.1909	58.5073	59.4398
H_2O	15.2478	24.1951	24.3318
H_2	1.0164	.0152	.0000
HO	.0000	.0001	62.9900
O_2	.0000	.0005	.0000
NO	.0000	.0005	.0000
NO_2	.0000	.0000	.0001

OPEN DETONATION SIMULATION

TABLE 19 OPEN DETONATION SIMULATION OF TETRYL EXPLOSIVE			
RATIO OF TETRYL EXPLOSIVE TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
CO_2	35.3929	61.3952	107.2852
CO	26.1509	28.7367	.0000
N_2	24.3891	103.2388	339.7916
H_2O	4.3954	5.2587	15.6840
H_2	1.1689	1.0985	.0000
CH_4	.3743	.2692	.0000
NH_3	.0021	.0027	.0000
O_2	.0000	.0000	37.2380
NO	.0000	.0000	.0001

TABLE 20 OPEN DETONATION SIMULATION OF EXPLOSIVE C3			
RATIO OF EXPLOSIVE C3 TO AIR			
Combustion Products $\frac{g}{100\ gm}$	$\frac{100}{0}$	$\frac{50}{50}$	$\frac{20}{80}$
CO_2	37.341	60.904	80.747
N_2	33.036	111.887	348.440
CO	12.843	12.508	0.000
H_2O	8.638	13.377	24.697
H_2	1.486	1.249	0.000
CH_4	1.237	0.071	0.000
NH_3	0.005	0.003	0.000
O_2	0.000	0.000	46.112

TABLE 21 OPEN DETONATION SIMULATION OF PBX (PLASTIC BONDED EXPLOSIVE)			
RATIO OF PBX TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
N_2	32.155	111.004	347.562
CO_2	28.929	50.481	98.681
H_2O	10.922	11.389	35.473
CO	10.856	19.723	0.000
CH_4	2.530	1.574	0.000
H_2	2.110	2.298	0.000
NH_3	0.008	0.009	0.000
O_2	0.000	0.000	18.280

TABLE 22 OPEN DETONATION SIMULATION OF C4			
RATIO OF C4 TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
N_2	34.4253	113.2748	349.8329
CO_2	32.6450	55.9038	82.3220
H_2O	11.5711	13.0497	33.7172
CO	9.3073	14.4287	.0000
CH_4	2.4459	1.3661	.0000
H_2	1.8620	1.9677	.0000
NH_3	.0003	.0091	.0000
O_2	.0000	.0000	34.1277

TABLE 23 OPEN DETONATION SIMULATION OF RDX			
	RATIO OF RDX TO AIR		
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
CO_2	48.7416	58.9424	59.4398
N_2	37.8328	116.6877	353.2383
H_2O	9.9767	24.3318	24.3318
CO	8.2893	.3135	.0000
CH_4	1.4184	.0000	.0000
H_2	1.2488	.0351	.0000
NH_3	.0057	.0000	.0000
O_2	.0000	.0000	62.9901
NO	.0000	.0000	.0000

TABLE 24 OPEN DETONATION SIMULATION OF PETN			
RATIO OF PETN TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
CO_2	57.0348	69.6044	69.6044
N_2	17.7227	96.5733	333.1241
H_2O	16.5448	22.7942	22.7942
CO	7.9963	.0000	.0000
H_2	.6987	.0000	.0000
CH_4	.0021	.0000	.0000
NH_3	.0006	.0000	.0000
O_2	.0000	11.0279	24.4774
NO	.0000	.0003	.0000

TABLE 25 OPEN DETONATION SIMULATION OF FLASH POWDER			
RATIO OF FLASH POWDER TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
Al_2O_3	43.774	0.000	0.001
S_2	21.363	4.558	0.000
BaCl	16.529	16.528	0.000
KCl	5.172	6.318	0.000
K	4.342	3.739	0.000
N_2	2.677	81.529	318.080
S	2.328	0.026	0.000
AlS	2.188	0.000	0.000
AlCl	0.882	0.000	0.000
Al_2O	0.266	0.000	0.000
Al	0.232	0.000	0.000
SO	0.158	1.670	0.000
$AlCl_2$	0.027	0.000	0.000
Cl	0.019	0.000	0.000
AlOCl	0.014	0.000	0.000
S_2O	0.010	0.297	0.000
NS	0.008	0.000	0.000
AlO	0.005	0.000	0.000
SO_2	0.002	38.087	49.840
KO	0.000	0.003	0.000
NO	0.000	0.001	0.000
O	0.000	0.000	0.000
$BaCl_2$	0.000	0.000	0.001
Ba	0.000	0.000	0.001
SO_3	0.000	0.000	0.000
O_2	0.000	0.000	56.613

TABLE 26 OPEN DETONATION SIMULATION OF TNT			
RATIO OF TNT TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
CO_2	32.7455	52.5221	135.6325
CO	23.8155	35.5236	.0000
N_2	18.4991	97.3486	333.9009
H_2O	5.4634	5.5565	19.8291
H_2	1.4507	1.4984	.0000
CH_4	.6223	.3904	.0000
NH_3	.0026	.0034	.0000
O_2	.0000	.0000	10.6348
NO_2	.0000	.0000	.0001
NO	.0000	.0000	.0026

TABLE 27 OPEN DETONATION SIMULATION OF TOVEX			
RATIO OF TOVEX TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	40 / 60
H_2O	34.474	20.837	14.860
N_2	29.125	107.975	147.400
O_2	15.297	36.449	47.024
CO_2	2.088	2.087	2.086

TABLE 28 OPEN DETONATION SIMULATION OF COMP B			
RATIO OF COMP B TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
CO_2	36.5118	61.0846	92.0142
N_2	29.8013	108.6513	345.2058
CO	16.0221	18.9525	.0000
H_2O	7.6196	9.4311	23.3935
H_2	1.0082	1.4561	.0000
CH_4	1.4184	.4197	.0000
NH_3	.0144	.0047	.0000
O_2	.0000	.0000	39.3864
NO	.0000	.0000	.0000

TABLE 29 OPEN DETONATION SIMULATION OF H6			
RATIO OF H6 TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
CO	25.4296	46.4200	.0000
N_2	22.4190	101.3142	337.8310
CO_2	35.3929	61.3952	107.2852
H_2	2.4846	2.1745	.0000
$CaCl_2$	.4704	.0012	.0003
CNH	.0882	.0003	.0000
CaCl	.0089	.0000	.0000
HCl	.0002	.0002	.0000
H_2O	.0005	2.8213	22.2700
CO_2	.0032	9.1624	82.1161
Ca	.0015	.0000	.0000
C_2H_2	.0012	.0000	.0000
$CaHO_2$	.0009	.0002	.0000
NH_3	.0003	.0014	.0000
H	.0001	.0000	.0000
O_2	.0000	.0000	19.6408
CH_4	.0122	.0065	.0000
NO	.0000	.0000	.0132

TABLE 30 OPEN DETONATION SIMULATION OF HBX 1			
RATIO OF HBX 1 TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
CO	32.0044	48.9195	.0000
N_2	22.0497	100.9035	337.4522
H_2	2.5107	2.2183	.0000
CO_2	.0840	12.8132	89.9553
H_2O	.0677	2.5818	22.6387
CH_4	.0576	.1017	.0000
$CaCl_2$	.0242	.0000	.0002
CNH	.0095	.0004	.0000
NH_3	.0000	.0026	.0000
HCL	.0002	.0000	.0000
$CaHO_2$	.0005	.0000	.0000
O_2	.0000	.0000	12.4853
NO	.0000	.0000	.0102

TABLE 31 OPEN DETONATION SIMULATION OF HBX3			
	RATIO OF HBX3 TO AIR		
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
CO	31.288	37.359	0.000
N_2	3.523	92.571	332.441
H_2	2.089	2.083	0.000
CNH	0.198	0.425	0.000
C_2H_2	0.023	0.005	0.000
Al	0.006	0.000	0.000
Al_2O_3	0.004	0.000	0.000
CH_4	0.003	0.002	0.000
H	0.002	0.001	0.000
H_2O	0.001	0.001	18.772
CO_2	0.001	0.001	72.841
O_2	0.000	0.000	9.688
NO	0.000	0.000	0.116
HO	0.000	0.000	0.004

TABLE 32 OPEN DETONATION SIMULATION OF HMX			
RATIO OF HMX TO AIR			
Combustion Products g / 100 gm	100 / 0	50 / 50	20 / 80
CO_2	40.8240	58.9476	59.4398
N_2	37.8328	116.6877	353.2383
H_2O	10.0549	24.0161	24.3318
CO	8.0631	.3133	.0000
CH_4	1.4329	.0000	.0000
H_2	1.2364	.0353	.0000
NH_3	.0057	.0000	.0000
O_2	.0000	.0000	62.9901
NO	.0000	.0000	.0000

APPENDIX C-5

CONCLUSIONS OF AMCCOM OPEN BURNING AND OPEN DETONATION (OB/OD) EMISSIONS AND RESIDUES STUDY

SECTION 7. CONCLUSIONS

7.1. Conclusions (Addressed by Study Objectives)

7.1.1. Objective 1 - BangBox Characterization: Characterize the BB chamber volume, ventilation rate, and combustion product cloud homogeneity level.

The chamber volume, ventilation rate, and cloud homogeneity were successfully determined, and found satisfactory for subsequent use throughout the data evaluation/analysis processes.

7.1.2. Objective 2 - Sampling and Analyses: Develop and improve proposed air sampling equipment and sample analysis procedures to be used in later phases on the FWAC, for sampling product clouds from large-scale follow-on outdoor OB/OD trials.

7.1.2.1. Samplers and detectors used in the BB tests that were felt to have performed well enough to be used for FWAC sampling of open-air clouds of OB/OD products included 0.85-L evacuated canisters; 6-L evacuated canisters; 32-L evacuated tanks; CO_2, CO, SO_2, and NO_x real-time gas monitors; quartz-fiber particulate filters; Teflon™ particulate filters; the Belfort integrating nephelometer; the RAM nephelometer; and DMPS, ASASP, and FSSP aerosol spectrometers.

7.1.2.2. Samplers used in BB tests that were felt to have performed marginally included the resin filters (both Porapak-R™ and XAD-2™) which were an integral part of the semi-VOST system and the Velostat™ bag. The resin filters greatly constricted airflow, thus limiting their suitability for FWAC grab sampling. The bag proved inadequate for some volatile and semivolatile organic compounds, because of absorption and subsequent off-gassing.

7.1.2.3. The CO real time instrument did not perform properly. The CO data was obtained from the 6-L canister analysis.

7.1.3. Objective 3 - Comparison of SFC/MS and GC/MS: Refine, standardize, and compare SFC and GC techniques for extracting and analyzing resins, and filters, for trace quantities of semivolatile organic OB/OD combustion products and residues, using MS detectors.

Both SFC/MS and GC/MS are sufficiently sensitive analysis techniques to detect and quantify semivolatile organic (exotic) target analytes collected from chamber air by quartz-fiber filters, resin-filled canisters, and evacuated stainless steel cylinders. SFC is superior for some of the less thermally stable exotic species of interest, e.g. N-nitrosoamines, and some of the nitro compounds.

7.1.4. Objective 4 - Other Standard Analytical Methods: Verify adequacy of other standard analytical methods to be used for analyses of gases, particulates, volatile organic compounds, metals, and nonmetals.

7.1.4.1. The Velostat™ bag sampler proved inadequate for some volatile and semivolatile organic compounds because of absorption and subsequent off-gassing problems.

7.1.4.2. The liquid impingers (bubblers) used for measuring HCN, NH_3, and HCL in the cloud were adequate for the BB.

7.1.4.3. The extraction and analytical procedures (GC/FID) used for analysis of the volatile organics (VOC's) and the SF_6 (GC/ECD) proved to be highly successful.

7.1.4.4. Elemental analysis proved successful using XRF techniques.

7.1.5. Objective 5 - Identify and Quantify Specific Target Analytes: Identify and quantify specific target analytes for TNT, a double-base propellant, and a composite propellant.

7.1.5.1. TNT Detonation

7.1.5.1.1 The maximum EF values calculated from TNT detonation data are given in Table 7.1.

Table 7.1 Maximum Emission Factors From TNT Detonation by the Carbon Balance Method.

Species	Emission Factor (kg/kg)
Methane	1.3×10^{-4}
Acetylene	1.8×10^{-5}
Benzene	8.7×10^{-6}
Selected C_2-C_{10} non-methane paraffins	1.5×10^{-4}
Selected C_2-C_{10} olefins	3.0×10^{-5}
Selected non-benzene aromatics	3.0×10^{-5}
Phenol	2.5×10^{-5}
Naphthalene	1.5×10^{-4}
Other individual semivolatile (target analyte exotic) aromatics varied from	3×10^{-9} to 7×10^{-5}

7.1.5.1.2 Open detonation is an extremely efficient TNT thermal treatment method. Carbon-containing species measured from 227-gram (0.5-lb) TNT detonations were generally distributed as shown in Table 7.2.

Table 7.2 Distribution from Carbon-containing Species Measured From TNT.

Species	Percent
Carbon Dioxide	97.20
Carbon Monoxide	0.50
C_1 to C_{10} volatile hydrocarbons and other organics	0.57
Elemental carbon (soot)	1.71

7.1.5.2. Propellant Burn

7.1.5.2.1 Propellant burn maximum EFs were generally one to two orders of magnitude lower than those for the corresponding TNT detonation product.

7.1.5.2.2 Based on propellant carbon conversion to CO_2 open burning of double-base and composite propellants is an extremely efficient thermal treatment method. However, further work is needed to determine the fate of chlorine in the combustion products. Carbon-containing species measured from burning these fuels are distributed as shown in Table 7.3.

Table 7.3 Carbon-containing Species Measured from Propellant Burns.

Species	Percent	
	Double-Base	Composite
Carbon Dioxide	99.64	99.88
Carbon Monoxide	0.15	0.11
Organic Carbon	0.21	0.00
Elemental carbon (soot)	0.00	0.01

7.1.6. Objective 6 - PCDD's and PCDF's: Assess polychlorinated dibenzodioxins (PCDDs) and dibenzofurans (PCDFs) levels generated from burning the composite propellant containing high concentration of NH_4ClO_4.

None of the most toxic PCDDs were detected, and only one of two samples had a marginal value for the less toxic PCDFs indicating that their source was not derived from the composite propellant.

7.1.7. Objective 7 - Morphology, Composition and Size Distribution of Particulate: Provide information on the morphology, composition, and size distributions of airborne particulate material generated by OB/OD operations in the BB.

Particulate morphology and composition was accomplished by SEM and optical microscopy. The results showed that over 90 percent of the particulate was soot (carbon) with small amounts of calcium carbonate and non-asbestos insulating material.

7.1.8. Objective 8 - Carbon Balance Method: Examine, using data produced under controlled conditions, the validity of the proposed carbon balance method of calculating emission factors; compare the results with those calculated using the more-conventional cloud volume times concentration method.

7.1.8.1. The proposed carbon balance method of calculating emission factors of products of combustion resulting from OD of TNT and double-base and composite propellant burns has been verified under conditions which permit a careful comparison with the cloud-volume method.

7.1.8.2. EFs calculated by the carbon balance-method agreed within experimental uncertainty with those calculated by the more traditional concentration times cloud volume method. During periods of nonhomogenity of cloud concentration the carbon balance-method provided better estimates of the EF.

7.1.8.3. Sufficient CO_2 concentrations (above background ambient levels) must be measurable to be able to apply the carbon balance method of calculating EFs during followon, large-scale outdoor OB/OD tests.

7.1.9. Objective 9 - QA/QC Procedures: Identify or develop appropriate program-specific QA/QC procedures.

A QA/QC program was developed specifically to address BB testing and subsequent analyses. This program, along with its findings and conclusions, is delineated in Volume 3 of this report.

7.1.10. Objective 10 - Sample Storage/Transport Procedures: Establish procedures for transport and storage of sample specimens.

Procedures were established to ensure that, during transportation and storage, semivolatile compounds would be retained by their respective sampling media, and that sample identity and integrity would be maintained. These procedures are described in Volume 3 of this report.

APPENDIX C-6

U.S. DEPARTMENT OF DEFENSE DOCUMENT PERTAINING TO OPEN BURNING AND OPEN DETONATION OF WASTE EXPLOSIVES AND PYROTECHNICS

RESPONSE TO THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
NOTICE OF DEFICIENCY (NOD)
FOR DEPARTMENT OF DEFENSE (DOD)
RESOURCE CONSERVATION AND RECOVERY ACT
(RCRA) PART B, SUBPART X,
PERMIT APPLICATIONS SUBMITTED IN REGION IV

1. Introduction.

a. The EPA, Region IV, recently sent letters to all DOD installations in that region advising that the RCRA Part B, Subpart X, regulation was not intended to perpetuate the use of open burning and open detonation (OB/OD) technologies and their associated uncontrolled releases of combustion products and residues to the environment. Consequently, Subpart X permit applications for OB/OD operations may be denied if adequate justification is not provided to support these technologies. Also, alternatives can and should be developed for specific munitions and reactive wastes for which such a justification cannot be provided. Furthermore, EPA does not intend to issue permits for OB/OD units located in impact ranges due to the inability to adequately monitor soil or groundwater safely or accurately.

b. An ancillary issue was also raised by EPA that involves the potential of military ammunition and ordnance to detonate. The energetic materials disposed at DOD installations that are regulated under RCRA Subpart X have inherent characteristics which result in their classification as reactive (explosive) hazardous waste. Propellants, energetics, and pyrotechnics (PEP) typically exhibit explosive characteristics ranging from deflagration (very rapid pressure rate-of-rise fires) to detonation. Both deflagration and detonation can cause extensive structural damage and loss of life. Region IV recognizes the inherent safety problems with handling explosives, as reflected by accidents that have occurred at explosive manufacturing and demilitarization facilities and the resultant need for OB/OD capabilities.

c. This response is designed to address EPA concerns in these areas and provide information to justify the submittal and subsequent evaluation by EPA of Subpart X permit applications submitted by DOD in EPA Region IV. This justification describes DOD's conventional ammunition demilitarization program; existing alternative technologies to OB/OD currently available at some locations;

ongoing research and development (R&D) programs to supplement and/or replace OB/OD technologies; and demilitarization equipment upgrade programs. In addition, the issue of OB/OD units located within impact ranges is also discussed in terms of currently ongoing actions occurring between EPA and the U.S. Army.

2. The DOD Conventional Ammunition Demilitarization Program. Demilitarization or destruction is a necessary and final step in the life cycle management of military ammunition and ordnance. Assets requiring demilitarization are managed in the Special Defense Property Disposal Account (SDPDA) which is euphemistically known within DOD as the "Demil Account." This account is an assets tracking system which ensures, among other factors, that appropriate final disposition considerations are made. Assignments of munitions and ordnance to the SDPDA or their classification as currently unserviceable, do not necessarily result in these items being demilitarized. They can and are included in the Foreign Military Sales Program, the Recycle Program, and/or are reworked to meet original or alternative specifications. Therefore, an assignment of any ammunition or ordnance item to this account does not constitute a designation of such items as waste, solid waste, or hazardous waste. Consequently, assets carried in the SDPDA are considered to be outside the scope of RCRA regulations.

a. The Single Manager for Conventional Ammunition Demilitarization. In 1975, the U.S. Army was designated as the Single Manager within DOD for conventional ammunition disposal and demilitarization. Conventional ammunition does not include nuclear or lethal toxic chemical agent munitions and there are no biological weapons in the DOD inventory. DOD Directive 5160.65-M delineates the Single Manager and individual Military Service responsibilities for this program. One purpose of the Single Manager concept is to achieve the most efficient and economical management of disposal and demilitarization options while ensuring safe operations and compliance with environmental regulations.

b. Other Military Service Demilitarization Programs. Demilitarization efforts conducted by Military Services other than the U.S. Army under the auspices of the Single-Service Manager are relatively small and are generally confined to supporting local operations that include but are not limited to manufacturing and R&D programs. Additionally, the demilitarization of certain service-unique weapon systems is handled by the individual Military Services. Examples of this type of operation include

large rocket motors, missile motors, and torpedoes. Individual Military Service responsibilities include funding, facilitation, and demilitarization technology development for service-unique weapon systems.

c. DOD Training and Force Readiness Programs. DOD considers the following activities to be outside the scope of RCRA regulations:

(1) Training. The Military Services have missions to train troops and maintain a readiness capability for combat. As such, live fire training and bombing exercises are an inherent part of these missions. During artillery and mortar live fire training exercises, not all propellant charges are used. Because excess propellant presents a safety threat in real combat situations, training in the safe elimination of excess propellant charges is considered a part of the training exercise. All functions associated with live-fire military training and bombing events are not demilitarization or waste treatment operations and, as such, are considered to be outside the scope of RCRA regulatory requirements.

(2) Range Clearance. Impact areas on live-fire ammunition and bombing ranges are periodically cleared of unexploded ordnance. As a secondary mission, Explosive Ordnance Disposal (EOD) personnel support installations with the management of these training ranges. In the interest of safety, doctrine requires unexploded ordnance to be destroyed in place on the range. Ordnance that has failed to function as designed is inherently dangerous to move or even leave in place. Range maintenance includes the destruction of unexploded impacted rounds as the safest method of explosive hazard elimination. The destruction of unexploded impacted ordnance items found on impact ranges and destroyed in place on those impact ranges is also considered to be an integral part of each Military Service's training missions and is, therefore, considered to be outside the scope of RCRA regulations. The movement and/or accumulation of unexploded impacted ordnance items for demilitarization in large lots is considered to be within the scope of RCRA regulations.

(3) Defective Ammunition. On occasion defective ammunition or ordnance items are identified by ammunition inspectors assigned to Military Service installations. These items are retained in the installation's ammunition inventory for disposition determination which is a function of asset value and safety considerations, (i.e., unsafe to handle or unsafe to use for its intended purpose). If the items are unsafe to handle, immediate

destruction is authorized and performed by EOD personnel or equivalent Federal civilian personnel. If the items are safe to handle but unsafe to use for their intended purposes and are valued at less than $1,000.00, individual installations are authorized to conduct demilitarization as an executable option. However, hazardous waste regulations do not apply at this time, since the demilitarization option, if exercised, is not an irreversible decision and those items may still be returned to a DOD installation for reworking to meet specifications. Disposition of defective items that are safe to handle and are valued at over $1,000.00 require special disposition instructions from the respective Item Manager.

(4) Turn-Ins After Training Exercises. Ammunition that has been issued for live-fire training exercises that is not actually used and remains in unopened packages is returned under accountability to ammunition issue points for re-inclusion into the inventory. Unpacked ammunition or ammunition in opened packages is also returned to the ammunition issue point under accountability and is inspected for serviceability prior to being returned to the inventory. Unserviceable ammunition is segregated for subsequent disposition determination.

(5) Turn-Ins During Amnesty Programs. Military installations that conduct live-fire training exercises have instituted a no questions asked ammunition turn-in amnesty program to reduce the misappropriation and any subsequent inappropriate disposal or use of military ammunition and ordnance. Generally, military personnel are briefed before and after training events that retention of ammunition is illegal. For those individuals who initially ignore these warnings, amnesty collection points are designated on installations where military personnel may deposit ammunition with no questions asked. Ammunition items deposited at these amnesty points are often damaged and/or have unrecognizable nomenclature identifications from a quality control perspective and usually involve very low quantities. As such, these items are not suitable for training reissue. Through this program, ammunition is brought back under military control and included in proper military storage accountability for subsequent disposition determination.

d. Manufacturing Plant Explosive Wastes and Off-Specification End Items.

(1) During the manufacture of military energetic materials, off-specification and residual propellants,

explosives and pyrotechnics are produced. These residuals include production remnants, scraps, and cleanup residues. The quantities of off-specification and residual energetic materials requiring treatment are minimized to the maximum extent that is technically feasible through reclamation and recycling procedures. Production residuals and off-specification materials that can be incinerated safely are destroyed in explosive waste incinerators (EWIs) at those installations with this type of equipment. Those materials that are considered to be too unstable and, therefore, unsafe to incinerate are destroyed by OB. Thus, for safety reasons there is an ongoing requirement for OB/OD capabilities at plants that manufacture energetic materials. Off-specification and energetic materials that cannot be reclaimed or recycled are determined to be wastes and hazardous waste regulations apply at the time of that determination.

(2) During the loading, assembling and packing of military ammunition, and ordnance end items, off-specification items are occasionally produced. These items are not immediately considered to be waste because they can be and often are reworked into specification items where technically feasible. However, once a determination has been made that items cannot be reworked, they are classified as waste and where applicable as hazardous waste.

e. Emergency EOD Operations.

(1) EOD units are primarily tactical military units which are trained to support deployed forces in war environments. EOD units during peacetime make use of their practical technical knowledge of ordnance functioning, design, and composition to the benefit of state and local communities and those civilian officials who are occasionally forced to deal with emergencies involving military ordnance that has migrated into their communities or is involved in commercial carrier accidents. Emergency EOD responses to the private sector also involve improvised nonmilitary items (homemade bombs), explosives confiscated during drug enforcement actions, and foreign country ammunition and ordnance items brought into the United States as souvenirs from war zones. Generally, EOD units do not provide routine destruction of commercial explosives collected from civilian sectors.

(2) Basically, EOD units provide emergency services to protect citizens, return DOD-owned military ordnance to competent authority, institute proper account-

ability, and if determined to be appropriate, destroy these items within the capability of the EOD unit's host installation. During EOD emergency responses the risk level may on occasion require, in the judgment of the senior EOD person onsite, that onsite/in-place destruction be conducted, when transportation would present an unacceptable explosion hazard. If the ordnance item is deemed by the senior EOD person onsite to be safe to transport, then the preferred option is to transport the item to a military RCRA permitted OB/OD facility for destruction to avoid exposure of citizens and their property to risks associated with an explosion. In most cases, however, the ammunition item can be transported to such an OB/OD site. The procurement of all transportation manifests and EPA emergency permits, where necessary, for treatment involving DOD-owned materials is the responsibility of the Military Services. For emergency EOD responses that are determined onsite to involve non-DOD owned materials, this responsibility remains with the civil authorities not the Military Services. In these cases DOD has no jurisdiction but does provide support to civil authorities. Existing policy does not allow for the treatment of non-DOD assets on DOD property. Exemptions to this policy may be granted to allow for the treatment of non-DOD materials on DOD property. Unrelated, nonrecurring incidents typify these emergency operations.

3. Existing Alternative Technologies to OB/OD Currently Available at Some Locations. Existing research shows that there is no single demilitarization method or technology that will satisfy all of the requirements to safely treat either the range of items in the existing SDPDA, manufacturing plant residuals, or off-specification materials. While OB/OD is currently a commonly used demilitarization technology, it is not an acceptable technology for many munition items, (e.g., smoke filled and incendiary items and improved conventional munitions (ICMs) that contain multiple items such as bomblets). Existing policy prohibits OB/OD of many of the pyrotechnic items filled with smokes and dyes. However, the Military Services have equipment developed or under development that can reduce the size, convert, and/or dispose of a large portion of the current SDPDA through disassembly. Demilitarization in most cases consists of disassembling or modifying the munition into a configuration that is appropriate for the final treatment process. This may involve cutting, punching, shearing, disassembly, or separation (removal of energetic material from the munition case) of the components and energetic materials. The nature of these activities and the energetic materials

involved put the operators at a greater safety risk than they would be at during OB/OD operations. These disassembly and separation processes are very rarely the final treatment step.

a. Separation and Disassembly Technologies.

(1) In most cases separation and/or disassembly of munition items is required if the method of destruction is other than OB/OD. Limited disassembly is sometimes possible for items that are suitable for OD operations but are not suitable for other thermal treatment operations. For example, if incineration is to be used, munition components have to be broken down into items that contain less than 600 grains of confined explosive to meet safety requirements of existing equipment.

(2) Many methods of explosive component separation have been used over the years. These methods are labor and energy intensive and have the tendency to generate substantial volumes of hazardous waste and place workers at a greater risk than OB/OD. For example, most existing washout equipment creates large volumes of explosive-contaminated water and carbon filters as by-products. Therefore, separation has been used little in the last 15 years and most of the equipment needs extensive upgrade to bring it into compliance with today's environmental and safety standards. In addition, these units may have residual explosives in internal plumbing that would be an explosive safety problem if upgrades were implemented. A brief description of some of these existing technologies follows (note: separation is an intermediary step towards final demilitarization):

(a) Hot Water Washout. A process that uses either a stream or jet of low or high pressure hot water to separate energetic materials from munition cases. This method has generally been employed to remove trinitrotoluene (TNT) or similar semimeltable explosives from projectile bodies. The Ammunition Peculiar Equipment (APE) 1300 unit is an example of this type of technology. These units were operated during the late 1960s and early 1970s to separate explosive fillers and recover projectile bodies for subsequent reloading. These units did not have waste water treatment capability and employed unlined lagoons where excess explosive contaminated water permeated into the surrounding soil. Restoration projects are currently underway at affected installations. Only one installation, Lexington-Blue Grass Army Depot, Kentucky, has an operational APE 1300 unit.

This unit utilizes horsehair and activated carbon filter systems to reduce the quantities of TNT contaminants in the discharge effluent to concentrations below detection limits. Nine other U.S. Army installations have either laid away or dismantled their units.

(b) Steam-out. Steam-out is a process that directly applies steam to the energetic material filler to melt out and separate it from the munition case. This process is the most efficient separation process currently available. However, the process produces explosive-contaminated waste water (less than for hot water washout). This process is also limited to meltable explosives. The U.S. Army has a steam-out unit that is operational at Crane Army Ammunition Activity, Indiana, and laid away equipment at Cornhusker Army Ammunition Plant, Nebraska; Newport Army Ammunition Plant, Indiana; and Pine Bluff Arsenal, Arkansas. The U.S. Navy has an operational unit at Keyport Naval Weapons Station, Washington.

(c) Autoclave. The autoclave is an enclosed chamber in which heat is applied to the exterior of a munition to melt out the explosive filler. This technique is not as efficient as applying steam directly to the filler. The autoclave, when configured properly, reduces the amount of explosive-contaminated water produced. It is limited in application to only those explosives that are meltable, such as TNT. The U.S. Army has an operational autoclave that is in use at Ravenna Army Ammunition Plant, Ohio, and another that is being brought on line at Hawthorne Army Ammunition Plant, Nevada.

b. Destruction. Alternative destruction methods to OB/OD that are currently employed by the DOD rely primarily on incineration to demilitarize energetic materials. Due to safety considerations, the maximum quantity of confined explosive per item that can be processed through any existing incinerator is 600 grains. Therefore, most items that are to be destroyed by this means must be disassembled, separated, or processed in some manner to prevent detonations that would injure operational personnel or damage or destroy the incinerator. This additional processing adds to the inherent safety risks involved with destruction of these items.

(1) APE 1236/2210 Rotary Kiln Incinerators. The APE 1236/2210 incinerators are used for the destruction of small arms ammunition and ordnance items that contain less than 600 grains of confined explosive material in each item. The APE 1236 is the U.S. Army's standard unit

and is currently undergoing upgrade to meet environmental regulatory standards. The U.S. Army has two APE 2210 incinerators, which are a variation of the APE 1236, located at Hawthorne Army Ammunition Plant, Nevada. One of these incinerators is in the current APE upgrade program. There are 18 APE 1236 incinerators located at various U.S. Army installations. Twelve of these incinerators are in the current APE upgrade program, of which one is a prototype not used for routine demilitarization operations. In addition, Pine Bluff Arsenal has an incinerator with the same basic design as the APE 1236. This unit has been upgraded independently of the APE 1236 upgrade program.

(2) Explosive Waste Incinerator (EWI). The EWI is also a modified APE 1236 which has a different feed system to accommodate bulk (unconfined) energetic materials (up to 5 pounds per serve for a total of 300 pounds per hour) and air pollution abatement equipment similar to the APE 1236. The U.S Army has 7 of these units at Iowa, Kansas, Lake City, Mississippi, Radford (two units) Army Ammunition Plants, and Savanna Army Depot Activity. All of these units, except for the one at Savanna Army Depot Activity, are currently operational and permitted. Although not APE-designated units, three of these units were included in the current APE upgrade program (Iowa, Kansas and Lake City Army Ammunition Plants).

(3) Fluidized Bed Incinerator (FBI). The FBI uses air to entrain solids in a highly turbulent combustion chamber. This equipment is not used for incineration of explosive materials but has been used for incineration of riot control agents and non-explosive munition fillers. The U.S. Army has one of these units at Pine Bluff Arsenal, Arkansas, which is RCRA permitted, and is operational.

(4) Electrochemical Reduction. Electrochemical reduction is a treatment process based on the chemical reaction caused by an electric current that converts energetic materials to less reactive materials, inert and/or other useful products. This process is only applicable to a few, very select, munition fillers. Efforts to date utilizing this technology for the select munition fillers have achieved limited success.

(5) Chemical Conversion. Currently the U.S. Army is disposing of sulfur trioxide-chlorosulfonic acid solution (FS), a bulk smoke producing mixture, by chemical neutralization. This process involves combining FS with a lime slurry in a 4 million gallon vat. The chemically neutralized product is then discharged to the sanitary sewer system.

(6) Western Area Demilitarization Facility (WADF). The WADF, located at Hawthorne Army Ammunition Plant, is a unique facility that was designed and built by the U.S. Navy specifically for the demilitarization of military ammunition and ordnance items. The U.S. Army assumed management of WADF in April 1984. The facility was originally designed to operate on a 3-shift, 8 hours-per-shift, 5 days-per-week basis for each of the operational components. Due to certain subsequently identified safety and/or interface problems, the facility is currently undergoing modifications so that it can be safely operated. However, specific individual components of this facility can and have been used. A recent review of the SDPDA inventory at Hawthorne Army Ammunition Plant indicated the tonnage in that account was slowly increasing. To provide an option to alleviate the associated storage problem, a proposed six-year workload program was developed that identified all items that could be demilitarized in WADF components assuming a determination was made to actually demilitarize these assets. During this review certain items were identified that WADF was not designed to process.

(7) Environmental Permitting Status. RCRA permits have been granted for the EWIs located at Iowa, Kansas, Lake City, Mississippi, and Radford (two EWIs) Army Ammunition Plants. EWIs at Iowa, Kansas, and Lake City Army Ammunition Plants are currently being operated under the RCRA 720-hour shakedown provision. A final RCRA permit for reactive hazardous waste only has been issued for the deactivation incinerator at Iowa Army Ammunition Plant. Also, a final RCRA permit has been issued for the fluidized bed incinerator and rotary kiln deactivation furnace at Pine Bluff Arsenal. RCRA Part B permit applications have been prepared for ten APE 1236 incinerators located at the following nine installations: Anniston, Lexington-Blue Grass, Red River, Seneca, Sierra, Tooele (two APE 1236s) Army Depots; McAlester Army Ammunition Plant; Hawthorne Army Ammunition Plant; and Crane Army Ammunition Activity. With the exception of Hawthorne Army Ammunition Plant, all of these installations submitted RCRA Part B permit applications prior to February. 1991. The application for Hawthorne Army Ammunition Plant will be submitted upon completion of additional hardware modifications and engineering drawings. The first of the trial burn tests was scheduled to be conducted at Lake City in late February 1991; followed by Iowa in April 1991; Kansas, Anniston, and Tooele will follow.

c. Hazardous Waste Minimization (HAZMIN) Program.

(1) The U.S. Navy is investigating ways to develop and demonstrate a technology to recover scrap propellant generated during manufacturing operations. The recovery will include propellant process modifications and equipment to cut and consolidate the scrap. The intent of this program is to eventually return scrap propellant to the supplier for rework into raw product.

(2) In order to identify areas where reductions in the generation of energetic material wastes can be made, the U.S. Army is conducting HAZMIN audits at its production plants and also those involved in loading, assembling, and packing munition items. These audits focus on all hazardous waste streams including PEP materials. Technical recommendations for completed audits are under review for implementation determination.

(3) DOD and the Military Services mandate that HAZMIN considerations be included in all acquisition plans and modernization programs.

(4) The Military Services require each of their installations to prepare HAZMIN plans. They each have an overall goal of 50 percent reduction of the 1985 hazardous waste generation volume by 1992. HAZMIN plans have to include all hazardous waste generation streams, specifically including those involving energetic materials. The Military Services recognize HAZMIN as a vital part of environmental compliance and therefore have mandated reduction in hazardous waste generation at all of their installations.

d. Recycle Program. The first option considered and one of the main methods for disposal of military ammunition and ordnance and/or components of munition items is recycling. The U.S. Army is currently operating a White Phosphorus (WP) Conversion Plant at Crane Army Ammunition Activity. This plant is used to convert the WP contained in munitions to phosphoric acid which is then sold to commercial industries for manufacture of fertilizer. This program is very successful and has resulted in nearly all of these munitions being demilitarized. Approximately one more year will be required to demilitarize the remaining inventory.

e. Foreign Military Sales Program. The Single Manager further reduces the inventory of munition items in the SDPDA by making such items available to North Atlantic Treaty Organization member countries and other

countries that are allied to the United States. This program is used at every opportunity.

4. Ongoing R&D Programs to Supplement and/or Replace OB/OD Technologies.

a. The U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). The Technical Support Division of USATHAMA is investigating the use of waste energetic materials as a supplement to fuel oils. The two primary explosives under study are TNT and cyclotrimethylene-trinitramine (RDX). Laboratory and bench scale tests have verified the principle as a workable alternative. Pilot-scale testing is underway to develop fuel mixing/feeding procedures and to determine fuel mixture energy parameters. Not only will this provide for the recycle/reuse of these materials but will also use the energy stored in these explosives as a supplemental fuel. Information to date indicates that the use of waste explosives as supplements to fuel for boiler plants appears to be a viable means of utilizing waste energetic materials. Before this technology can be fielded, explosive safety considerations, due to the location of boilers in administrative office areas, will have to be overcome and may prove to be a limiting factor. Boilers are generally located as close to the point of energy/heat use to avoid loss of heat. This proximity factor, while beneficial from an energy conservation perspective, presents some counteracting safety concerns with the use of explosives near populated areas. Additionally, explosive materials will have to be separated from munition items, and due to the small quantities of explosives that can be used as supplemental fuels, only a small percentage of material that is typically demilitarized could be disposed of in this manner. Overall safety and risk considerations will make it difficult to field this technology.

b. The U.S. Army Defense Ammunition Center and School (USADACS) Alternative Technologies Study. USADACS, located at Savanna Army Depot Activity, Illinois, has recently completed a literature research study on alternative technologies. This study summarizes and documents past, present, and potential technologies which are divided into 11 main technology families depending on munition and type of energetic material utilized. Promising technologies are and will be included in future R&D programs with an emphasis placed upon safety features. Some of these include the following:

(1) Cryofracture. This process is under development with an emphasis towards developing a technology

for the demilitarization of lethal toxic chemical agent munitions. However, the technology may have application for conventional ammunition demilitarization too. In the process liquid nitrogen is used to embrittle the munition casing which then enables it to be fractured in a 1,000-ton press. This technology may prove to be a rapid, safe method to reduce the size and expose explosive filler material contained in munition items. The fractured parts of the munition/explosive can then be incinerated if they are small enough.

(2) Water Jet Abrasive Cutting. This is a method under development for disassembly of munitions. A high pressure water jet with entrained abrasive is used in the process. This method would generate explosive-contaminated water. There is also a safety consideration that has to be resolved involving the undefined effects of high pressure water combined with abrasive material impinging on explosive materials.

(3) High Pressure Washout. This process uses a stream or jet of high pressure water, up to 55,000 pounds per square inch, to separate energetic materals from munition cases. This technology is under development and may prove to be useful for press-loaded munitions that have internal plumbing which renders existing washout methods ineffective. This system will also generate explosive-contaminated waste water. There are also some safety concerns involving the impact of a high pressure water jet on energetic materials.

(4) Solvent Washout. This is a process that uses a liquid to dissolve energetic materials loaded in munitions. Several liquids have been demonstrated to achieve the desired separation. However, most of the liquids investigated that can solvate explosives tend to have unwanted properties such as carcinogenicity, toxicity, or flammability. They also have inherent disposal problems.

(5) Super- and Sub-Critical Extraction. This is a developmental method to separate energetic materials from munition casings. The process uses a material that is a gas at atmospheric pressure but converts to a liquid under pressure. In the liquid phase, the material can be used to dissolve energetic materials. When the liquid becomes saturated, the pressure is reduced which in turn causes the liquid to revert back to a gas causing the dissolved energetic material to precipitate out. Ideally, the system would be a closed-loop system so that the gas could be collected and reused and the precipitated energetic material reclaimed or destroyed as appropriate.

(6) Biodegradation. This process uses microorganisms or fungus to consume energetic materials and thus produce a less hazardous or inert material. The method is under development for use in disposing of red and pink water produced during the manufacture of explosives. The method may also be useful for the treatment of waste water generated from other demilitarization operations. Field tests are currently underway using this technology for the remediation of explosives-contaminated soils.

c. The U.S. Army Armament, Munitions and Chemical Command (AMCCOM) OB/OD Emissions and Residues Characterization Study.

(1) Until recently, very little field/experimental data existed for emissions and residues generated during OB/OD operations. Up to this time, emissions data were based on theoretical calculations derived from computer models. Due to lack of currently fieldable alternatives to OB/OD other than those currently in use by DOD, a demonstration of OB/OD's environmental acceptability would warrant its continued use. The AMCCOM OB/OD program is being used to demonstrate which PEPs can be treated by OB/OD in an environmentally safe manner. The program methodology is supported by Headquarters, EPA, Office of Solid Waste, and EPA Region VIII as necessary information for Subpart X reviews. The EPA has been actively involved throughout the development and implementation of this program. AMCCOM OB/OD program data demonstrate environmental acceptability of OB/OD for various PEPs and these data have been presented in a series of EPA seminars held throughout the United States during 1990. Based on reviews and analyses made to date, results from this program have not supported the conclusion made by Region IV that hazardous materials are released to the environment by OB/OD operations for tested energetic materials.

(2) A combination of the AMCCOM OB/OD program sampling and theoretical emissions data along with dispersion/deposition and fate analysis modeling data are intended to be used to demonstrate environmental acceptability by PEP family. The study will provide individual pollutant release characterizations for applicable PEPs. For air pollutants, ground-level off-property concentrations must not exceed National Ambient Air Quality Standards (NAAQS) and other applicable state ambient concentration standards. Some states utilize fractions of threshold limit values (TLV) as acceptability

criteria for the pollutants not regulated be NAAQS - such as TLV/100 and TLV/1000 for acceptable one-hour average and annual average concentrations, respectively. Additional concentration acceptability guidance is expected with the promulgation of implementing regulations for the 1990 Clean Air Act Amendments.

(3) Among the materials tested by OD were TNT, Composition B, Explosive D, and RDX. The OB test included single, double, and triple based propellants. The manufacturing residues included in the OB tests consisted of various double based and composite rocket and missile motor propellants.

(4) Air and soil samples were collected and analyzed for target analytes in all pollutant categories. Treatment efficiencies are also being calculated by determining residual material left after the combustion and/or detonation. Groundwater studies have been completed by the U.S. Army Environmental Hygiene Agency and USATHAMA, and have been presented to the EPA's Office of Solid Waste.

(5) Testing has been completed and the final report is being written. Data indicate that approximately 98 percent of emissions from detonation and 99 percent from burning go to carbon dioxide and water. The large hot fireballs (6,000 to 8,000 degrees Fahrenheit) generated during OD of high explosive munitions effectively destroy waste constituents considered hazardous by EPA. Analyses of the data indicate that emissions from OB/OD generally fall well within Federal and state environmental guidelines and standards.

(6) Future plans for the OD emissions/residues test program involve underground detonations of energetic materials suitable for OB/OD that are currently in the SDPDA and the development of an atmospheric dispersion model for these types of operations.

(7) The OB/OD characterization study has yielded data from which emission factors have been calculated for products of combustion for tested materials. This data base will be of value in conducting health risk assessments required under the provisions of RCRA Subpart X.

d. The U.S. Army Research, Development and Engineering Center (ARDEC). Currently, demilitarization of munitions is funded with Operational and Maintenance, Army, (OMA) type funds. Because this is also the type of funding used for

personnel salaries there has often been a tendency for shortfalls to occur in supporting the demilitarization program including its R&D efforts. Starting in fiscal year (FY) 1992 (1 October through 30 September), the demilitarization program will be funded with Procurement Ammunitions, Army, (PAA) funds. By law, new technology cannot be developed using PAA funds, therefore, the technology development portion of the demilitarization program is being transferred to ARDEC and will be funded with Research, Development, Testing and Engineering (RDT&E) funds. This administrative change is designed to resolve the problem of past insufficient funding levels for the demilitarization program and allow for the development of further alternatives to OB/OD. Initial projected funding levels are $83 thousand for FY91 and $1 million per year for FYs 92 through 97.

e. The U.S. Army Production Base Modernization Activity (PBMA). In order to identify alternative technologies, other than OB/OD, for treating propellant and explosive production wastes, PBMA has completed a technological review of available commercial incinerator technologies for military adaptation. Concept designs have been investigated which include material feed systems, burner parameters, and pollution control equipment. A project has been submitted for funding to develop a pilot unit to demonstrate adaptable technologies.

f. Other Military Service Programs. The U.S. Navy is developing an incinerator to destroy munitions that contain colored smoke and flare compositions. Along with development of the incinerator, the program includes the development of real time emission gas monitoring systems for polynuclear aromatic hydrocarbon (PAH) compounds and trace metals. Problems may be encountered in separating the smoke and flare materials from the munitions. The U.S. Air Force has developed a process to reclaim ammonium perchlorate from Class 1.3 (will vigorously burn with potential to detonate) solid rocket motors. The reclaimed material is being characterized for reuse. Technologies for the disposal of Class 1.1 (unconfined it may detonate) propellants which contain nitroglycerine, HMX, nitrocellulose, and ammonium perchlorate are also being developed. In order to remove the propellant from the motor casing,
a process utilizing cryogenic washout is under devlopment. Other technologies being developed at the bench scale include biodegradation, hydrothermal reduction, and supercritical water oxidation.

g. Inter-Service Programs.

(1) The Joint Ordnance Commanders Group (JOCG). The Munitions Demilitarization and Disposal Subgroup of

the JOCG is conducting an R&D program for the demilitarization of large rocket and missile motors. This organization conducted a survey of technology development efforts within governmental organizations, industry, and academia. Identified existing and emerging demilitarization technologies have been narrowed down to four potentially feasible R&D projects. The overall program addresses both near-term disposal of Hazard Class 1.3 propellants and long-term demilitarization of Hazard Class 1.1 propellants and explosives. Three emerging technologies have been selected to remove 1.1 energetic materials from motor cases.

(2) Large Rocket/Missile Motor (LRM) Demilitarization Program. By 1996, there will be over 83.9 million pounds of LRM solid propellant that will need to be demilitarized as a result of managing the Intercontinental Ballistic Missile's (ICBMs) normal life cycle support program and the proposed disarmament treaties. Long-term storage of these items is expensive, but more importantly, will pose an explosive safety hazard. A Joint Service LRM ad hoc working group has been organized and has already conducted a disposal technology review. Several technologies that could apply to LRM demilitarization have been identified. These technologies which include biological treatment methods, high pressure washout of energetic materiels, critical fluid extraction, incineration, super-critical fluid oxidation, and biodegradation are in various stages of development. In addition, the technologies that are available in associated industries are also being reviewed and studied for their status and applicability.

(3) Joint Army-Navy-National Aeronautics and Space Administration-Air Force (JANNAF) Inter-Agency Committee. The Safety and Environmental Protection Subcommittee of JANNAF is addressing technologies for ordnance demilitarization and disposal or reclamation of PEPs. The Subcommittee conducts workshops which provide a forum for Government, scientific, and industry representatives to meet, exchange technology, and related information.

(4) Ordnance Executive Environmental Steering Committee. The purpose of the Ordnance Executive Environmental Steering Committee which was formed on 25 January 1991 is to develop a DOD unified position on ordnance-related environmental and safety issues; analyze new legislation and regulations and provide guidance to the Military Services; improve the identification of

funding and support those requirements; exchange information and foster R&D; and develop a Demilitarization Management Plan. The Committee's mission is to focus high-level attention on these issues and ensure that the total effort is pulled together and directed toward accomplishment of common goals and objectives. The members of the Committee are Secretariat level civilian personnel, General Officers of each of the Military Services and a JANNAF representative.

5. Demilitarization Equipment Upgrade Programs.

a. The U.S. Army is implementing a program to upgrade twelve APE 1236 incinerators (Anniston, Letterkenny, Lexington-Blue Grass, Red River, Seneca, Sierra, Tooele (two APE 1236s) Army Depot, Savanna Army Depot Activity, McAlester Army Ammunition Plant, Crane Army Ammunition Activity, and Fort Richardson), three EWIs (Iowa, Kansas, and Lake City Army Ammunition Plants) and one APE 2210 incinerator (Hawthorne Army Ammunition Plant) which are used to demilitarize ammunition items containing up to 600 grains of confined explosives and bulk explosive wastes. The second APE 1236 incinerator located at Tooele Army Depot is used to develop ammunition feed rates, to perform test burn projects, and to provide operator certification training. The APE upgrade program includes modifying the feed system to accommodate a computerized automatic waste feed cutoff, installing a high temperature afterburner, gas coolers, a shroud to trap fugitive emissions, and other air pollution control equipment. This equipment is limited to small items and has a history of requiring complicated modifications to meet emission requirements. The ability of the existing design to meet environmental emissions standards has yet to be proven.

b. The APE upgrade program began in 1987 and will continue into at least 1992. As of December 1990 the following progress has been made:

(1) All upgrade hardware has been designed and procured. Shipment has been made to 14 of the 15 installations.

(2) Major hardware installation has occurred at 9 incinerators.

(3) Some late hardware modifications were made after the initial nine upgrade contracts were awarded; some were accomplished through contract vehicles, while others were accomplished by the U.S. Army APE technical teams. Modifications at three incinerators have been

completed; three require attention from the APE teams; and the final three require some further contract modification work.

(4) Upgrade specifications for the last seven incinerators are being prepared. Of these, contract awards for Lexington-Blue Grass Army Depot and McAlester Army Ammunition Plant are projected for July 1991. The remaining five awards will follow over a 6-month period. These newer specifications will incorporate the features that required modifications to the first nine incinerators.

6. Policy. DOD and the Military Services have existing policies and regulations which mandate all OB/OD facilities to be in full compliance with all applicable Federal, state, and local environmental regulations. Policies outline the types of OB/OD operations that require compliance with RCRA hazardous waste management requirements as well as define the point at which energetic materials become hazardous wastes. Regulations define general facility standards and operational procedures for operators of OB/OD facilities to follow to ensure compliance.

7. Subpart X Permit Application Support Program.

a. USATHAMA, as the Executive Agent for the Army Environmental Office for Army Subpart X permitting issues, has established and funded contracts to extend DOD's capabilities in the following areas:

(1) Develop an Army Position Paper on Subpart X permitting.

(2) Develop an Army Management Plan for Subpart X permitting.

(3) Develop an Army-wide Subpart X Status Report.

(4) Resolve NODs received for Subpart X permit applications.

(5) Establish an automated waste ammunition characterization data base.

b. The issues being addressed in the Army Position Paper fall into the two broad functional areas of health and environmental assessments and environmental performance standards. In the first functional area, topics under study include environmental monitoring to characterize the current migration status of any past releases;

ground water; surface water and soil assessments; health and environmental criteria; waste ammunition characterization specifications; and air quality assessments. In the second functional area, topics under study include unit location requirements; selection of appropriate treatment technology; design and construction requirements; operational inspection and maintenance requirements; effectiveness of treatment; waste characterization plans; air monitoring plans; environmental monitoring plans; modeling the fate of releases to the environment; noise considerations, and closure plans. The objective of this effort is to provide additional environmental guidance to each of the Military Services for the conduct and monitoring of OB/OD operations; and to ensure that OB/OD operations are conducted in an environmentally acceptable and regulatory conforming manner.

8. Safety Considerations. Safety has in the past and continues to play a prominent role in DOD decisions to perform OB/OD operations. In addition to emergency EOD operations, which have already been discussed, the following safety factors are considered for continuing OB/OD operations:

a. To preclude spontaneous combustion, demilitarization personnel are required to OB in a short period of time unserviceable artillery propellant with low or no stabilizer remaining. Similarly, to prevent accidental detonation, any munition that is declared too dangerous to remove from its packaging, (i.e., 20 millimeter U.S. Naval rounds with copper azide formulation) must be disposed of through OD.

b. Amnesty and routine turn-ins of ammunition and explosives result in the generation of items that may be unserviceable, tampered with, or have unidentifiable lot or nomenclature identifications. Installations that are regulatorily denied the ability to conduct OB/OD operations will be required to package and transport these items over public highways, thus, potentially exposing the general public to unnecessary hazards.

9. Regulated Treatment or Disposal Units Located Within Impact Ranges. This section of the response addresses the EPA Region IV statement that "Regulated treatment or disposal units located within impact ranges will not be permitted due to the inability to adequately monitor soil or ground water safely or accurately." There are several issues raised by this statement of position:

a. Surface soils can be tested for residual TNT, RDX, and heavy metals. Based on test results, the extent of any further evaluation can be better determined. Some subsurface soil investigation along with leaching studies in lieu of ground water monitoring may be warranted. Such testing was recently conducted at Camp Shelby, Mississippi (11 December 1990).

b. Ground water monitoring is not specifically required for Subpart X regulated units and may not be necessary based on the results of previous soil testing and due to the nature of the predominant activity, (i.e., live fire training) on the range.

c. The EPA Region IV position seems to assume that an assessment has been made and that in all cases, OB/OD of energetic reactive wastes has an impact on ground water. The regulation is quite clear that permits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment, including but not limited to, appropriate design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of hazardous waste or hazardous constituents from the unit. The preamble to Subpart X, 52 Federal Register 46946, at 46955, states that an assessment must be conducted for each medium. However, if the assessment shows that no impact on a given medium is expected, the permit need not specify conditions to protect that medium.

d. Section 264.601 sets out nine factors to be considered in the assessment of the impact on ground water or the subsurface environment. Applying these factors to OB/OD operations in impact areas should demonstrate that no impact on ground water and subsurface areas is expected.

(1) The first factor, 40 CFR 264.601(a)(1), includes the volume, concentration, and physical and chemical characteristics of the waste placed in the unit. The volume and concentration determine the maximum amount and concentration that may conceivably enter the ground water. This is an important factor in assessing OB/OD activity, since the volume and concentration of waste involved in OB/OD activities is minuscule compared to the volume and concentration of the same contaminants generated by the impact range activity. Requiring OB/OD to be conducted off range results in large expenditures and the possible contamination of a heretofore uncontaminated site, a result at odds with the purpose of protecting human health and the environment.

(2) The third factor, 40 CFR 264(a)(3), the existing quality of ground water, including other sources of contamination and their cumulative impact on ground water, more directly applies to the OB/OD activity in ranges. Even without testing, logic dictates that whatever effect, if any, OB/OD activity might have on the ground water, the range activity generates the very same contaminants in far greater volume in a much less controlled (from the regulations point of view, uncontrolled) environment. The preamble (page 46956) states this factor is useful in predicting the incremental risk of the new unit. If no measurable increment of risk present due to the existence of another source of contamination is expected, then the assessment would show that the OB/OD activity in the range would have negligible impact on ground water quality.

(3) The sixth factor focuses on land use patterns. Given the relative permanence of military impact ranges and their unsuitability for any other uses (except OB/OD activity) the land use factor should point favorably to continued OB/OD activity in ranges without requiring ground water monitoring.

(4) The other factors dealing with geohydrology and land use are negligible when OB/OD operations minor incremental contamination is considered.

e. Other Issues.

(1) EPA Region IV's position indicates it has a view which appears to be different from EPA Headquarters concerning the scope of regulation for DOD OB/OD activities. Army Regulation (AR) 200-1, paragraph 6-7 establishes policies for the application of hazardous waste management requirements contained in Title 40 Code of Federal Regulations (CFR) Parts 260 through 271 to the demilitarization of conventional military munitions, including training activities. These policies were staffed with EPA without objection. These policies were promulgated to subject OB/OD activity to RCRA regulation in only very narrow circumstances and with the recognition that the military is the expert authority on the arsenal. This was done by very narrowly defining when ordnance is categorized as waste. These narrow definitions are only understandable when coupled with an understanding of the unique characteristics of ordnance. For example, paragraph 6-7b(2) of AR 200-1 states that unserviceable ordnance is not waste if it is safe to handle and store and is accounted for and stored together with munitions or ordnance in the field service account. Similarly, paragraph 6-7b(3) defines

waste by the degree of management and control procedures exercised. Paragraph 6-7f declares that assignment of munitions and ordnance to the SDPDA or their classification as unserviceable are not designations of such items as waste. Paragraph 6-7d gives examples of actions which designate ordnance as waste, including disposal by transfer to a commercial recycler, disposal of residues from OD or other thermal treatment, disposal of items resulting from treatment by any method that has the effect of transforming the treated item into a non-munition or non-ordnance item that is no longer subject to management and control.

(2) When ordnance is collected and handled at the installation EOD site, it is the DOD's position that ordnance becomes waste upon the assignment of intent to dispose or destroy. This further demonstrates that the impact of regulated OB/OD activity upon the environment is negligible and the strict regulation requirements are not appropriate for units located within impact ranges.

10. Conclusions.

a. The DOD currently considers it of the utmost importance for those installations that have submitted Subpart X permit applications in Region IV to continue to have and maintain OB/OD operational capability. The DOD will work with EPA Region IV to provide necessary data and information to support the permitting of OB/OD units.

b. The Single Manager for Conventional Ammunition Demilitarization is developing an overall Demilitarization/Disposal Management Plan that considers safety to be paramount relative to environmental, cost, and energy factors. The plan will include numerous options such as separation, disassembly, destruction, HAZMIN, recycling, sales, and R&D. OB/OD are only two of several thermal treatment destruction processes, albeit important processes, that are used to demilitarize military ammunition and ordnance.

c. Because the DOD inventory covers a large range of energetic materials and munitions, different alternative treatment methods need to be developed, scaled up, evaluated for overall risk, and permitted. While some alternatives have progressed past the conceptual or laboratory scale, most are still years away from showing a significant impact. R&D efforts are ongoing to field test disassembly equipment to reduce the size of ordnance items. This will allow safe alternative demilitarization options to be applied in addition to OB/OD. DOD has

ongoing R&D and upgrade programs to implement alternative technologies to OB/OD. None of these concepts are mature enough to entirely replace OB/OD or to evaluate their full impact upon human health and the environment.

d. As new technologies become available, a best available control technology analysis will be conducted when required by EPA on a munition-by- munition and PEP case-by-case basis to determine whether OB/OD or some other alternative disposal process should be applied to the evaluated munition and PEP.

e. In regards to the issue of impact ranges, where contamination to specific media, (e.g., ground water and soils) is determined to be related to regulated OB/OD operations during the required assessments, environmental monitoring for that media is an appropriate permit requirement. Where no measurable contamination or no causal relationship can be made between media contamination and OB/OD operations, media monitoring is not an appropriate permit requirement. Media monitoring at or around impact ranges is not an appropriate permit requirement for the purpose of detecting expected negligible levels of contamination resulting from OB/OD operations in those ranges.

List of Installations

Navy

Naval Air Station, Key West, Florida
Naval Submarine Base, Kings Bay, Georgia
Naval Weapons Station, Charleston, South Carolina
Marine Corps Air Station, Beaufort, South Carolina
Marine Corps Air Station, Cherry Point, North Carolina
Marine Corps Base, Camp Lejeune, North Carolina

Army

Anniston Army Depot, Anniston, Alabama
Camp Shelby, Mississippi
Holston Army Ammunition Plant, Kingsport, Tennessee
Lexington-Blue Grass Army Depot, Lexington, Kentucky
Milan Army Ammunition Plant, Milan, Tennessee
Redstone Arsenal, Redstone, Alabama
Volunteer Army Ammunition Plant, Chattanooga, Tennessee
Fort Benning, Fort Benning, Georgia
Fort Bragg, Fort Bragg, North Carolina
Fort Campbell, Fort Campbell, Kentucky
Fort Gordon, Fort Gordon, Georgia
Fort Jackson, Fort Jackson, South Carolina
Fort Knox, Fort Knox, Kentucky
Fort McClellan, Fort McClellan, Alabama
Fort Rucker, Fort Rucker, Alabama
Fort Stewart, Fort Stewart, Georgia

Air Force

Arnold Air Force Base, Tennessee
Eglin Air Force Base, Florida
Cape Canaveral Air Force Base, Florida
Homestead Air Force Base, Florida
MacDill Air Force Base, Florida
Moody Air Force Base, Georgia
Myrtle Beach Air Force Base, South Carolina
Seymour Johnson Air Force Base, North Carolina
Shaw Air Force Base, South Carolina
Tyndall Air Force Base, Florida

APPENDIX C-7

THERMOCHEMICAL CHARACTERISTICS OF EXPLOSIVES

Appendix C-7
Thermochemical Characteristics of Explosives

Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Material	Heat of Combustion, Calories Per Gram at Constant Pressure	Heat of Formation, Kilogram Calories Per Mole	Products of Combustion	
			Heat, Calories Per Gram (water) Gas	Gas, Milliliters Per Gram
Primary Explosives				
Lead azide	--	-112 to -126.3	367	308
Mercury fulminate	938	-221 to -226	427	315
Diazodinitrophenol	--	956	820	
Lead Styphnate	1,251	92.3	460	440
Tetracene	--	270	658	1,190
Aliphatic nitrate esters				
BTN	2,167	368	1,458	--
DEGN	2,792	-99.4	1,161	--
Nitrocellulose: Pyroxlyn (12% N)	--	-216	1,020	--
Nitrocellulose: Guncotton (13.35% N)	2,313	-200	1,020	883.2
Nitrocellulose: High nitrogen (14.14% N)	--	-191	1,810	--
Nitroglycerin	1,603	-90.8	1,486	715
PETN	1,957	-128.7	1,510	790
TEGN	3,428	-603.7	750	--
TMETN	2,642	-422	--	--
Nitramines				
HMX	2,231 to 2,253	11.3 to 17.93	1,480	--
RDX	2,259 to 2,284	14.71	1,480	908
EDDN	2,013	156.1	128 to 159	--
Haleite	2,477	20.11	1,276	908
Nitroguanidine	2,021	20.29	880	1,077
Tetryl	2,914	4.67 to 7.6	1,450	760
Nitroaromatics				
Ammonium picrate	2,745	95.82	800	--
DATB	--	-97.1 to -119	910	--
HNAB	--	-58 to -67.9	1,420	--
HNS	3,451	-13.9 to 1.87	1,360	--
TATB	2,850	-33.46 to -36.85	1,018	--
TNT	3,563 to 3,598	-10 to -19.99	1,290	730
Ammonium nitrate	--	88.6	381	980

Note: -- no data.

APPENDIX C-8

WASTE ANALYSIS PLAN FOR
RADIOACTIVE POTASSIUM CHROMATE SOLUTION

1. WASTE GENERATION. Potassium Chromate (K_2CrO_4) solution is generated while performing work on, or in support of, ships' tanks. The concentration of potassium chromate in solutions in service is maintained less than 3,000 parts per million (ppm). The potassium chromate solution is controlled as mixed radioactive and hazardous waste because it is a waste which contains radioacivity subject to Naval Nuclear Propulsion Program requirements and the concentration of chromium in the waste is greater than 5.0 ppm. The waste contains hexavalent chromium at concentrations of less than 800 ppm. Analysis of the potassium chromate solution results in small volumes of analytical waste which may have pH<2.

2. WASTE ANALYSIS. The concentration of chromium in the waste is based on process knowledge and laboratory testing. The concentration of potassium chromate is monitored and maintained as part of the water chemistry control of shipboard systems. The concentration of potassium chromate is typically maintained between 1,000 ppm and 2,000 ppm, and will not exceed 3,000 ppm. This is equivalent to a chromium concentration of less than 800 ppm.

3. WASTE DESIGNATOR. The test waste designates as characteristic toxic for chromium. The EPA hazardous waste number is D007. Analytical wastes also have an EPA hazardous waste number of D002.

4. FREQUENCY OF RE-EVALUATION. This waste stream will be re-evaluated when the process changes or regulatory requirements change. This plan will be reviewed annually to ensure it is still accurate and complete.

5. LAND DISPOSAL RESTRICTIONS (LDR). This waste, as generated, is prohibited from land disposal as specified in GRR 391-3-11-16 and 40 CFR Part 268. This waste meets the definition of a wastewater per 40 CFR Part 268.2. There is no applicable treatment technology specified under 40 CFR Part 268.42, Table 2. The waste would therefore require treatment to meet concentration limits under 40 CFR Part 268.43, Table CCW. The Environmental Protection Agency acts jointly with Georgia Department of Natural Resources in enforcing land disposal restrictions and the Best Demonstrated Available Technology (BDAT) rules in Georgia.

6. TREATMENT BY GENERATOR. Treatment by generator will consist of neutralization followed by cement based stabilization. Treatment will be performed in a less than 90 day accumulation area. The potassium chromate solution will be solidified together

with other radioactive liquid to meet the disposal site acceptance criteria prohibiting the disposal of wastes containing free liquids. Solidification of this liquid is a standard process throughout the Naval Nuclear Propulsion Program for disposal of low level radioactive liquids that are unsuitable for reprocessing for reuse.

The treatment process utilizes the paddle drum and cement silicate method to solidify liquids. For analytical wastes only, the pH of the liquid is adjusted by adding sodium hydroxide to achieve a neutral or basic pH between 7 and 11. Potassium chromate solutions and analytical wastes are added as makeup water to other radioactive liquid waste. The pH of the liquid is adjusted to a neutral or basic pH. Ferrous sulfate ($FeSO_4$) and hydrated lime ($Ca(OH)_2$) are added to reduce the chromium from hexavalent to trivalent and precipitate the chromium as an hydroxide. The liquid is added to cement in the paddle drum and mixed to obtain a homogenous mixture. The paddle drum is the primary accumulation container. Sodium silicate is added to harden the mixture quickly. The cement is allowed to set for a minimum of 24 hours while venting through a HEPA filter to dissipate minimal heat given off during the curing process. The drum is inspected for the presence of free standing liquid and the hardness of the cement. The drum is shipped for burial as low level radioactive waste.

7. ANALYSIS OF REPRESENTATIVE SAMPLES. The paddle and drum silicate process requires 35 gallons of liquid waste for solidification. Only small amounts of potassium chromate are expected to be generated and require solidification. This waste stream will be combined with other radioactive liquids requiring solidification in order to minimize accumulation times and radioactive waste volumes. The following waste analysis assumes the worst case of solidifying a drum of potassium chromate solution waste only in order to verify that all lower percentage mixtures would be non-hazardous after solidification.

8. SAMPLE FABRICATION AND ANALYSIS.

a. A bench scale test of solidification of potassium chromate was performed by Trident Refit Facility, Bangor. Samples of the solidified potassium chromate solution were analyzed for the EPA Toxicity Characteristic Leaching Potential (TCLP) for chromium per 40 CFR Part 261.24 (b) and consistent within GRR 391-3-11-.07.

b. TCLP analyses were performed for chromium leachability on bench scale samples of solidified potassium chromate by Trident Refit Facility, Bangor. Puget Sound Naval Shipyard Environmental Laboratory independently analyzed the samples. The shipyard laboratory operates under a Quality Assurance Program accredited by the American Association of Laboratory Accreditors for environmental parameters. The TCLP leachate concentrations of chromium for all samples of the solidified solution were less than 5 mg/L.

c. The bench scale samples, free from radioactivity, were fabricated based on process knowledge of the expected waste. The samples represent the worst case, as they were made with the maximum potassium chromate concentration (3000 ppm). The actual waste typically has a lower concentration of potassium chromate (1000 ppm to 2000 ppm). Sampling the actual waste is avoided to preclude additional radioactive material handling and additional personnel exposure to radiation.

9. LDR DETERMINATION. GRR 391-3-11-.16 prohibits land disposal of this waste unless the concentration based on treatment standard is met prior to land disposal (under 40 CFR Part 268.42). The process of solidification of the potassium chromate solution waste constitutes treatment. This treatment converts the waste into a non-hazardous waste (nonwastewater TCLP extract is less than 5.0 ppm) as required.

WASTE ANALYSIS PLAN FOR
RADIOACTIVE MERCURIC NITRATE SOLUTION

1. WASTE GENERATION. Mercuric nitrate ($Hg(NO_3)_2$) solution is generated during the analysis of radioactive liquid samples for chlorides. The test determines chloride concentration by titration of the sample with a mercuric nitrate standard. Hydrogen peroxide and nitric acid are added to the sample prior to titration. When the analysis is completed, the mercuric nitrate solution is controlled as mixed radioactive and hazardous waste because it is a waste which contains radioacivity subject to Naval Nuclear Propulsion Program requirements and the concentration of mercury in the waste is greater than 0.2 parts per million (ppm). The waste has mercury as Hg^{+2} at concentrations of less than 25 ppm and a pH of about 3.0.

2. WASTE ANALYSIS. The concentration of mercury in the waste is based on process knowledge. The laboratory procedure for the test specifies the amount of reagents used. Each analysis generates about 110 ml of waste, to which less than 1.0 ml 0.028 N $Hg(NO_3)_2$ has been added. This is equivalent to a mercury concentration in the waste of less than 25 ppm.

3. WASTE DESIGNATOR. The waste designates as characteristic toxic for mercury. The EPA hazardous waste number is D009.

4. FREQUENCY OF RE-EVALUATION. This waste stream will be re-evaluated when the process changes or regulatory requirements change. This plan will be reviewed annually to ensure it is still accurate and complete.

5. LAND DISPOSAL RESTRICTIONS (LDR). This waste, as generated, is prohibited from land disposal as specified in GRR 391-3-11-.16 and 40 CFR Part 268. This waste meets the definition of a wastewater per 40 CFR Part 268.2. There is no applicable treatment technology specified under 40 CFR Part 268.42, Table 2. The waste would therefore require treatment to meet concentration limits under 40 CFR Part 268.43, Table CCW. The Environmental Protection Agency acts jointly with Georgia Department of Natural Resources in enforcing land disposal restrictions and the Best Demonstrated Available Technology (BDAT) rules in Georgia.

6. TREATMENT BY GENERATOR. Treatment by generator will consist of cement based stabilization. Treatment will be performed in a less than 90 day accumulation area. The mercuric nitrate solution will be solidified together with other radioactive liquid to meet the disposal site acceptance criteria prohibiting the disposal of wastes containing free liquids. Solidification of this liquid is a standard process throughout the Naval Nuclear Propulsion Program for disposal of low level radioactive liquids that are unsuitable for reprocessing for reuse.

The treatment process utilizes the paddle drum and cement

silicate method to solidify liquids. Using this process, mercuric nitrate solutions are added as makeup water to other radioactive liquid waste. The pH of the liquid is adjusted to a neutral or basic pH. The liquid is added to cement in the paddle drum and mixed to obtain a homogenous mixture. The paddle drum is the primary accumulation container. Sodium silicate is added to harden the mixture quickly. The cement is allowed to set for a minimum of 24 hours while venting through a HEPA filter to dissipate minimal heat given off during the curing process. The drum is inspected for the presence of free standing liquid and the hardness of the cement. The drum is shipped for burial as low level radioactive waste.

7. ANALYSIS OF REPRESENTATIVE SAMPLES. The paddle and drum silicate process requires 35 gallons of liquid waste for solidification. Only small amounts of mercuric nitrate solution are expected to be generated and require solidification. This waste stream will be combined with other radioactive liquids requiring solidification, in order to minimize accumulation times and radioactive waste volumes. The following waste analysis assumes the worst case of solidifying a drum of mercuric nitrate solution waste only in order to verify that all lower percentage mixtures would be non-hazardous after solidification.

8. SAMPLE FABRICATION AND ANALYSIS.

a. A bench scale test of solidification of mercuric nitrate was performed by Charleston Naval Shipyard. Samples of the solidified mercuric nitrate solution were analyzed for the EPA Toxicity Characteristic Leaching Potential (TCLP) for mercury per GRR 391-3-11-.07 and 40 CFR Part 261.24 (b).

b. TCLP analyses were performed for mercury leachability on solidified samples of mercuric nitrate solutions. Sample solutions containing 20 ppm, 100 ppm and 500 ppm of mercury (Hg^{+2}) were solidified. The TCLP leachate concentrations of mercury for the solidified solutions containing 20 ppm and 100 ppm of mercury were less than 0.2 ppm. The TCLP leachate concentration of mercury for the solidified solution containing 500 ppm of mercury was greater than 0.2 ppm

c. The method of fabrication of the test sample was as follows.

(1) Simulate test waste using mercuric nitrate solutions containing 20 ppm, 100 ppm and 500 ppm of mercury.

(2) Adjust the pH of the waste solution using ammonium hydroxide to between 7 and 11. Solidify each of the sample waste solutions in accordance with the following formula:

Volume Solution	Cement	Sodium Silicate
35 gallons	210 lbs	4 gallons

Note: The above formula was scaled down to produce one cup samples.

After the cement set, it was allowed to cure for 30 days.

d. The solidified samples of the mercuric nitrate test solutions were given the following Sample ID numbers by General Engineering Laboratories, Charleston, S.C., who performed the TCLP analyses:

Sample Location	Sample ID#
1) 20 ppm mercury	491
2) 100 ppm mercury	492
3) 500 ppm mercury	493

e. The results of the TCLP analysis showed the leachate concentrations of mercury from samples #491 and #492 were less than the EPA toxicity characteristic limit of 0.2 ppm for mercury. Copies of the certificate of analysis for the samples are provided with this enclosure. The experimental data establishes mercuric nitrate solutions with mercury concentrations less than 100 ppm prior to solidification will be non-hazardous after solidification. As discussed above, the mercury concentration of the mercuric nitrate solution to be solidified will be less than 25 ppm.

f. The bench scale samples, free from radioactivity, were fabricated based on process knowledge of the expected waste. The samples indicate a concentration four times the maximum concentration of mercury in the waste will meet the EPA Toxicity limit. Sampling the actual waste is avoided to preclude additional radioactive material handling and additional personnel exposure to radiation.

9. LDR DETERMINATION. GRR 391-3-11-.16 and 40 CFR Part 268 prohibit land disposal of this waste unless the concentration based on treatment standard for mercury is met prior to land disposal (under 40 CFR Part 268.42. The process of solidification of the mercuric nitrate solution waste constitutes treatment. This treatment converts the waste into a non-hazardous waste (nonwastewater TCLP extract is less than 0.2 ppm) as required.

WASTE ANALYSIS PLAN FOR
RADIOACTIVE SILVER NITRATE SOLUTION

1. WASTE GENERATION. Silver nitrate ($Ag(NO_3)$) solution is generated during the analysis of radioactive liquid samples for chlorides. The test is conducted in a test tube with silver nitrate and nitric acid added to the liquid sample. When the analysis is completed, the silver nitrate solution is controlled as mixed radioactive and hazardous waste because it is a waste which contains radioacivity subject to Naval Nuclear Propulsion Program requirements and the concentration of silver in the waste is greater than 5.0 parts per million (ppm). The waste has silver as Ag^{+1} at concentrations of about 250 ppm and a pH of about 3.0.

2. WASTE ANALYSIS. The concentration of silver in the waste is based on process knowledge. The laboratory procedure for the test specifies the amount of reagents used. Each test tube contains 25-30 ml of radioactive liquid for analysis, to which four (4) drops (about 0.2 ml) of 0.3 N $AgNO_3$ is added. This is equivalent to a silver concentration in the waste of between 215 and 260 ppm.

3. WASTE DESIGNATOR. The waste designates as characteristic toxic for silver. The EPA hazardous waste number is D011.

4. FREQUENCY OF RE-EVALUATION. This waste stream will be re-evaluated when the process changes or regulatory requirements change. This plan will be reviewed annually to ensure it is still accurate and complete.

5. LAND DISPOSAL RESTRICTIONS (LDR). This waste, as generated, is prohibited from land disposal as specified in GRR 391-3-11-.16 and 40 CFR Part 268. This waste meets the definition of a wastewater per 40 CFR Part 268.2. There is no applicable treatment technology specified under 40 CFR Part 268.42, Table 2. The waste would therefore require treatment to meet concentration limits under 40 CFR Part 268.43, Table CCW. The Environmental Protection Agency acts jointly with Georgia Department of Natural Resources in enforcing land disposal restrictions and the Best Demonstrated Available Technology (BDAT) rules in Georgia.

6. TREATMENT BY GENERATOR. Treatment by generator will consist of cement based stabilization. Treatment will be performed in a less than 90 day accumulation area. The silver nitrate solution will be solidified together with other radioactive liquid to meet the disposal site acceptance criteria prohibiting the disposal of wastes containing free liquids. Solidification of this liquid is a standard process throughout the Naval Nuclear Propulsion Program for disposal of low level radioactive liquids that are unsuitable for reprocessing for reuse.

The treatment process utilizes the paddle drum and cement silicate method to solidify liquids. Using this process, silver nitrate solutions are added as makeup water to other radioactive liquid waste. The pH of the liquid is adjusted to a neutral or basic pH. The liquid is added to cement in the paddle drum and mixed to obtain a homogenous mixture. The paddle drum is the primary accumulation container. Sodium silicate is added to harden the mixture quickly. The cement is allowed to set for a minimum of 24 hours while venting through a HEPA filter to dissipate minimal heat given off during the curing process. The drum is inspected for the presence of free standing liquid and the hardness of the cement. The drum is shipped for burial as low level radioactive waste.

7. ANALYSIS OF REPRESENTATIVE SAMPLES. The paddle and drum silicate process requires 35 gallons of liquid waste for solidification. Only small amounts of silver nitrate solution are expected to be generated and require solidification. This waste stream will be combined with other solutions and radioactive liquids requiring solidification, in order to minimize accumulation times and radioactive waste volumes. The following waste analysis assumes the worst case of solidifying a drum of silver nitrate solution waste only in order to verify that all lower percentage mixtures would be non-hazardous after solidification.

8. SAMPLE FABRICATION AND ANALYSIS.

a. Bench scale mock-up solidification of silver nitrate solutions were performed by Charleston Naval Shipyard. Samples of the solidified silver nitrate solution were analyzed for the EPA Toxicity Characteristic Leaching Potential (TCLP) for silver per GRR 391-3-11-.07 and 40 CFR Part 261.24(b).

b. TCLP analyses were performed for silver leachability on solified samples of silver nitrate solutions. Sample solutions containing 500 ppm and 600 ppm concentrations of silver nitrate were solidified. The TCLP leachate concentrations of silver in each case were less than 0.5 ppm.

c. The method of fabrication of the test sample was as follows.

(1) Simulate test waste using 500 ppm and 600 ppm silver nitrate solutions.

(2) Adjust the pH of the waste solution using ammonium hydroxide to between 7 and 11. Solidify each of the sample waste solutions in accordance with the following formula:

Volume Solution	Cement	Sodium Silicate
35 gallons	210 lbs	4 gallons

Note: The above formula was scaled down to produce one cup samples.

After the cement set, it was allowed to cure for 30 days.

d. The solified samples of the silver nitrate solutions were given the following Sample ID numbers by General Engineering Laboratories, Charleston, S.C., who performed the TCLP analyses:

Sample Location	Sample ID#
1) 500 ppm silver nitrate	490
2) 600 ppm silver nitrate	489

e. The results of the TCLP analysis showed the leachate concentrations of silver from samples #490 and #489 were both less than 0.500 ppm which is less than the EPA toxicity characteristic limit of 5.0 ppm for silver. Copies of the certificate of analysis for the samples are provided with this enclosure. Both samples contained silver concentrations (Ag^{+1}) greater than 300 ppm. The experimental data establishes that silver nitrate solutions with silver concentrarions less than 300 ppm prior to solidification will be non-hazardous after solidification.

e. The bench scale samples, free from radioactivity, were fabricated based on process knowledge of the expected waste. The samples indicate a concentration greater then the maximum concentration of silver in the waste will meet the EPA Toxicity limit. Sampling the actual waste is avoided to preclude additional radioactive material handling and additional personnel exposure to radiation.

9. LDR DETERMINATION. GRR 391-3-11-.16 and 40 CFR Part 268 prohibit land disposal of this waste unless the concentration based on treatment standard for silver is met prior to land disposal (under 40 CFR Part 268.42). The nonwastewater limit for silver is 5.0 ppm (TCLP). The process of solidification of the silver nitrate solution waste constitutes treatment. This treatment converts the waste into a non-hazardous waste (nonwastewater TCLP extract is less than 5.0 ppm) as required.

WASTE ANALYSIS PLAN FOR
RADIOACTIVE LIQUID WASTE WITH LOW pH

1. WASTE GENERATION. Radioactive liquid with low pH is generated during the analysis of radioactive liquid samples. Reagents used during analysis of radioactive liquid include acids. When the analysis is completed, test waste with low pH is controlled as mixed radioactive and hazardous waste because it is a waste which contains radioacivity subject to Naval Nuclear Propulsion Program requirements and the waste exhibits the characteristic of corrosivity. The test waste has a pH of less than 2.0.

2. WASTE ANALYSIS. The pH in the test waste is based on process knowledge. The laboratory procedure for the test specifies the amount of reagents used.

3. WASTE DESIGNATOR. The waste designates as characteristic corrosive. The EPA hazardous waste number is D002.

4. FREQUENCY OF RE-EVALUATION. This waste stream will be re-evaluated when the process changes or regulatory requirements change. This plan will be reviewed annually to ensure it is still accurate and complete.

5. LAND DISPOSAL RESTRICTIONS (LDR). This waste, as generated, is prohibited from land disposal as specified in GRR 391-3-11-.16 and 40 CFR Part 268. This waste meets the definition of a wastewater per 40 CFR Part 268.2. The applicable treatment technology specified under 40 CFR Part 268.42 is: deactivation to remove the hazardous characteristic of a waste due to ignitability, corrosivity, and /or reactivity (DEACT). This waste would need to be treated by DEACT prior to land disposal.

6. TREATMENT BY GENERATOR. Treatment by generator will consist of neutralization. Neutralization is performed as one step in the solidification procedure. Treatment will be performed in a less than 90 day accumulation area. The liquid waste with low pH will be neutralized and solidified together with other radioactive liquid to meet the disposal site acceptance criteria prohibiting the disposal of wastes containing free liquids. Solidification of this liquid is a standard process throughout the Naval Nuclear Propulsion Program for disposal of low level radioactive liquids that are unsuitable for reprocessing for reuse.

The treatment process utilizes the paddle drum and cement silicate method to solidify liquids. Using this process, liquid wastes with low pH are added as makeup water to other radioactive liquid waste. The pH of the liquid is adjusted to a neutral or basic pH. The liquid is added to cement in the paddle drum and mixed to obtain a homogenous mixture. The paddle drum is the primary accumulation container. Sodium silicate is added to harden the mixture quickly. The cement is allowed to set for a

minimum of 24 hours while venting through a HEPA filter to dissipate minimal heat given off during the curing process. The drum is inspected for the presence of free standing liquid and the hardness of the cement. The drum is shipped for burial as low level radioactive waste.

7. LDR DETERMINATION. GRR 391-3-11-.16 and 40 CFR Part 268 prohibit land disposal of this waste unless the technology based treatment standard for corrosivity is met prior to land disposal (under 40 CFR Part 268.42 for deactivation). The process of neutralization of the liquid waste with low pH constitutes treatment. This treatment converts the waste into a non-hazardous waste as required.

SECTION D
PROCESS INFORMATION

The information provided in this section is submitted in accordance with the requirements of 40 CFR 270.15, 270.23, 40 CFR 264.17, and 264 Subpart I.

D.1 CONTAINERS [40 CFR 270.15]. SUBASE Kings Bay has a hazardous waste container storage and transfer facility to serve the entire Base. This section details the design and management of the planned hazardous waste facility. The as-built engineering drawings and specifications of the building are certified by a Georgia-registered professional engineer and are in full compliance with U.S. Navy building codes.

The hazardous waste storage and transfer facility is approximately 1,600 feet from the Base boundary. The 8,164-square-foot building contains the following areas:

1. 11 container storage areas with a combined total area of 4,573 square feet,
2. 1,227 square feet of primary aisle space for use by the forklift,
3. 436-square-foot repackaging area,
4. 834-square-foot docking area with forklift charging area,
5. a personnel decontamination area with safety and emergency equipment,
6. 983 square feet of office space,
7. laboratory,
8. 111 square feet of entrance area, and
9. rest room facilities.

Each bay has a separate spill containment structure that allows maximum flexibility in segregating incompatible wastes. This building allows for a maximum inventory of 1,088 palletized 55-gallon drums, double stacked. The maximum capacity reflects 2.5-foot aisles between rows of drums. Ten bays are designed for a maximum of 96 drums each and two bays are designed for 64 drums each.

Figure D-1 presents the site plan of the hazardous waste building. Figure D-2 is a plan view of the building that identifies the storage bays, loading and unloading area, and location of emergency equipment. Figure D-3 presents elevations of the building. Figure D-4 is a section of the building. Figure D-5 depicts the typical arrangement for flammable and nonflammable wastes.

The building design incorporates a pre-engineered enclosed metal building over a continuous concrete slab. Expansion and construction joints have been purposefully placed at high points in the floor slab. The expansion joints minimize floor cracks. With the joints at the high point of the slab, spilled

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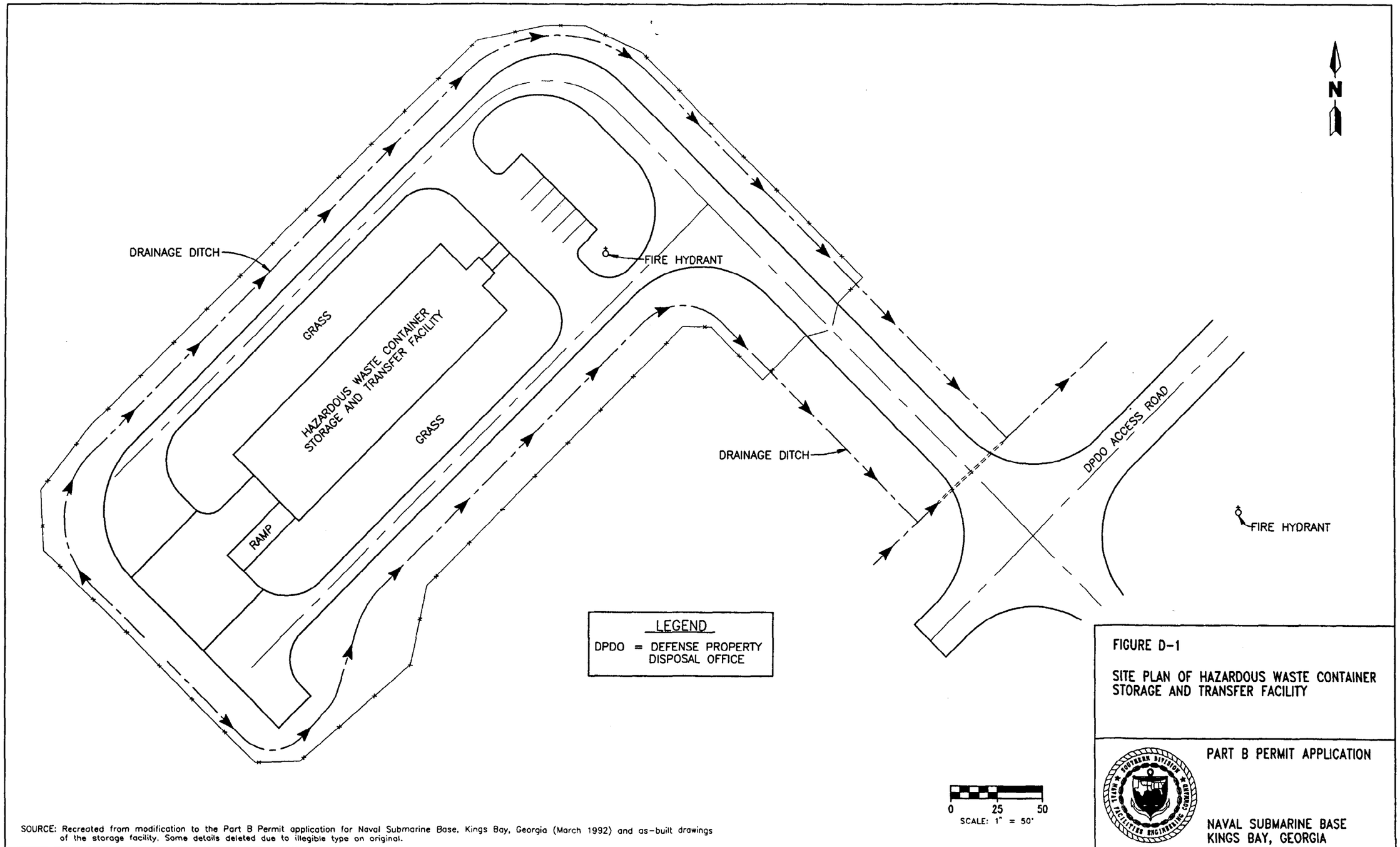

SOURCE: Recreated from modification to the Part B Permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992) and as-built drawings of the storage facility. Some details deleted due to illegible type on original.

FIGURE D-1

SITE PLAN OF HAZARDOUS WASTE CONTAINER STORAGE AND TRANSFER FACILITY

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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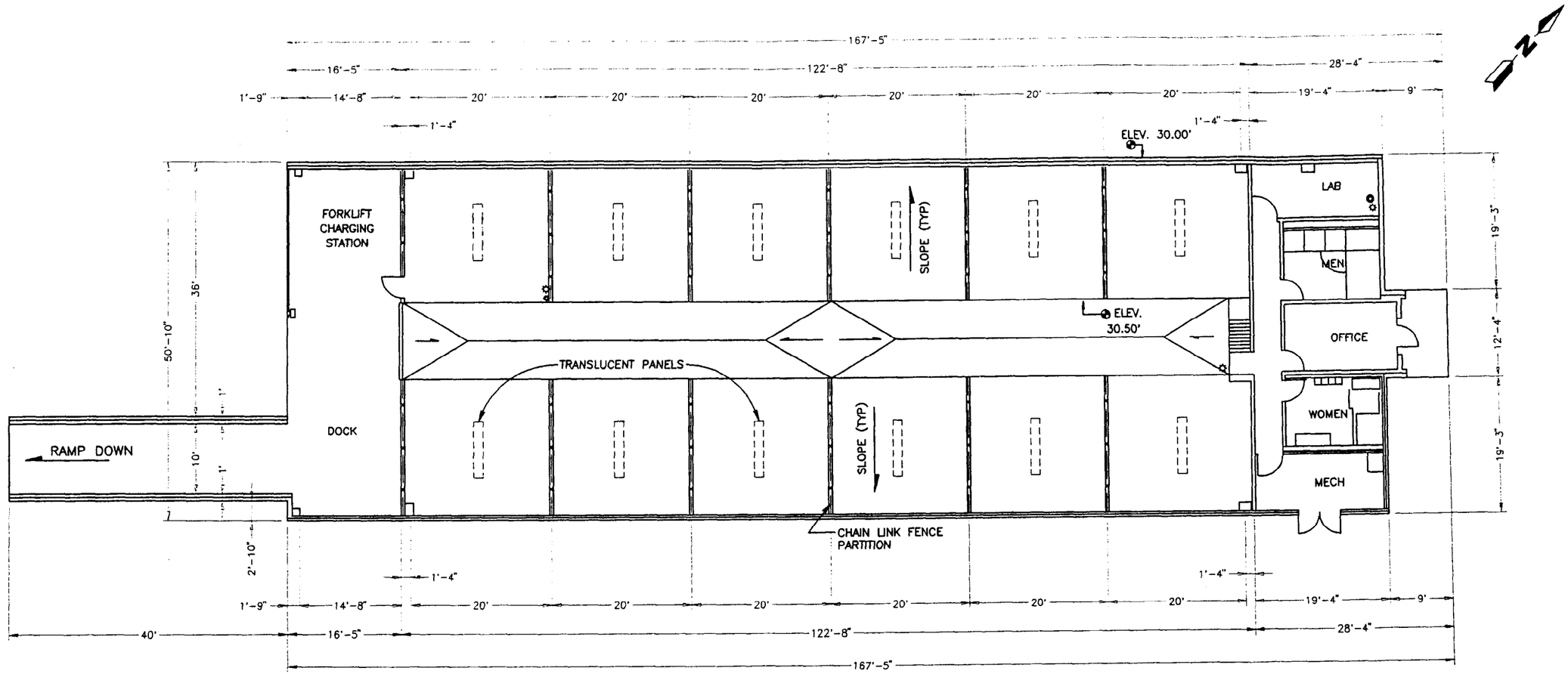
KB Site 11 [PART_B.per]#038
mlv.04.95

0503ABIZ



LEGEND

- ✡ EYE WASH
- ● FIRE EXTINGUISHER

0 8' 16'
SCALE: 1" = 16'

SOURCE: Recreated from modification to the Part B permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992).

FIGURE D-2

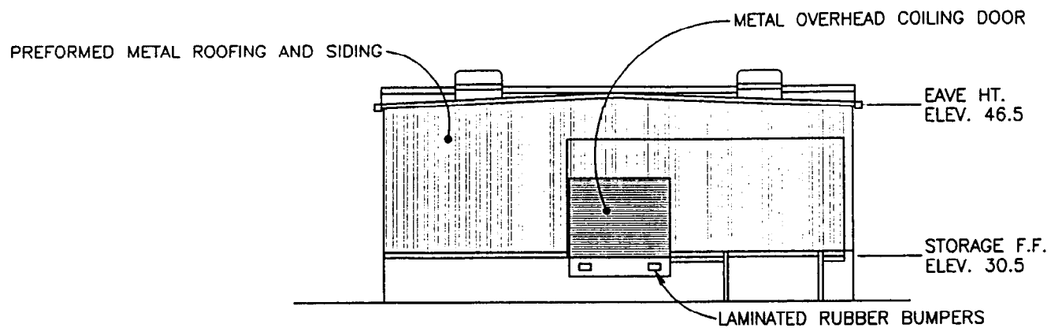
FLOOR PLAN, HAZARDOUS WASTE CONTAINER STORAGE AND TRANSFER FACILITY

PART B PERMIT APPLICATION

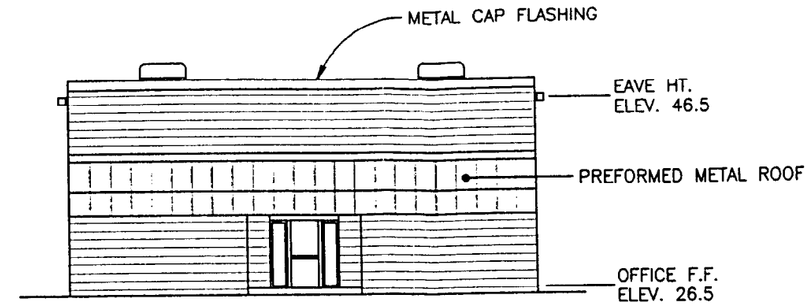
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

D:\DWG\ABB\08523-18\PART_B\FIG_D-2\DMF\950315

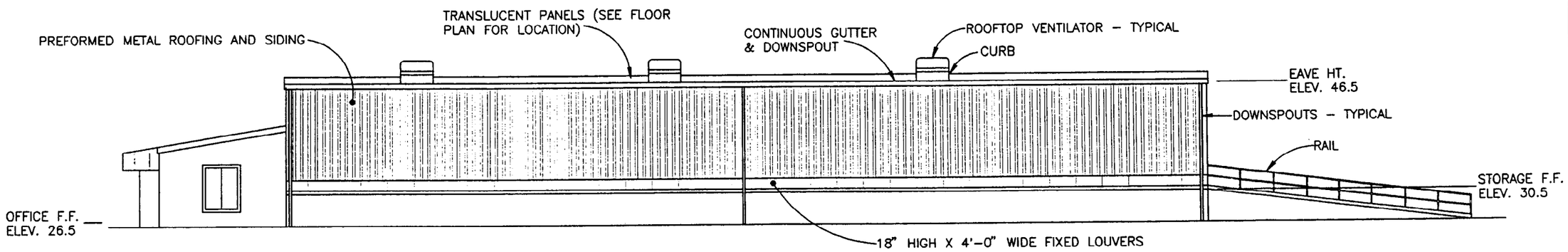
KB Site 11 [PART_B.per]#038
mlv.04.95



REAR ELEVATION



FRONT ELEVATION



RIGHT SIDE ELEVATION

FIGURE D-3

BUILDING ELEVATIONS, HAZARDOUS WASTE CONTAINER STORAGE AND TRANSFER FACILITY

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

0 8' 16'
SCALE: 1" = 16'

SOURCE: Recreated from modification to the Part B permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992). Some details deleted due to illegible type on original.

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KB Site 11 [PART_B.per]#038
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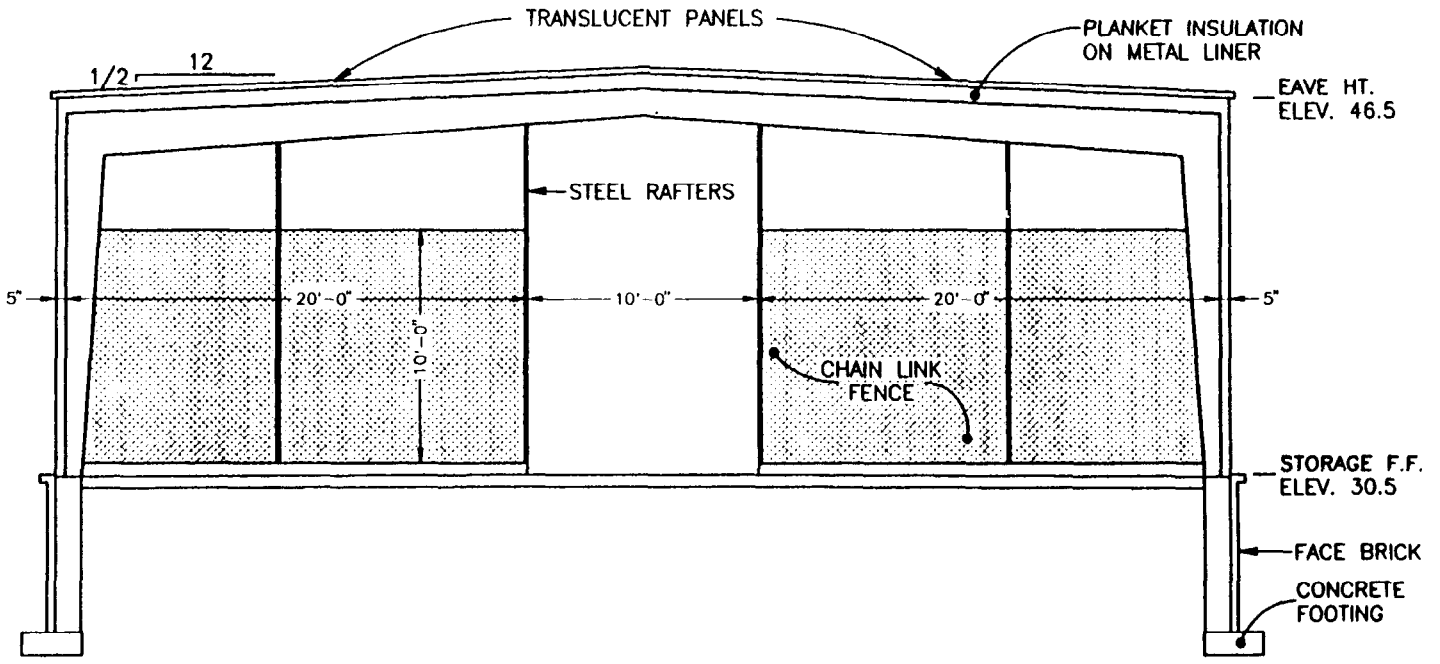

SOURCE: Recreated from modification to the Part B permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992). Some details deleted due to illegible type on original.

0 4' 8'
SCALE: 1" = 8'

FIGURE D-4

BUILDING SECTION, HAZARDOUS WASTE CONTAINER STORAGE AND TRANSFER FACILITY

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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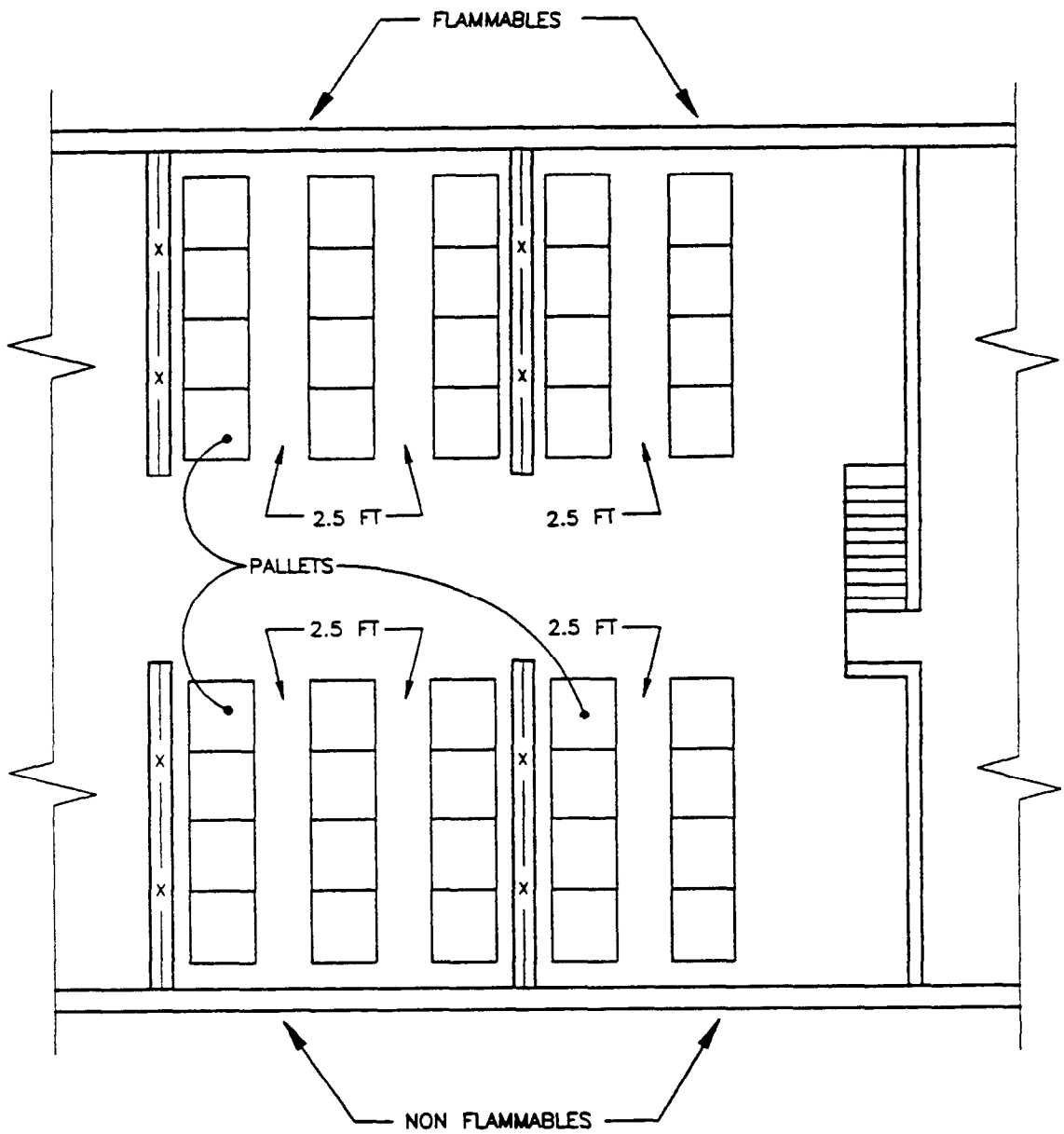
KB Site 11 (PART_B.per) #038
mlv.04.95



SOURCE: Recreated from modification to the Part B permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992).

NOT TO SCALE

FIGURE D-5

TYPICAL ARRANGEMENT FOR CONTAINER STORAGE

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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KB Site 11 (PART_B.per)#038
mlv.04.95

materials flow away from rather than accumulate at these joints. The joints will be filled with an epoxy sealant. These construction and management procedures preclude contamination of soil underneath the floor slab.

D.1.1 Containers with Free Liquids

D.1.1.1 Description of Containers The containers used for the storage of hazardous wastes are generally 55-gallon steel drums meeting the specifications of DOT 17E and 17C and are stamped as such. Hazardous wastes are never placed in the unwashed containers, except materials that are returned to their original container as waste. Some ship-generated wastes are packaged in other types of containers. In all cases, containers meet DOT specifications for the type of material inside the package. Under no circumstances are incompatible types of wastes mixed in the same drum.

D.1.1.2 Container Management Practices In accordance with the SUBASE Kings Bay Hazardous and Industrial Waste Management Plan and the Shipboard Hazardous Material and Waste Management Plan, it is the responsibility of each generating unit to ensure that all hazardous wastes meet the following conditions prior to transfer to the hazardous waste facility:

- the waste is compatible with its container,
- the container is properly sealed,
- the container is properly labeled, and
- a properly completed turn-in document identifying the waste accompanies the container.

At the hazardous waste facility, the hazardous waste Facility Operator will direct the placement and removal for each container into or from the appropriate storage cell. The wastes stored at the building will be grouped into these general classifications:

- flammable liquids,
- acids,
- alkalines,
- chlorinated hydrocarbons,
- oxidizers,
- reactives,
- reactives DANGEROUS WHEN WET, and
- general wastes (compatible).

These general classifications will be reflected on signs used to identify the contents of each storage bay. To accommodate the variability in quantities of wastes, no bay will be dedicated to a specific type of waste. Rather, a flexible container management system will be implemented to allow maximum utilization of storage space, while prohibiting the placement of incompatible wastes in the same storage bay. A discussion of the management of ignitable, reactive, and incompatible wastes is included in Section F.5.3.

The following specific management practices will be implemented by the hazardous waste Facility Operator:

Emptying of a Bay.

- Remove all containers from bay.
- Inspect the bay. If any liquid is present, remove it using absorbent or transfer pump, wash down bay floor, and remove rinse water. The removed liquids will be analyzed, identified, containerized, and labeled for proper disposal.
- Remove signs from bay.

Placing Containers in Empty Bay.

- Place containers in bay using 2.5-foot aisle space.
- Attach appropriate sign inside bay.

Placing Containers in Occupied Bay.

- Determine compatibility of received waste with that already present, using the compatibility table from 46 CFR 28728 appearing in Table C-11, supplemented by the information in the NFPA Fire Protection Guide on Hazardous Materials.
- Place containers in appropriate bay assuring 2.5-foot aisle space.
- If the received waste is of a different type than indicated by the sign in the bay, attach an additional sign identifying the received waste type.

Stacking Containers.

- Only stack containers that have similar shape and volume so that a stable arrangement is provided.

When chlorinated wastes are received, the hazardous waste coordinator will ensure that all aluminum and galvanized materials are removed from the bay receiving that waste.

The hazardous waste Facility Operator will have a sufficient number of signs identifying each type of waste to allow adequate waste type identification.

D.1.1.3 Secondary Containment System Design and Operation

Secondary Containment Design. The floor of the hazardous waste facility is constructed of concrete designed for a uniform load of 250 pounds per square foot and a 5,000-pound forklift axle load.

A chemical resistant floor sealer was applied to the storage area floor of the hazardous waste facility. All interior construction joints are sealed with sealing compounds conforming to American Society for Testing and Materials (ASTM) specifications.

Containment System Drainage. Each bay is surrounded by curbing on three sides that range from 0 to 6 inches in height. Within each bay, the floor is sloped toward the rear curb. The sloped floor, bounded by curbs, forms a wedge-shaped containment, isolating any leaked or spilled liquids within one storage bay. All drums will be stored on pallets to prevent contact with standing liquids. The drums stored at the rear of the bay will be further elevated by placing the pallets and drums on the back two rows on pre-positioned pallets.

The center aisle slopes toward the center, providing containment for any spilled or leaked liquid waste during transfer.

Containment System Capacity. Table D-1 presents the relationship between storage capacity and containment volume in each bay. Table D-1 also presents the containment volume of the center aisle catchment.

Table D-1
Storage and Containment Capacities for Hazardous Waste Container Storage and Transfer Facility

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

				Containment					
		Capacity					Capacity		
Component	Floor Dimensions	Drums	Gallons[1]	Required	Configuration	Depth (feet)	Cubic Feet	Formula	Gallons
Stairwell bays	20'8" × 20'5"	[2]64	3,520	660	Wedge	6	102	1/2(20 × 20.42 × 0.5)	763
All other bays	20'0" × 20'5"	96	5,280	440	Wedge	6	102	1/2(20 × 20.42 × 0.5)	763
Center aisle	122'6" × 10'	[3]4	220	55	2 troughs	1	37	1/2(37.5 × 20 × 0.08) + (1/3(10 × 20 × 0.08)	275

[1] Based on 55-gallon drums.
[2] Provides clear space for egress.
[3] Only one pallet of four drums will be allowed in aisle during movement of drums; at no time will aisles be used for storage.

Notes: ' = feet.
" = inches.
× = by.

Only one pallet of four drums will be moved along the aisle, thus prohibiting incompatible wastes in that area.

Control of Run-on. Run-on is prevented at the hazardous waste facility by elevating the finished floor of the storage area about 4 feet above grade and sloping the site away from the building.

Removal of Liquids from Containment System. Each bay has an individual containment system designed to capture all spills and leaks. Any spills and leaks from the contents of a bay will be collected immediately with a portable pump and containerized. Any liquids remaining after use of the pump will be absorbed and the absorbent will be combined with the pumped liquid. If the container(s) that leaked or spilled can be identified, the spilled liquid containers can be labeled appropriately. If the containers that spilled or

leaked cannot be identified, a sample will be taken and analyzed per the Waste Analysis Plan (as an unknown). After collection of the spill, the storage bay will be flushed with water, which will be collected in the collection system, then pumped into 55-gallon containers(s) and stored as hazardous waste. The pump and hoses will be flushed with water directly into 55-gallon containers and these containers will be stored as hazardous waste.

D.1.2 Containers Without Free Liquids Spill containment volume provided in the building assumes that all containers hold free liquids.

D.2 OPEN BURNING AND OPEN DETONATION [40 CFR 270.23].

D.2.1 Facility Description The U.S. Navy conducts OB/OD of waste explosives and munitions at SUBASE Kings Bay. Although these two types of treatment involve different techniques, both may be conducted at the OB/OD facility. This facility has been identified on Figure B-2, which is located in a pocket at the end of this permit application.

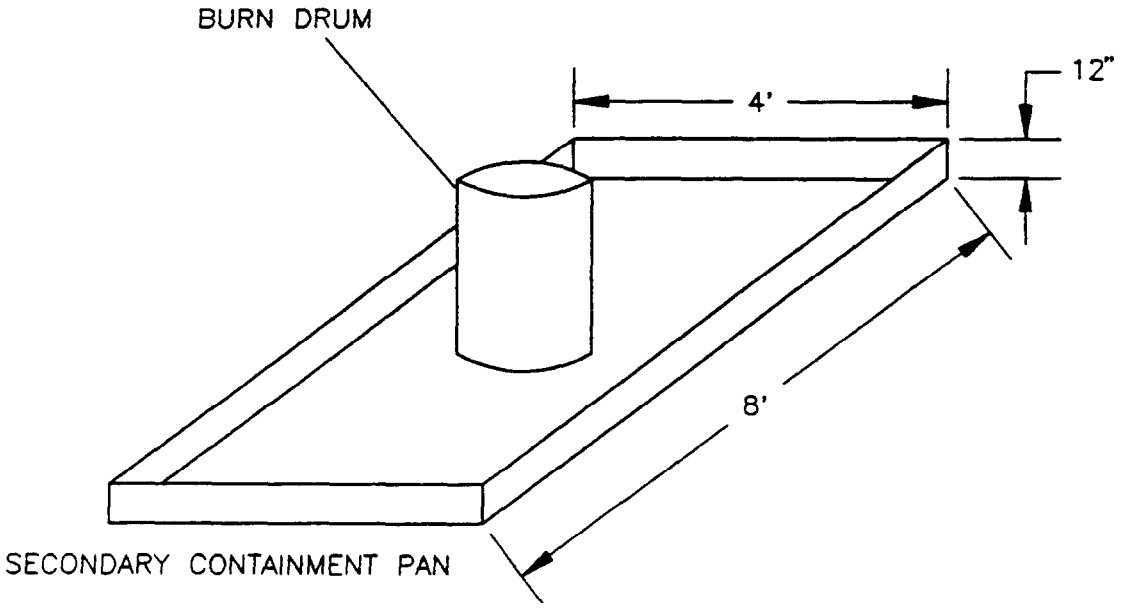
The OB/OD facility is a structureless unit with overall approximate dimensions of 500 feet long and 200 feet wide with a small reinforced-concrete enclosed safety bunker (crew shelter) located at the open end. The OB/OD pad is surrounded by an earthen berm that has been constructed to an elevation of approximately 20 feet.

An open burning apparatus consists of a perforated metal drum in which burns are conducted. The drum is situated in a 4-foot by 8-foot sheet metal pan with a 1-foot lip. The secondary containment pan is equipped with a close fitting metal cover to prevent accumulation of stormwater during non-operating periods. These devices are constructed of materials capable of withstanding intense heat and providing adequate containment of initiating fluids as well as any residual ash that may be generated. After burns are completed, all ash residues from the burn drum and any materials in the secondary containment pan that may have been generated will be removed and containerized or resubmitted for OB/OD operations. The burn drum will be removed to an interior storage area to prevent rainwater from accumulating within the drum. Figure D-6 shows the configuration of the unit.

Open detonation operations are conducted on the ground without secondary containment. There are no engineered structures associated with the open detonation facility.

D.2.2 Detailed Plans of the OB/OD Facility The apparatus used for the open burning of explosive wastes is depicted in Figure D-6. A simplified drawing of the crew shelter is provided as Figure D-7 and the actual detailed plans are submitted as Figure D-8, located at the back of this permit application. In addition, Figures D-9 and D-10 represent the engineering drawings at the OB/OD facility and the temporary storage magazine, respectively. Both of these figures are located at the back of this permit application.

D.2.2.1 Operating Procedures for Open Burning All treatment operations, whether they include open burning or open detonation, will be conducted in accordance with the NAVSEA Operating Procedure (OP) 5 technical manual entitled *Ammunition*



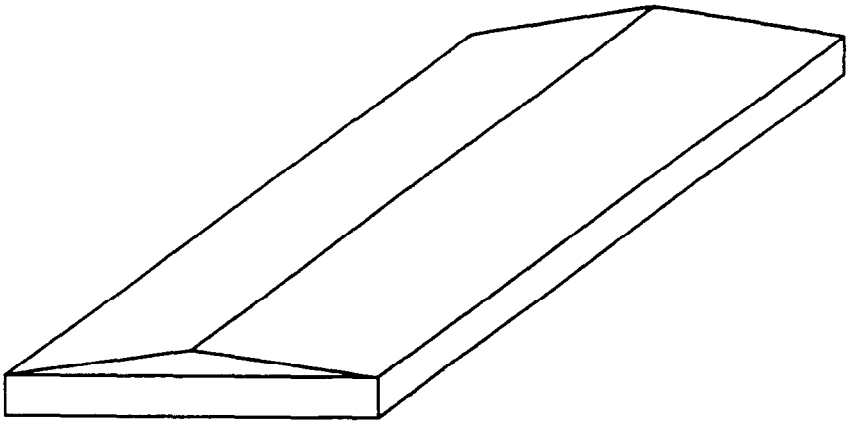


FIGURE D-6

OPEN BURNING DEVICE

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

D:\DWG\ABB\08523-18\PART_B\FIG_D-6\DMF\950207

KB Site 11 [PART_B.per]#038
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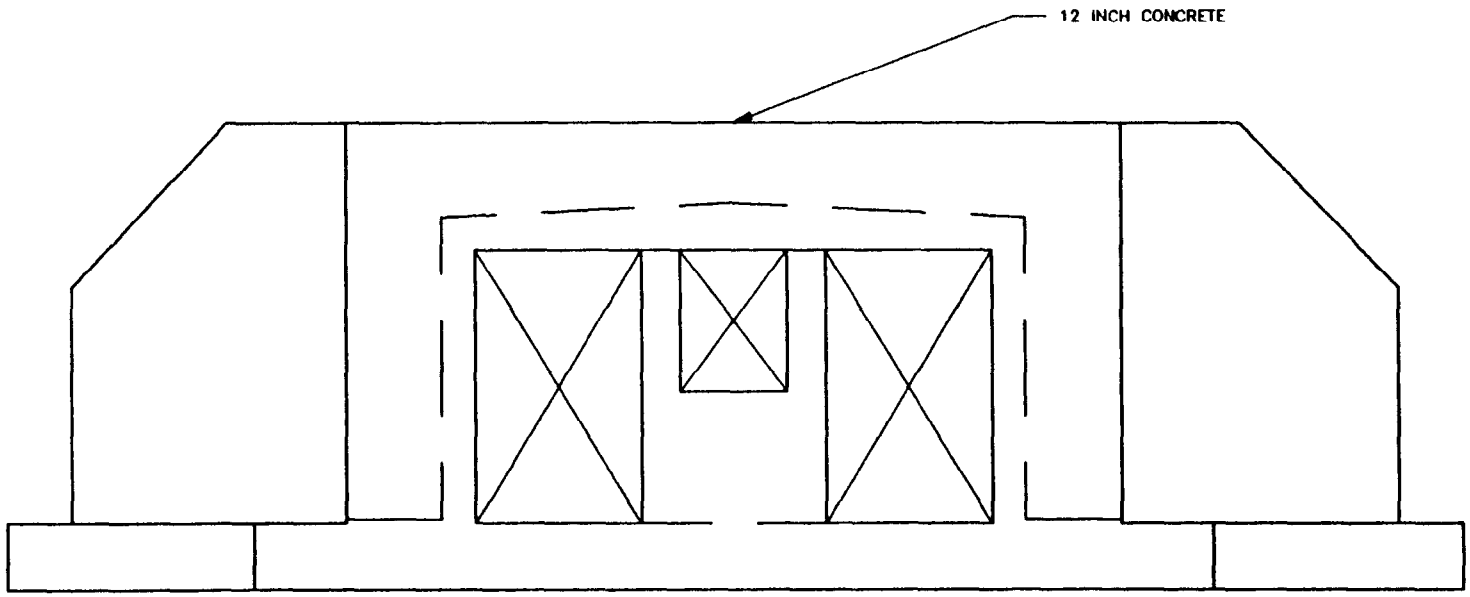


SOURCE: Recreated from modification to the Part B permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992).

0 2.5 5
SCALE: 1" = 5'

FIGURE D-7

CREW SHELTER FRONT ELEVATION

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

D:\DWG\ABB\08523-18\PART_B\FIG_D-7\DMF\950412

and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation and Shipping. A summary of those safety requirements is provided below. In addition, SUBASE Kings Bay has developed a site-specific instruction pertaining to the use of the OB/OD range. A copy of this instruction is included in Appendix D-1.

General Requirements. Disposal of ammunition by burning will only be accomplished in an area approved by NAVSEASYSCOM and destruction will not be undertaken until NAVSEASYSCOM has approved the operation.

The ground within the immediate vicinity of the burning pad area will not exceed a 10 degree grade. Burning will be done in a containment device capable of withstanding high temperatures and containing any initiating liquids and residual ash.

Regardless of the types of ammunition, explosive, or other similarly hazardous material involved in an authorized disposition by burning, it is important to recognize that a detonation may occur. To provide adequate protection, burning grounds will normally be a minimum of 1,800 feet away from any magazine, storehouse, inhabited building or other structure, and any public highway or passenger railroad. Lesser distances may be established after approval from NAVSEASYSCOM.

Burning grounds will be reasonably free from undergrowth or shrubbery. An area 300 feet square will be freed of all long grass and undergrowth. All vegetation such as dry grass, leaves, as well as other combustible materials, and glass or glass particles will be removed within a radius of 200 feet from the burning ground.

Posting of Prescribed Procedures. Prescribed specific procedures in connection with the disposition of each specific type or condition of explosive will be posted at the burning site.

Personnel Assignment. Commanding officers will be responsible for the assignment of personnel to operations at disposal areas. All disposal personnel will be well qualified, fully informed regarding the hazards to be encountered and the applicable operating safety precautions to be observed, and capable of safely performing their duties. The number of employees engaged in a destruction operation will be limited, but at no time will any person be allowed to work alone.

Personnel Protection. All personnel will be instructed as to the dangers of inhaling toxic vapors resulting from the burning hazardous materials. When prevailing winds would cause the inhalation of toxic fumes, operations will be suspended or personnel will be equipped with respirators.

Sufficient and suitable protection for personnel must be provided in the form of clothing and shelter at the disposal site. A minimum of two fire blankets will be available for emergency use. Personnel engaged in disposal operations will be instructed in the proper use of the fire blankets. A personnel protection area will be provided at the burning ground in the form of a bunker. The bunker will be located a minimum of 100 feet from the actual burning pad. There will be no direct viewing.

No burning ground operations will be undertaken unless properly manned and equipped mobile fire-fighting equipment is standing by in a safe location or can be readily available within 5 minutes.

Telephone or two-way radio communication with the station network, including emergency and fire-fighting units, will be available during operations. Communications will not be located at a distance greater than 2,500 feet.

Disposal by burning will not be undertaken during conditions of high wind velocity (in excess of 15 mph). There will be instrumentation available at the burning site capable of indicating wind velocity.

Guards, safety signals, road blocks, and warning signs will be used to keep unauthorized personnel from danger areas during destruction operations. The burning operations will not be initiated unless a red flag is prominently displayed and/or a whistle or siren is sounded.

Material Stockpiling. Materials awaiting destruction will be kept far enough from the disposal location to be protected against accidental ignition or explosion from hurled fragments, grass fires, sparks, or burning embers. For burning operations, the stockpile area will be a minimum of 500 feet from any active burning pad.

Electrical Storms. The destruction of ammunition, explosives, or similarly hazardous materials and operations incidental thereto will not be undertaken during electrical storms.

Accidents. Any casualty, misfire, or accident involving fatalities or injuries to personnel or appreciable property damage will be reported immediately by the most expedient method to COMNAVSEASYSCOM. The Commanding Officer of the concerned activity should immediately appoint a board of qualified, but not involved, personnel to investigate and assemble the pertinent details concerning the accident.

Delivery of Hazardous Material to the Burning Site. The motor vehicle used to transport hazardous material to the burning ground area will be approved for explosive operations in accordance with OP 3681.

The containers of hazardous materials will be carefully loaded into the vehicle and secured against falling or moving during transfer to the burning ground.

No person other than the driver, who will be qualified to transport dangerous cargoes in accordance with OP 2239, and a maximum of two other authorized helpers will ride in or on a vehicle transporting hazardous materials.

The motor vehicle used to transport the containers to the burning pad will be positioned for unloading at the burning pad with the exhaust outlet on the opposite side from which the containers are to be removed. The motor will not be left running while hazardous materials are unloaded.

The motor vehicle, if retained at the burning pad for any purpose, will be moved back a minimum of 50 feet from the nearest material prior to opening the containers and returned to the stockpile area and the motor shut off prior to ignition of the ignition train.

Containers of hazardous materials will be handled carefully at all times. They will not be dragged over the floor of the truck or over the ground and will not be thrown, pushed, or dumped off the truck to the ground. If the truck is not equipped with an elevator type tailgate, the individual containers will be lifted and placed on the ground by hand, one at a time. The containers will be spaced evenly along the burning pad. If containers are palletized, the pallet will be placed along side the burning pad and unbound. They will not be unpalletize in the vehicle.

Required Tools. Only authorized-spark resistant tools will be used while working within a radius of approximately 15 feet from exposed hazardous materials. However, a clean, sharp knife may be used when cutting time blasting fuses for use with a nonelectric firing system.

Tools that may be used for handling explosive material will not be permitted to become heated by remaining near burning explosives.

Placement of Hazardous Waste Containers. Hazardous materials will always be removed from containers, as attempts to burn certain hazardous materials under even slight confinement may result in an explosion. Materials being burned must be examined carefully to make certain no detonator or blasting cap is included. No unauthorized admixtures of hazardous material with extraneous material, other explosives, detonators, or similar items will be permitted.

In addition, all empty containers will be moved back from the burning pad a minimum of 100 feet prior to igniting the powder train to avoid being dangerously overheated from the burn. Wet scrap propellant will be burned in a different location or at a different time than dry scraps.

Placement of Hazardous Materials on Burning Pad. Prior to delivery of any hazardous material to a burning pad, the pad will be carefully inspected for the presence of dangerous objects or prohibited foreign material. If the burning pad has been previously used that day, it will be inspected to assure that the ground is not dangerously warm and is free from flowing, smoldering, or burning embers and residues. Any detected hazardous materials will be placed in a hazardous waste drum and disposed as a hazardous waste or retrieved for treatment with other explosives. All personnel will retreat to the shelter except one operator and the supervisor who will remain to prepare for the ignition.

Ignition of the explosives is accomplished by placing the squib or safety fuse in a small pile or small web (powder grains, for 3-inch cartridges or smaller) smokeless powder located so as to overlap the edge of the explosives to be burned. Ignition of the smokeless powder will be by an electric squib firing system.

Disposal operations will only be conducted during daylight hours.

Post Burn Requirements. Personnel will remain in the protective shelter until all the explosive spread for burning has been consumed.

After the burning has visually exhausted itself, a wait of at least 5 minutes is required prior to anyone returning to the burn pad. The supervisor and one operator will then be allowed to return to inspect the general area of the burn for completeness of burn, heat retainment, and any other dangerous conditions. If no unusual conditions exist, the area may be wet down thoroughly with water.

A period of at least 2 hours from the wet down time is required before another burn may be conducted in the same containment device. If water facilities are not available, a period of 4 hours must elapse.

Cleanup. Following burning operations, the area will be inspected for the presence of unburned ordnance or residual ash. All such discovered items will either be disposed immediately or returned to a proper magazine to await future disposal.

D.2.2.2 Operating Procedures for Open Detonation

Detonation Site. Detonation of explosive material shall be undertaken only in those areas or locations which have been specifically approved by NAVSEASYSCOM. The destruction will not be undertaken until NAVSEASYSCOM has approved the operation.

All vegetation such as dry grass, leaves, and other combustible materials will be removed within a radius of 500 feet, or firebrand distance, whichever is greater from the point of destruction. NOTE: when OB/OD sites are the same, the minimum separation from any magazine, storehouse, inhabited building or other structure, and public traffic route will be 1,800 feet (as specified by the U.S. Navy NAVSEA OP 5 Safety Manual) and the cleared area around the site will be for a radius of 500 feet.

Posting of Prescribed Procedures. Prescribed specific procedures in connection with the disposition of each specific type or condition of explosives will be posted at the detonation site. Likewise, appropriate station orders or regulations for the operation of detonation sites will be established.

Personnel Protection. Each detonation site will provide a crew-protective area, may include a personnel shelter in the form of a bunker. If such a shelter is used, it will be NAVSEA-approved and will contain no direct viewing ports. Mirrors or periscopes may be used for visual observation. The distance from the point of detonation for the SUBASE Kings Bay OB/OD will be 300 feet.

Fire-fighting Equipment. When the fire hazard in wooded and grassy areas is high because of dry conditions, no demolition operations will be undertaken unless properly manned mobile fire-fighting equipment is standing by in a safe location or can be made readily available within 5 minutes.

Communications. The requirements for communication devices are the same as those specified for open burning.

Weather Conditions. The supervisor or EOD officer in charge of demolition will request information from the nearest U.S. Weather Station concerning cloud cover and air mass conditions prior to detonation. This person will make the decision to detonate explosives based on his experience and his knowledge of local soil and rock strata conditions. Detonation will not be conducted during periods of heavy, low total overcast.

Warning Signs. The requirements for the posting of warning signs are the same as those for open burning.

Material Stockpiling. The distance to explosive material awaiting destruction will vary in accordance with the class of site as approved by NAVSEA; however,

in no case will material be stored at less than intraline distance from the explosive being destroyed based on the largest quantity involved. No persons will be assigned to this area when actual detonation operations are underway. No material will be staged at the detonation site.

Electrical Storms. The destruction of ammunition, explosives, or similarly hazardous materials and operations incidental thereto will not be undertaken during electrical storms.

Accidents. The requirements for reporting accidents are the same as those required for open burning.

Safety Requirements. The number of personnel on disposal operations will be kept to a minimum, but in no circumstances will an operator work alone.

When actual detonation of explosive material is underway, no personnel will be stationed at or near material awaiting disposal in the stockpile area.

The demolition crew will remain at the protective crew area a period of time after detonation has been completed (5 minutes minimum after single shots; 30 minutes minimum after multiple shots). Work will be scheduled so that detonations will not occur within 30 minutes prior to securing the range at the end of the day.

The fire department will be notified that destruction by detonation is to be performed. The range will not be secured until no probability of fire exists.

Only spark-resistant tools will be used while working within a radius of 15 feet from explosive energetic material; a clean sharp knife may be used when cutting time blasting fuse or detonating cord. Detonation operations will be performed during daylight hours only. Blasting caps will be installed only when all operators except those doing the actual ignition work have retreated to the protective crew shelter. Blasting caps will be carefully handled at all times.

Ammunition and explosives to be destroyed will not be roughly or carelessly handled. The regulations for handling ammunition and explosives are the same as those prescribed for open burning. Extra care should be taken, because in most instances the hazards of the ammunition or explosives to be destroyed are increased by such factors as age, deterioration, or damage.

If the material being disposed produces high fragmentation, the detonation will take place behind an area having an earthen embankment built up a minimum of 4 feet, or in a pit or trench a minimum of 4 feet deep. Unless the demolition site meets the requirements for Class A, a covering of earth will be used to effectively limit the range of fragments.

Delivery of Hazardous Materials to Detonation Site. The motor vehicle used to transport hazardous materials to the demolition ground will meet the requirements of NAVSEA OP 3681.

No person or persons other than the driver and two helpers will ride in or on a vehicle transporting explosive material. The driver will be qualified to transport hazardous materials. The requirements for material handling and transportation are the same as those required for open burning operations.

Post Detonation Requirements. Following each single shot, after a reasonable waiting period (minimum 5 minutes), a careful search of the surrounding grounds will be made for unexploded ammunition or explosive. For multiple shots, a minimum of 30 minutes will be observed. Items or material such as lumps of explosive or unfused ammunition may be picked up and prepared for the next detonation. Fuzed ammunition or items that may have internally damaged components should be detonated in place. Residual ash may be resubmitted for OB/OD operations.

D.2.2.3 **Requirements for Handling Generated Ash** The open burning of waste explosives may generate residual ash. If the ash is not resubmitted to OB/OD operations, this ash will be transferred from the burn drum and secondary containment device to a 55-gallon drum after each burning operation. When the drum has reached full capacity, the contents will be sampled and analyzed according to the protocol established in the Waste Analysis Plan. If the contents are determined to be nonhazardous, the ash may be disposed at a solid waste landfill and will not be subject to the waste manágement requirements of RCRA.

However, if the analytical results indicate that the ash is hazardous due to the presence of the specified heavy metals or due to its reactive characteristics, the residual ash will be designated as a hazardous waste. The container will be labeled and dispositioned to the hazardous waste storage facility at SUBASE Kings Bay. Thereafter, containers will be managed in accordance with Section D.1 of this permit application.

D.2.2.4 **Facility Maintenance** The OB/OD facility is maintained to prevent fires according to NAVSEA OP 5. Grass and/or brush are controlled through cutting, burning, or applying chemical herbicides as appropriate. In addition, a monthly cleanup operation is conducted. During this time, all casings and remaining metal fragments are collected and disposed.

D.2.2.5 **Facility Monitoring** There are no structures at the OB/OD facility and, therefore, monitoring operations are not conducted.

D.2.2.6 **Facility Inspection** The parameters of the facility inspection are discussed in Section F.

D.2.2.7 **Closure Requirements** The closure requirements are discussed in Section I.

D.2.3 Post-Closure Requirements The post-closure requirements are discussed in Section I.

D.2.3.1 **Hydrologic, Geologic, and Meteorologic Information** The information required to comply with 40 CFR 264.601 and 602 is discussed in Section L.

D.2.3.2 **Potential Pathways of Exposure** This information is included in Section L.

D.2.3.3 **Effectiveness of Treatment** Effectiveness of treatment is discussed in Section C.

APPENDIX D-1

SITE-SPECIFIC INSTRUCTION PERTAINING TO THE USE OF THE OB/OD RANGE

March 4, 1992

NAVSUBASE KINGS BAY INSTRUCTION 8027.2E

Subj: INFORMATION AND REGULATIONS GOVERNING THE USE OF THE DEMOLITION RANGE

Ref: (a) CNO ltr ser 411FV/721884 of 8 May 1980
(b) NAVSEA OP-5 Vol 1
(c) Hazardous Waste Management Plan for SUBASE Kings Bay
(d) EODB 60A-1-1-21
(e) NAVSEA SW060-AA-MMA-010

Encl: (1) Demolition Range Use Notification
(2) Demolition Range Message Request (sample)
(3) Supervisor's Statement
(4) Worker's Statement
(5) Range Diagram

1. Purpose. To promulgate the procedures to be followed by personnel desiring to conduct ordnance disposal operations or demolition training at the Naval Submarine Base (SUBASE) Demolition Range.

2. Cancellation. NAVSUBASE KINGS BAY INSTRUCTION 8027.2D.

3. Discussion. The SUBASE "Class C" demolition range is managed and controlled by the Commanding Officer, SUBASE, Kings Bay, GA, per reference (a). References (b) through (e) dictate specific rules, regulations and guidelines for:

(a) Ordnance Handling and Safety (ref b)
(b) Hazardous Waste Management (ref c)
(c) EOD Specific Demolition Procedures (ref d)
(d) Demolition Materials (ref e)

All military or law enforcement agencies in the SUBASE area may use this range for disposal of unserviceable ordnance items or for demolition training as long as thoroughly qualified and certified personnel are conducting the operation. References (b) through (e) serve as the basis for conducting explosives operations and must be explicitly followed. Extra caution and care must be exercised during all disposal operations since the inherent hazards of unserviceable

ordnance are often increased by factors such as age, deterioration, damage, obsolescence, or questionable identity to item.

4. Review.

a. The Officer in Charge (OIC), Explosives Ordnance Disposal Detachment Kings Bay shall review this instruction annually or whenever there is a change or revision of a source document.

b. All Range Safety Supervisors shall review this instruction annually and sign enclosure (3).

c. All workers shall review this instruction prior to participating in demolition operations and sign enclosure (4).

5. Action.

a. A qualified/certified Range Safety Officer or Range Safety Supervisor must be on site and controlling the demolition/burn operation.

b. Range Scheduling. For routine operations:

(1) Written approval from CO, SUBASE must be obtained prior to operations. All enclosure (1) personnel, including EOD Det Kings Bay must be notified at least 24-48 hours in advance.

(2) Demolition/burn operations should be scheduled during normal business hours.

(3) Range use may be requested by message (enclosure (2)).

c. Prior to commencing demolition/burn operations. The Range Officer/Supervisor will conduct an "Operation Brief" with all personnel involved. Due to the variety of hazardous materials that could be disposed of or encountered on the range, the Range Officer/Supervisor must conduct a "Range Safety/Hazard Brief" to ensure all personnel are familiar with safety procedures and hazards that can be encountered. Positive control of all personnel must be maintained throughout the operation. The following conditions must exist:

(1) Meteorological limits to operation:

(a) Winds less than five (5) knots, and away from populated areas.

(b) No precipitation or fog.

(c) Favorable grass and weather. Fire Chief SUBASE has the final say in determining if wind and/or grass conditions (higher than 18 inches or too dry) are unsatisfactory for demolitions/burns.

(d) Demolition operations must be suspended during electrical or thunder storms which are within 5 miles of the range.

(2) Radio communications must be established with NSB Security.

(3) Bravo flag must be conspicuously displayed prior to and during operations. A flag pole is installed at the demolition range.

(4) Security personnel have been briefed and are positioned at appropriate intersections, as shown in enclosure (5), according to the size of the demolition shots anticipated:

(a) USS PROTEUS Blvd and Sparrow Trail

(b) Shrike Trail and Kingfisher Trail

(c) Meadowlark Trail and Dredge Disposal area access

(d) USS MARIANO VALLEJO and USS JOHN C. CALHOUN Dr.

(5) The Range Officer/Supervisor shall ensure that all materials to be transported to the range for burning are weighed prior to burning.

d. Demolition Operation.

(1) The Range Officer/Supervisor must maintain radio contact with Security and Fire Department personnel until completion of demolition operations.

(2) The Range Officer/Supervisor must ensure no detonation exceeds the 150 pound limit established by reference (a).

(3) All detonations should be dual primed.

(4) There must be a delay of at least 15 seconds between multiple shots to ensure "countability" of shots.

(5) Permission to prime and initiate explosive shots must be obtained from the Range Officer/Supervisor.

(6) All misfires will be handled in accordance with reference (e).

(7) The EOD range shall be inspected by the Range Officer/Supervisor following each detonation. Any debris remaining shall be collected for further treatment or off-site disposal. Wastes may not be stored at the EOD facility.

e. Burn Operations.

(1) All burning procedures will comply with OP 5, Volume 1, Chapter 13; specifically: all safety equipment will be on hand, and all safety precautions will be observed and ensured by the Range Safety Supervisor.

(2) Take all necessary measures to ensure minimum contamination of soil occurs by using burn-drum and secondary containment pan appropriately. The burn-drum and secondary containment pan shall be inspected prior to each burn to verify the integrity of the units. Prior to ignition, the burn-drum must be placed in the secondary containment vessel located downrange. The Range Officer/Supervisor shall ensure that all burn materials transported to the range are placed within the burn drum for burning.

(3) All ashes must be collected, bagged, weighed, and labelled prior to turn-in to the SUBASE Hazardous Waste Storage Facility Operator. Waste may not be stored at the EOD facility.

f. Equipment. The Range Safety Supervisor shall determine the equipment required to complete a specific operation. Standardized load out lists should be developed for each operation.

g. Safety Equipment. In addition to Fire/EMS on standby during disposal and burn operations, two fire blankets shall be on site during all burn operations.

h. Post Operation.

(1) Remove all trash brought onto the demolition range, and ensure no hazardous debris, such as fragments or ash residue, remains.

(2) The Range Officer/Supervisor will notify appropriate personnel when operations are completed.

5. Prohibition. No waste from either open burning or open detonation operations may be stored at the EOD facility.

C. E. ELLIS

Distribution: (SUBASE 5605.1I)
List A, B, G, H (less 4, 6, 7), J (Case I)

MEMORANDUM

From: Requesting Command
To: Commanding Officer, Naval Submarine Base, Kings Bay

Subj: DEMOLITIAN RANGE USE NOTIFICATION

Ref: (a) NAVSUBASEKINGSBAYINST 8027.2E

1. In accordance with reference (a), the following request is submitted.

DATE AND TIME OF OPERATION _____

PURPOSE OF OPERATION _____

Commanding Officer's Authorization: Approved / Disapproved

_____
(Commanding Officer's Signature)

Notification: (To be completed by Range Safety Officer/Supervisor prior to range use. Include date and point of contact.)

Fire/EMS (2263) _____

Security Department (2168) _____

Recreation Department (8103) (Etowah Park) _____

Resident OIC of Construction (2671) (ROICC) _____

BOSC SAFETY (8592) _____

SUBASE CDO (2020/4703) _____

DOSF (TRF) (1853) _____

DEMOLITION RANGE MESSAGE REQUEST (sample)

UNCLASSIFIED

01 01 000000Z DTE YR RR RR UUUU

///SAMPLE ONLY///

YOUR COMMAND/ACTIVITY

CO SUBASE KINGS BAY GA

EODGRUTWO DET KINGS BAY GA

UNCLAS //N08027//

SUBJ: USE OF NSB DEMO RANGE

MSGID/GENADMIN/YOUR COMMAND//

REF/A/DOC/SUBASEINST/15OCT91//

AMPN/SUBASEINST 8027.2E//

RMKS/

1. IAW REF A REQ USE OF NSB DEMO RANGE AND SUPPORT FACILITIES FOR: DATE/ TYPE OF OPERATION.

2. AMPLIFYING REMARKS//

///SAMPLE ONLY///

UNCLASSIFIED

SUPERVISOR'S STATEMENT

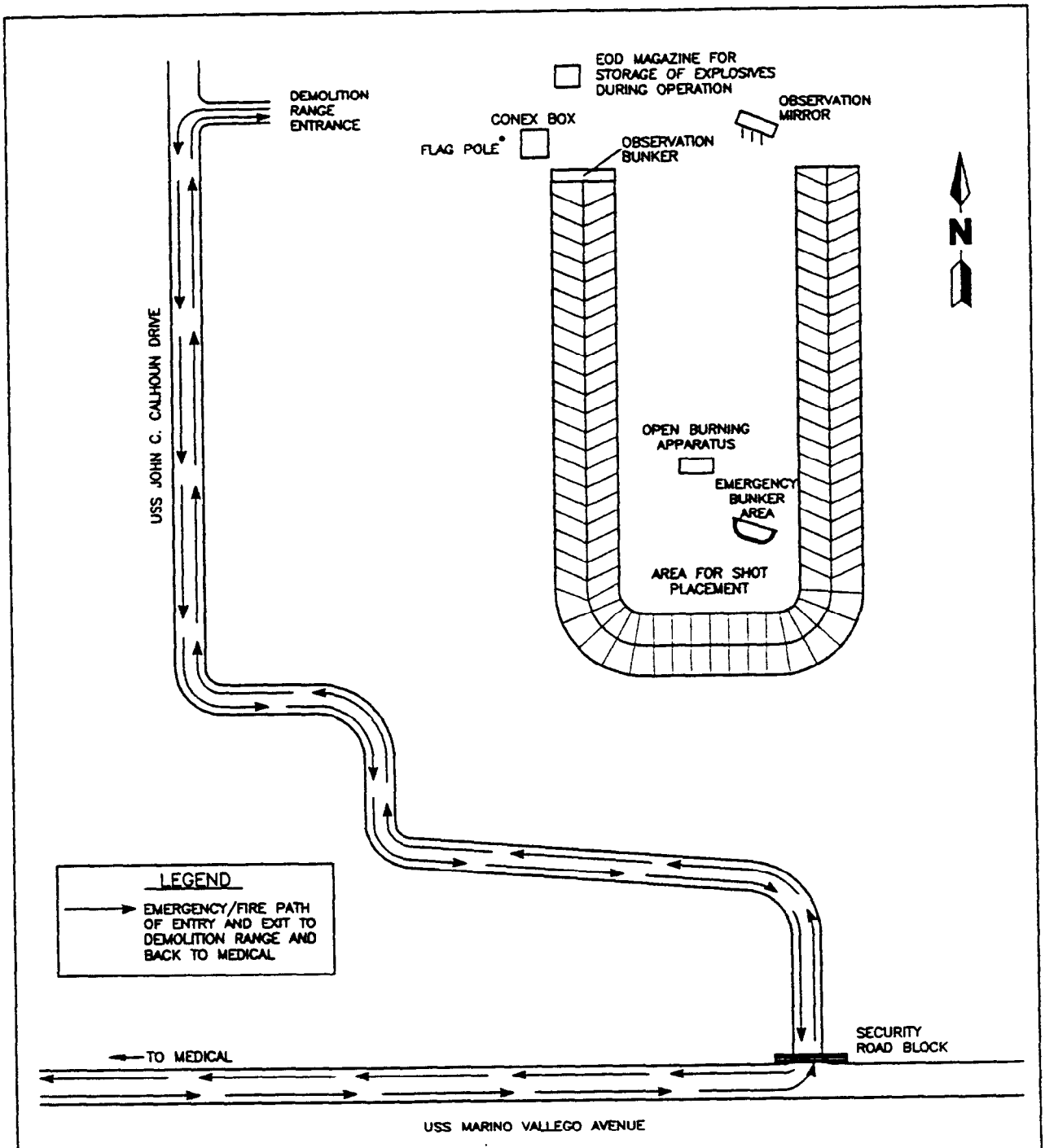
I have read this SOP. I understand it. To the best of my knowledge the processing described within this SOP can be done in a safe, healthful and environmentally sound manner. I have made sure all persons assigned to this process are qualified and have read and understand the requirements of this SOP and have signed the workers statement for this process. I will conduct an annual review of this SOP during recurring processing. If deviations from this SOP are necessary, I will ensure that this processing is stopped until the SOP is revised and approved. If unexpected safety, health or environmental hazards are found, I will make sure this processing is stopped until the hazards have been eliminated.

SUPERVISOR'S NAME	DATE	SUPERVISOR'S NAME	DATE

WORKER'S STATEMENT

I have read this SOP and I have received the safety/hazard control briefing. I understand them. I will follow this SOP unless I identify a hazard not addressed in it or encounter an operation I do not understand. If that occurs, I will stop processing and notify my immediate supervisor.

WORKER'S NAME	DATE	SUPERVISOR'S NAME	DATE



SOURCE: Recreated from Modification to the Part B Permit Application for Naval Submarine Base, Kings Bay, Georgia (March, 1992).

NOT TO SCALE

OPEN BURNING/OPEN DETONATION RANGE EMERGENCY ROUTE

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE KINGS BAY, GEORGIA

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APPENDIX D-2

WASTE ANALYSIS PLAN FOR
RADIOACTIVE POTASSIUM CHROMATE SOLUTION

1. WASTE GENERATION. Potassium Chromate (K_2CrO_4) solution is generated while performing work on, or in support of, ships' tanks. The concentration of potassium chromate in solutions in service is maintained less than 3,000 parts per million (ppm). The potassium chromate solution is controlled as mixed radioactive and hazardous waste because it is a waste which contains radioacivity subject to Naval Nuclear Propulsion Program requirements and the concentration of chromium in the waste is greater than 5.0 ppm. The waste contains hexavalent chromium at concentrations of less than 800 ppm. Analysis of the potassium chromate solution results in small volumes of analytical waste which may have pH<2.

2. WASTE ANALYSIS. The concentration of chromium in the waste is based on process knowledge and laboratory testing. The concentration of potassium chromate is monitored and maintained as part of the water chemistry control of shipboard systems. The concentration of potassium chromate is typically maintained between 1,000 ppm and 2,000 ppm, and will not exceed 3,000 ppm. This is equivalent to a chromium concentration of less than 800 ppm.

3. WASTE DESIGNATOR. The test waste designates as characteristic toxic for chromium. The EPA hazardous waste number is D007. Analytical wastes also have an EPA hazardous waste number of D002.

4. FREQUENCY OF RE-EVALUATION. This waste stream will be re-evaluated when the process changes or regulatory requirements change. This plan will be reviewed annually to ensure it is still accurate and complete.

5. LAND DISPOSAL RESTRICTIONS (LDR). This waste, as generated, is prohibited from land disposal as specified in GRR 391-3-11-16 and 40 CFR Part 268. This waste meets the definition of a wastewater per 40 CFR Part 268.2. There is no applicable treatment technology specified under 40 CFR Part 268.42, Table 2. The waste would therefore require treatment to meet concentration limits under 40 CFR Part 268.43, Table CCW. The Environmental Protection Agency acts jointly with Georgia Department of Natural Resources in enforcing land disposal restrictions and the Best Demonstrated Available Technology (BDAT) rules in Georgia.

6. TREATMENT BY GENERATOR. Treatment by generator will consist of neutralization followed by cement based stabilization. Treatment will be performed in a less than 90 day accumulation area. The potassium chromate solution will be solidified together

with other radioactive liquid to meet the disposal site acceptance criteria prohibiting the disposal of wastes containing free liquids. Solidification of this liquid is a standard process throughout the Naval Nuclear Propulsion Program for disposal of low level radioactive liquids that are unsuitable for reprocessing for reuse.

The treatment process utilizes the paddle drum and cement silicate method to solidify liquids. For analytical wastes only, the pH of the liquid is adjusted by adding sodium hydroxide to achieve a neutral or basic pH between 7 and 11. Potassium chromate solutions and analytical wastes are added as makeup water to other radioactive liquid waste. The pH of the liquid is adjusted to a neutral or basic pH. Ferrous sulfate ($FeSO_4$) and hydrated lime ($Ca(OH)_2$) are added to reduce the chromium from hexavalent to trivalent and precipitate the chromium as an hydroxide. The liquid is added to cement in the paddle drum and mixed to obtain a homogenous mixture. The paddle drum is the primary accumulation container. Sodium silicate is added to harden the mixture quickly. The cement is allowed to set for a minimum of 24 hours while venting through a HEPA filter to dissipate minimal heat given off during the curing process. The drum is inspected for the presence of free standing liquid and the hardness of the cement. The drum is shipped for burial as low level radioactive waste.

7. ANALYSIS OF REPRESENTATIVE SAMPLES. The paddle and drum silicate process requires 35 gallons of liquid waste for solidification. Only small amounts of potassium chromate are expected to be generated and require solidification. This waste stream will be combined with other radioactive liquids requiring solidification in order to minimize accumulation times and radioactive waste volumes. The following waste analysis assumes the worst case of solidifying a drum of potassium chromate solution waste only in order to verify that all lower percentage mixtures would be non-hazardous after solidification.

8. SAMPLE FABRICATION AND ANALYSIS.

a. A bench scale test of solidification of potassium chromate was performed by Trident Refit Facility, Bangor. Samples of the solidified potassium chromate solution were analyzed for the EPA Toxicity Characteristic Leaching Potential (TCLP) for chromium per 40 CFR Part 261.24 (b) and consistent within GRR 391-3-11-.07.

b. TCLP analyses were performed for chromium leachability on bench scale samples of solidified potassium chromate by Trident Refit Facility, Bangor. Puget Sound Naval Shipyard Environmental Laboratory independently analyzed the samples. The shipyard laboratory operates under a Quality Assurance Program accredited by the American Association of Laboratory Accreditors for environmental parameters. The TCLP leachate concentrations of chromium for all samples of the solidified solution were less than 5 mg/L.

c. The bench scale samples, free from radioactivity, were fabricated based on process knowledge of the expected waste. The samples represent the worst case, as they were made with the maximum potassium chromate concentration (3000 ppm). The actual waste typically has a lower concentration of potassium chromate (1000 ppm to 2000 ppm). Sampling the actual waste is avoided to preclude additional radioactive material handling and additional personnel exposure to radiation.

9. LDR DETERMINATION. GRR 391-3-11-.16 prohibits land disposal of this waste unless the concentration based on treatment standard is met prior to land disposal (under 40 CFR Part 268.42). The process of solidification of the potassium chromate solution waste constitutes treatment. This treatment converts the waste into a non-hazardous waste (nonwastewater TCLP extract is less than 5.0 ppm) as required.

WASTE ANALYSIS PLAN FOR
RADIOACTIVE MERCURIC NITRATE SOLUTION

1. WASTE GENERATION. Mercuric nitrate ($Hg(NO_3)_2$) solution is generated during the analysis of radioactive liquid samples for chlorides. The test determines chloride concentration by titration of the sample with a mercuric nitrate standard. Hydrogen peroxide and nitric acid are added to the sample prior to titration. When the analysis is completed, the mercuric nitrate solution is controlled as mixed radioactive and hazardous waste because it is a waste which contains radioacivity subject to Naval Nuclear Propulsion Program requirements and the concentration of mercury in the waste is greater than 0.2 parts per million (ppm). The waste has mercury as Hg^{+2} at concentrations of less than 25 ppm and a pH of about 3.0.

2. WASTE ANALYSIS. The concentration of mercury in the waste is based on process knowledge. The laboratory procedure for the test specifies the amount of reagents used. Each analysis generates about 110 ml of waste, to which less than 1.0 ml 0.028 N $Hg(NO_3)_2$ has been added. This is equivalent to a mercury concentration in the waste of less than 25 ppm.

3. WASTE DESIGNATOR. The waste designates as characteristic toxic for mercury. The EPA hazardous waste number is D009.

4. FREQUENCY OF RE-EVALUATION. This waste stream will be re-evaluated when the process changes or regulatory requirements change. This plan will be reviewed annually to ensure it is still accurate and complete.

5. LAND DISPOSAL RESTRICTIONS (LDR). This waste, as generated, is prohibited from land disposal as specified in GRR 391-3-11-.16 and 40 CFR Part 268. This waste meets the definition of a wastewater per 40 CFR Part 268.2. There is no applicable treatment technology specified under 40 CFR Part 268.42, Table 2. The waste would therefore require treatment to meet concentration limits under 40 CFR Part 268.43, Table CCW. The Environmental Protection Agency acts jointly with Georgia Department of Natural Resources in enforcing land disposal restrictions and the Best Demonstrated Available Technology (BDAT) rules in Georgia.

6. TREATMENT BY GENERATOR. Treatment by generator will consist of cement based stabilization. Treatment will be performed in a less than 90 day accumulation area. The mercuric nitrate solution will be solidified together with other radioactive liquid to meet the disposal site acceptance criteria prohibiting the disposal of wastes containing free liquids. Solidification of this liquid is a standard process throughout the Naval Nuclear Propulsion Program for disposal of low level radioactive liquids that are unsuitable for reprocessing for reuse.

The treatment process utilizes the paddle drum and cement

silicate method to solidify liquids. Using this process, mercuric nitrate solutions are added as makeup water to other radioactive liquid waste. The pH of the liquid is adjusted to a neutral or basic pH. The liquid is added to cement in the paddle drum and mixed to obtain a homogenous mixture. The paddle drum is the primary accumulation container. Sodium silicate is added to harden the mixture quickly. The cement is allowed to set for a minimum of 24 hours while venting through a HEPA filter to dissipate minimal heat given off during the curing process. The drum is inspected for the presence of free standing liquid and the hardness of the cement. The drum is shipped for burial as low level radioactive waste.

7. ANALYSIS OF REPRESENTATIVE SAMPLES. The paddle and drum silicate process requires 35 gallons of liquid waste for solidification. Only small amounts of mercuric nitrate solution are expected to be generated and require solidification. This waste stream will be combined with other radioactive liquids requiring solidification, in order to minimize accumulation times and radioactive waste volumes. The following waste analysis assumes the worst case of solidifying a drum of mercuric nitrate solution waste only in order to verify that all lower percentage mixtures would be non-hazardous after solidification.

8. SAMPLE FABRICATION AND ANALYSIS.

a. A bench scale test of solidification of mercuric nitrate was performed by Charleston Naval Shipyard. Samples of the solidified mercuric nitrate solution were analyzed for the EPA Toxicity Characteristic Leaching Potential (TCLP) for mercury per GRR 391-3-11-.07 and 40 CFR Part 261.24 (b).

b. TCLP analyses were performed for mercury leachability on solidified samples of mercuric nitrate solutions. Sample solutions containing 20 ppm, 100 ppm and 500 ppm of mercury (Hg^{+2}) were solidified. The TCLP leachate concentrations of mercury for the solidified solutions containing 20 ppm and 100 ppm of mercury were less than 0.2 ppm. The TCLP leachate concentration of mercury for the solidified solution containing 500 ppm of mercury was greater than 0.2 ppm

c. The method of fabrication of the test sample was as follows.

(1) Simulate test waste using mercuric nitrate solutions containing 20 ppm, 100 ppm and 500 ppm of mercury.

(2) Adjust the pH of the waste solution using ammonium hydroxide to between 7 and 11. Solidify each of the sample waste solutions in accordance with the following formula:

Volume Solution	Cement	Sodium Silicate
35 gallons	210 lbs	4 gallons

Note: The above formula was scaled down to produce one cup samples.

After the cement set, it was allowed to cure for 30 days.

d. The solidified samples of the mercuric nitrate test solutions were given the following Sample ID numbers by General Engineering Laboratories, Charleston, S.C., who performed the TCLP analyses:

Sample Location	Sample ID#
1) 20 ppm mercury	491
2) 100 ppm mercury	492
3) 500 ppm mercury	493

e. The results of the TCLP analysis showed the leachate concentrations of mercury from samples #491 and #492 were less than the EPA toxicity characteristic limit of 0.2 ppm for mercury. Copies of the certificate of analysis for the samples are provided with this enclosure. The experimental data establishes mercuric nitrate solutions with mercury concentrations less than 100 ppm prior to solidification will be non-hazardous after solidification. As discussed above, the mercury concentration of the mercuric nitrate solution to be solidified will be less than 25 ppm.

f. The bench scale samples, free from radioactivity, were fabricated based on process knowledge of the expected waste. The samples indicate a concentration four times the maximum concentration of mercury in the waste will meet the EPA Toxicity limit. Sampling the actual waste is avoided to preclude additional radioactive material handling and additional personnel exposure to radiation.

9. LDR DETERMINATION. GRR 391-3-11-.16 and 40 CFR Part 268 prohibit land disposal of this waste unless the concentration based on treatment standard for mercury is met prior to land disposal (under 40 CFR Part 268.42. The process of solidification of the mercuric nitrate solution waste constitutes treatment. This treatment converts the waste into a non-hazardous waste (nonwastewater TCLP extract is less than 0.2 ppm) as required.

WASTE ANALYSIS PLAN FOR
RADIOACTIVE SILVER NITRATE SOLUTION

1. WASTE GENERATION. Silver nitrate ($Ag(NO_3)$) solution is generated during the analysis of radioactive liquid samples for chlorides. The test is conducted in a test tube with silver nitrate and nitric acid added to the liquid sample. When the analysis is completed, the silver nitrate solution is controlled as mixed radioactive and hazardous waste because it is a waste which contains radioacivity subject to Naval Nuclear Propulsion Program requirements and the concentration of silver in the waste is greater than 5.0 parts per million (ppm). The waste has silver as Ag^{+1} at concentrations of about 250 ppm and a pH of about 3.0.

2. WASTE ANALYSIS. The concentration of silver in the waste is based on process knowledge. The laboratory procedure for the test specifies the amount of reagents used. Each test tube contains 25-30 ml of radioactive liquid for analysis, to which four (4) drops (about 0.2 ml) of 0.3 N $AgNO_3$ is added. This is equivalent to a silver concentration in the waste of between 215 and 260 ppm.

3. WASTE DESIGNATOR. The waste designates as characteristic toxic for silver. The EPA hazardous waste number is D011.

4. FREQUENCY OF RE-EVALUATION. This waste stream will be re-evaluated when the process changes or regulatory requirements change. This plan will be reviewed annually to ensure it is still accurate and complete.

5. LAND DISPOSAL RESTRICTIONS (LDR). This waste, as generated, is prohibited from land disposal as specified in GRR 391-3-11-.16 and 40 CFR Part 268. This waste meets the definition of a wastewater per 40 CFR Part 268.2. There is no applicable treatment technology specified under 40 CFR Part 268.42, Table 2. The waste would therefore require treatment to meet concentration limits under 40 CFR Part 268.43, Table CCW. The Environmental Protection Agency acts jointly with Georgia Department of Natural Resources in enforcing land disposal restrictions and the Best Demonstrated Available Technology (BDAT) rules in Georgia.

6. TREATMENT BY GENERATOR. Treatment by generator will consist of cement based stabilization. Treatment will be performed in a less than 90 day accumulation area. The silver nitrate solution will be solidified together with other radioactive liquid to meet the disposal site acceptance criteria prohibiting the disposal of wastes containing free liquids. Solidification of this liquid is a standard process throughout the Naval Nuclear Propulsion Program for disposal of low level radioactive liquids that are unsuitable for reprocessing for reuse.

The treatment process utilizes the paddle drum and cement silicate method to solidify liquids. Using this process, silver nitrate solutions are added as makeup water to other radioactive liquid waste. The pH of the liquid is adjusted to a neutral or basic pH. The liquid is added to cement in the paddle drum and mixed to obtain a homogenous mixture. The paddle drum is the primary accumulation container. Sodium silicate is added to harden the mixture quickly. The cement is allowed to set for a minimum of 24 hours while venting through a HEPA filter to dissipate minimal heat given off during the curing process. The drum is inspected for the presence of free standing liquid and the hardness of the cement. The drum is shipped for burial as low level radioactive waste.

7. ANALYSIS OF REPRESENTATIVE SAMPLES. The paddle and drum silicate process requires 35 gallons of liquid waste for solidification. Only small amounts of silver nitrate solution are expected to be generated and require solidification. This waste stream will be combined with other solutions and radioactive liquids requiring solidification, in order to minimize accumulation times and radioactive waste volumes. The following waste analysis assumes the worst case of solidifying a drum of silver nitrate solution waste only in order to verify that all lower percentage mixtures would be non-hazardous after solidification.

8. SAMPLE FABRICATION AND ANALYSIS.

a. Bench scale mock-up solidification of silver nitrate solutions were performed by Charleston Naval Shipyard. Samples of the solidified silver nitrate solution were analyzed for the EPA Toxicity Characteristic Leaching Potential (TCLP) for silver per GRR 391-3-11-.07 and 40 CFR Part 261.24(b).

b. TCLP analyses were performed for silver leachability on solified samples of silver nitrate solutions. Sample solutions containing 500 ppm and 600 ppm concentrations of silver nitrate were solidified. The TCLP leachate concentrations of silver in each case were less than 0.5 ppm.

c. The method of fabrication of the test sample was as follows.

(1) Simulate test waste using 500 ppm and 600 ppm silver nitrate solutions.

(2) Adjust the pH of the waste solution using ammonium hydroxide to between 7 and 11. Solidify each of the sample waste solutions in accordance with the following formula:

Volume Solution	Cement	Sodium Silicate
35 gallons	210 lbs	4 gallons

Note: The above formula was scaled down to produce one cup samples.

After the cement set, it was allowed to cure for 30 days.

d. The solified samples of the silver nitrate solutions were given the following Sample ID numbers by General Engineering Laboratories, Charleston, S.C., who performed the TCLP analyses:

Sample Location	Sample ID#
1) 500 ppm silver nitrate	490
2) 600 ppm silver nitrate	489

e. The results of the TCLP analysis showed the leachate concentrations of silver from samples #490 and #489 were both less than 0.500 ppm which is less than the EPA toxicity characteristic limit of 5.0 ppm for silver. Copies of the certificate of analysis for the samples are provided with this enclosure. Both samples contained silver concentrations (Ag^{+1}) greater than 300 ppm. The experimental data establishes that silver nitrate solutions with silver concentrarions less than 300 ppm prior to solidification will be non-hazardous after solidification.

e. The bench scale samples, free from radioactivity, were fabricated based on process knowledge of the expected waste. The samples indicate a concentration greater then the maximum concentration of silver in the waste will meet the EPA Toxicity limit. Sampling the actual waste is avoided to preclude additional radioactive material handling and additional personnel exposure to radiation.

9. LDR DETERMINATION. GRR 391-3-11-.16 and 40 CFR Part 268 prohibit land disposal of this waste unless the concentration based on treatment standard for silver is met prior to land disposal (under 40 CFR Part 268.42). The nonwastewater limit for silver is 5.0 ppm (TCLP). The process of solidification of the silver nitrate solution waste constitutes treatment. This treatment converts the waste into a non-hazardous waste (nonwastewater TCLP extract is less than 5.0 ppm) as required.

WASTE ANALYSIS PLAN FOR
RADIOACTIVE LIQUID WASTE WITH LOW pH

1. WASTE GENERATION. Radioactive liquid with low pH is generated during the analysis of radioactive liquid samples. Reagents used during analysis of radioactive liquid include acids. When the analysis is completed, test waste with low pH is controlled as mixed radioactive and hazardous waste because it is a waste which contains radioacivity subject to Naval Nuclear Propulsion Program requirements and the waste exhibits the characteristic of corrosivity. The test waste has a pH of less than 2.0.

2. WASTE ANALYSIS. The pH in the test waste is based on process knowledge. The laboratory procedure for the test specifies the amount of reagents used.

3. WASTE DESIGNATOR. The waste designates as characteristic corrosive. The EPA hazardous waste number is D002.

4. FREQUENCY OF RE-EVALUATION. This waste stream will be re-evaluated when the process changes or regulatory requirements change. This plan will be reviewed annually to ensure it is still accurate and complete.

5. LAND DISPOSAL RESTRICTIONS (LDR). This waste, as generated, is prohibited from land disposal as specified in GRR 391-3-11-.16 and 40 CFR Part 268. This waste meets the definition of a wastewater per 40 CFR Part 268.2. The applicable treatment technology specified under 40 CFR Part 268.42 is: deactivation to remove the hazardous characteristic of a waste due to ignitability, corrosivity, and /or reactivity (DEACT). This waste would need to be treated by DEACT prior to land disposal.

6. TREATMENT BY GENERATOR. Treatment by generator will consist of neutralization. Neutralization is performed as one step in the solidification procedure. Treatment will be performed in a less than 90 day accumulation area. The liquid waste with low pH will be neutralized and solidified together with other radioactive liquid to meet the disposal site acceptance criteria prohibiting the disposal of wastes containing free liquids. Solidification of this liquid is a standard process throughout the Naval Nuclear Propulsion Program for disposal of low level radioactive liquids that are unsuitable for reprocessing for reuse.

The treatment process utilizes the paddle drum and cement silicate method to solidify liquids. Using this process, liquid wastes with low pH are added as makeup water to other radioactive liquid waste. The pH of the liquid is adjusted to a neutral or basic pH. The liquid is added to cement in the paddle drum and mixed to obtain a homogenous mixture. The paddle drum is the primary accumulation container. Sodium silicate is added to harden the mixture quickly. The cement is allowed to set for a

minimum of 24 hours while venting through a HEPA filter to dissipate minimal heat given off during the curing process. The drum is inspected for the presence of free standing liquid and the hardness of the cement. The drum is shipped for burial as low level radioactive waste.

7. LDR DETERMINATION. GRR 391-3-11-.16 and 40 CFR Part 268 prohibit land disposal of this waste unless the technology based treatment standard for corrosivity is met prior to land disposal (under 40 CFR Part 268.42 for deactivation). The process of neutralization of the liquid waste with low pH constitutes treatment. This treatment converts the waste into a non-hazardous waste as required.

SECTION E
GROUNDWATER MONITORING SYSTEM

There are no groundwater monitoring requirements for the hazardous waste facility.

To confirm that the OB/OD operations are not adversely affecting the environment, SUBASE Kings Bay has implemented a program of annual soil monitoring. The soil monitoring program will provide an indication of whether there is a potential for groundwater contamination.

Monitoring wells are not feasible at the OB/OD site due to the presence of the berm surrounding the site. Placement of wells within the bermed area would create a high probability of damage to the well from the detonation activities. Wells placed outside the berm would be over 100 feet from the area of concern; it is not felt that these wells could provide significant information. Therefore, surface and near-surface soil monitoring will be used to evaluate the area for contamination that could impact groundwater.

SUBASE Kings Bay conducts groundwater monitoring at each SWMU to survey for effects of releases from waste disposed at the sites. The SWMUs are inactive and investigations are generally performed using a phased approach. The groundwater quality at each SWMU is evaluated in comparison to background groundwater quality. The details of a groundwater monitoring program for an SWMU are presented to the Georgia Department of Natural Resources (DNR), Environmental Protection Division, for approval.

The following sections provide a brief description of the area hydrogeology and detail the soil monitoring program.

E.1 SITE HYDROGEOLOGY. The uppermost aquifer in the Kings Bay area is the unconfined water table (surficial) aquifer. Below the surficial aquifer lies the upper confining unit. The primary artesian aquifer, or the Floridan aquifer system, lies below the upper confining unit. The surficial aquifer extends from approximately 6 to 90 feet below land surface (bls) and consists of post-Miocene Age unconsolidated fine- to very coarse-grained, well sorted sand. Layers of poorly sorted sand, clayey silty sand, and, at depth, argillaceous limestone are interbedded with these well-sorted sand beds.

The upper confining unit, beginning at approximately 90 feet bls, ranges from 380 to 530 feet thick. This confining unit separates the water table aquifer from the Floridan aquifer system and includes not only extremely low permeability clay, but also moderately permeable sand beds. The confining unit is a regional formation, the Hawthorn Formation of late and middle Miocene Age, present from north Florida to South Carolina.

The Floridan aquifer system is composed of upper and lower permeable zones, termed the Upper Floridan and the Lower Floridan aquifers, respectively. This unit is used for drinking water, as it is of potable quality and provides sufficient yield.

The water table is characteristically quite shallow beneath the Base. Near the OB/OD facility, groundwater lies only a few feet below ground throughout most of

the year. Water levels from wells screened in the water table aquifer indicate that shallow groundwater flow in the OB/OD area is directed east toward Marianna Creek and Kings Bay. The hydraulic gradient in this direction is approximately 0.0024 foot per foot.

E.2 ANNUAL SOIL SAMPLING PROGRAM.

E.2.1 Soil Monitoring Soil in the immediate vicinity of the burn pad and detonation site will be sampled on an annual basis. This annual sampling will investigate the possible presence and extent of any residual soil contamination resulting from operations at the OB/OD facility. If contamination is encountered, further investigations will be conducted to determine the full extent of the impact. If warranted, a plan for corrective action will be developed, submitted, and implemented for remediation.

The presence of contamination will be determined through use of the USEPA Health and Environment Assessment (HEA) criteria or by statistical comparison with a quantified background sample when no HEA criteria exist. All samples, including the background sample, will be analyzed for reactivity and the TCLP for selected metals.

E.2.2 Sample Locations and Depths Soil samples will be collected from three areas located within the detonation control berm and one background area located northeast of the berm. Figure E-1 shows the sampling locations. During each annual sampling event, the background sample will be collected first to prevent cross contamination.

Two samples will be collected near the burn pan, directly north and south of the pan, approximately 3 feet from the unit. Samples will be collected from the top 6 inches of soil at both locations.

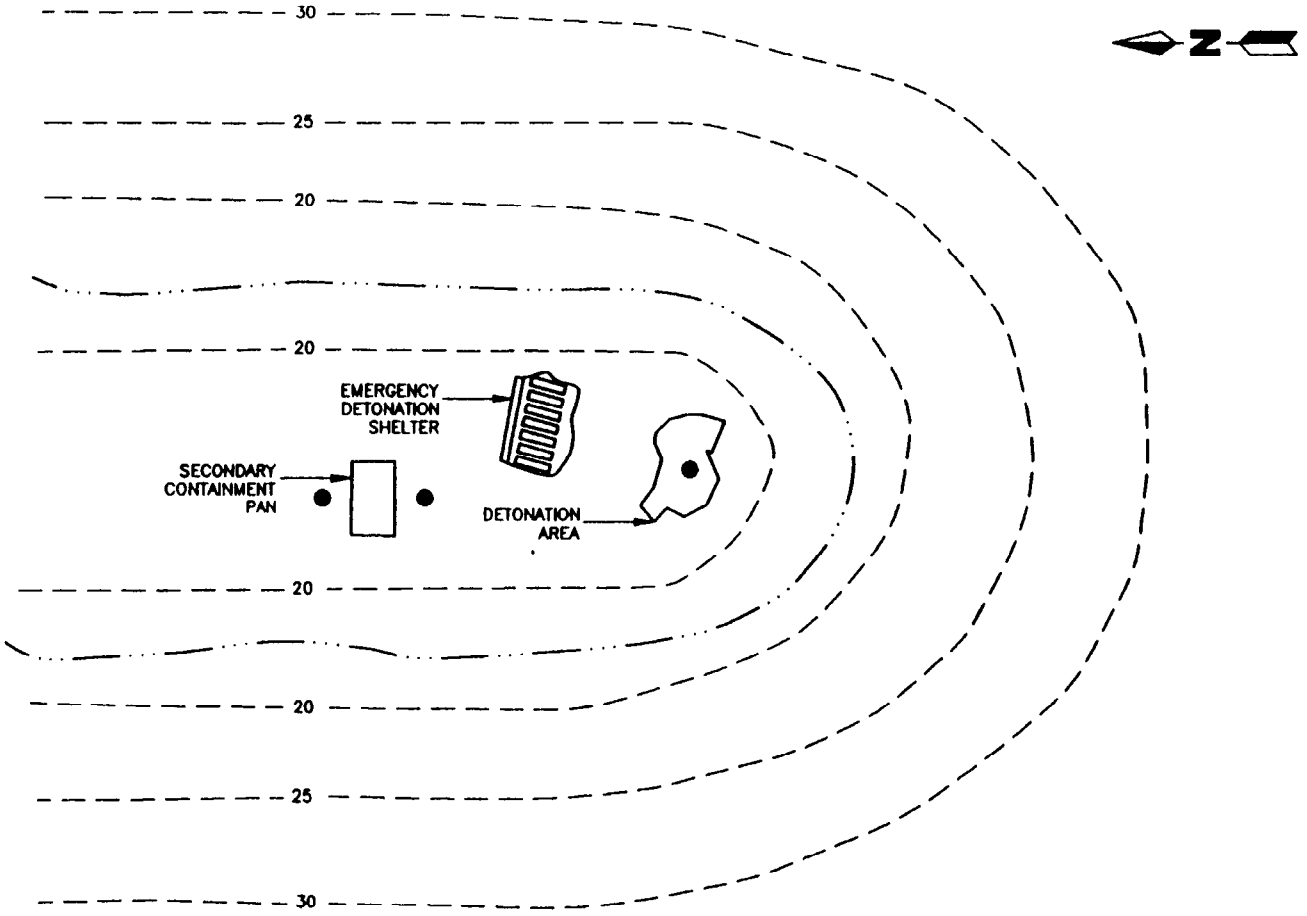
The third sample location is located directly in the center of the detonation area. Three samples will be collected vertically from this location. Sample intervals are 0 to 1, 1 to 2, and 2 to 3 feet bls.

The background sample will be collected from an area away from the OB/OD facility and from an interval of 1 to 2 feet bls.

E.2.3 Sampling Methodology Field sampling teams will consist of at least two people and EOD personnel will be present during all sampling activities. One person will collect the sample while the other person maintains complete notes on sampling procedures and daily activities.

Disposable latex surgical gloves will be worn during all sampling activities. To prevent cross contamination, a clean pair will be donned before each sample is collected.

All samples will be collected with a clean, stainless-steel hand auger and placed in containers appropriate for the parameters of concern (Table A-4). Immediately after collection, samples will be placed on ice in ice chests. On the day of collection, samples will be labeled and shipped in ice chests via overnight courier to a USEPA-approved laboratory.



SOURCE: Recreated from modification to the Part B permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992). Some details deleted due to illegible type on original.

NOT TO SCALE

LEGEND

● – SOIL SAMPLING LOCATION

FIGURE E-1

ANNUAL SOIL SAMPLING LOCATIONS

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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A COC form will be completed and kept with the samples inside the cooler at all times. Sampling personnel will maintain custody from the time of sample collection until the cooler is delivered to the courier service.

The hand auger will be decontaminated before the first sample is collected and between each sample collection. Decontamination will consist of an Alconox™ wash and potable water rinse.

E.2.4 Sample Analysis Samples will be analyzed for barium, cadmium, mercury, selenium, and lead using the TCLP and reactivity tests. Analytical methods and sample quantities for each constituent are presented in Table E-1.

Table E-1
Analytical Requirements

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Parameter	Method	Container	Preservative	Holding Time
TCLP Metals	1311 (TCLP) 6010 or 7000 Series 7471 (mercury)	16 ounce glass jar, Teflon™-lined septa	4 °C	28 days to extraction 56 days to extraction
Reactivity	U.S. Bureau of Mines 1. Gap test 2. Detonation, deflagration, and transition test	4 Liters	N/A	N/A

Notes: TCLP = Toxicity Characteristic Leachate Procedure.
°C = degrees Celsius.
N/A = not applicable.

SECTION F
PREPAREDNESS AND PREVENTION PLANS

The information in this section is provided in accordance with the requirements of 40 CFR 270.14(b)(4), (5), (6), (8), and (9); 40 CFR 264.14; 264.15; 164.30 through 164.37; and 264.174.

F.1 SECURITY [40 CFR 270.14(b)(4)].

F.1.1 Security Procedures and Equipment Overall security for SUBASE Kings Bay is the responsibility of the Base Security Officer. A pass issued by the Base Security Office is required for entry onto the Base. Transport access to SUBASE is gained only through one of five entrances. The Stimpson Gate on Stimpson Drive is staffed 24 hours a day by security police. The St. Marys Gate (also referred to as Daniel Webster Gate) on the south side of the Base on Point Peter Road is also continuously manned. The Jackson Road Gate is located north of Stimpson Gate and is open and manned during brief periods in the morning and afternoon on weekdays. Franklin Gate located to the south of Stimpson Gate is manned during normal working hours. The fifth gate located north of Jackson Gate on USS Proteus Boulevard is locked except for special occasions and is for limited access to SUBASE. The entire Base is fenced along land boundaries.

In addition to the gate guards, the Base Security Officer and security personnel patrol the Base 24 hours a day, 7 days a week. All security personnel are equipped with radios for immediate reporting of emergencies or security problems. The entire station is connected to an internal telephone system that is also used for off-station communication.

The hazardous waste facility is surrounded by a chain-link fence with a locking gate. In addition, the facility meets the security requirements of 40 CFR 264.14 by being part of SUBASE Kings Bay, which has a complete security system as described in the previous paragraphs. Besides the Base security system and perimeter fence, the building is kept locked except when the hazardous waste Facility Operator is there. All hazardous wastes are kept within the locked facility.

Warning Signs. Signs reading "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT" and "NO SMOKING" will be posted on the hazardous waste facility in sufficient numbers to be seen from any approach. All signs will be legible from a distance of 25 feet and will be written in English.

The OB/OD facility has danger signs posted that read "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT." These signs are posted at the entrance to the facility on John C. Calhoun Road and on each side of the facility. In addition, "NO SMOKING" signs are posted at the facility. These signs have been produced so that they are legible from at least 25 feet and are written in English.

F.1.2 Waiver SUBASE Kings Bay does not request a waiver of the security requirements stated in 40 CFR 264.14(a)(1) and (2) regarding injury to intruder and violation by intruder.

F.2 INSPECTION SCHEDULE [40 CFR 270.14(B)(5)].

F.2.1 General Inspection Requirements SUBASE conducts general inspections of the hazardous waste management area for structural deterioration, unauthorized discharges, equipment malfunctions, and security problems. These general inspections are performed by the Fire Department Inspector (quarterly), Public Works (weekly), and the Safety Officer (at least quarterly). These inspections, as described in Table F-1, are in addition to the requirements for a hazardous waste storage facility.

Table F-1
General Inspections

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Inspector	Nature of Inspections	Frequency
Safety Officer	The SUBASE Kings Bay Safety Officer conducts periodic inspections of all buildings for compliance with the OSHA and ANSI standards, as well as Navy requirements. These inspections are documented and include ventilation, safety equipment, and procedures.	At least quarterly
Fire Inspector	The SUBASE Kings Bay Fire Department Fire Inspector conducts periodic inspections of all buildings for fire safety and compliance with NFPA and Navy fire safety standards. Inspector initiates changes if required.	At least quarterly
Public Works	The Public Works maintenance staff conducts periodic inspections of all station facilities for evidence of malfunctions, deteriorations, and needed improvements.	Weekly

Notes: SUBASE = Naval Submarine Base.
OSHA = Occupational Safety and Health Administration.
ANSI = American National Standards Institute.
NFPA = National Fire Protection Agency.

F.2.2 OB/OD Inspection Requirements The OB/OD facility is a structureless unit; therefore, the structural inspection requirements of 40 CFR 264.14 do not apply. However, the grounds of the OB/OD facility will be inspected prior to and after each burn or detonation operation. The inspector will look for UXOs or large items of debris, such as metal casings, and dispose of them before any destruction operations are undertaken. Also, the containment device used for conducting open burning operations will be inspected for signs of significant deterioration that may allow initiating fluids or ash to leak onto the ground. The inspector will inspect all welds to ensure that they are intact and ensure that there are no unexploded materials remaining in the device from the previous burn.

In addition, emergency equipment will be inspected. Portable fire extinguishers will be inspected to ensure that they are in proper working order. The pressure gauge will be check and the pressure noted. If the pressure gauge indicates that the extinguisher requires recharging, the inspector will make arrangements with the Base Fire Department to get the extinguisher recharged.

NAVSEA OP 5 requires that there be two fire blankets at the OB/OD facility when burning and/or detonation operations are being conducted. The inspector will check to ensure that they are at the facility and that they are in a condition

suitable for their purpose. In addition, the inspector will ensure that safety glasses are present. He will also inspect the oxygen breathing apparatus (OBA) canisters, full-face respirators, and Scott™ air packs (self-contained breathing apparatus [SCBA]) on a monthly basis and after each use. The inspector will note the condition of the air canisters, the pressure gauges on the air canisters, valve, and seals and ensure face masks are fully intact and free from cracks or significant deterioration.

The inspection table for the OB/OD facility is included as Table F-2. EOD will be responsible for maintaining the inspection records for a period of at least 3 years.

F.3 WAIVER OF PREPAREDNESS AND PREVENTION REQUIREMENTS [40 CFR 270.14(b)(6)].

SUBASE Kings Bay does not request a waiver of the preparedness and prevention requirements of 40 CFR, Subpart C. Documentation of compliance with these requirements is contained below and in Section D and Section G.

F.3.1 Equipment Requirements

F.3.1.1 Internal Communication Internal communication in the storage area at the hazardous waste facility will be by voice. Fire alarm pull stations are located at all exits of the building and fire alarm horn and light devices are located in the stairwell and in the office area. Heat detectors designed for the detection of fires will be located in each storage bay, the forklift charging area, the repackaging bay, the center aisle, laboratory, and the mechanical room. The actuation of any manual fire alarm or automatic heat detector will cause all building evacuation alarm devices to sound continuously and a coded signal will be transmitted over the station fire alarm system circuit.

Internal communication at the OB/OD facility will be by voice. The number of personnel involved in activities at the unit will be limited, but in no case will operations be conducted by only one person. This will ensure that at least one person is able to notify emergency response personnel in the event that the other person is injured or in the case of an emergency situation.

F.3.1.2 External Communications Telephones located in the hazardous waste facility will provide external communications to other areas on-base and off-base services, if needed. Also, the fire detection and alarm system will provide a means of direct contact with the SUBASE Fire Department.

F.3.1.3 Emergency Equipment Portable fire extinguishers, emergency shower and eye wash stations, water supply (for decontamination), personal protective equipment (discussed in Section G), a first aid kit, and absorbents are maintained at the hazardous waste facility. This equipment is identified on Figure D-2 and a list of the equipment, quantity, and location is provided in Section G.

Emergency equipment for the OB/OD facility is maintained and stored at the EOD office located in Building 2013 at SUBASE Kings Bay. Emergency equipment is taken to the OB/OD facility when burning or detonation operations are conducted. The facility is unmanned except when treatment operations are conducted; therefore, emergency equipment is not maintained at the unit. Emergency equipment consists of portable fire extinguishers, citizens band (CB) radios contained in

Table F-2
Open Burning and Open Detonation Facility Inspection Schedule

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Item	Problem	Frequency
I. Safety and Emergency Equipment		
Fire extinguishers	Needs recharging	Prior to disposal operations
Fire blankets	Present	Prior to disposal operations
Radios	Operative	Prior to disposal operations
Safety glasses	Present	Prior to disposal operations
Full face respirators	Cracks and deteriorated lines	Monthly and after use
OBA canisters	Dents, cracks, and signs of deterioration and low oxygen.	Monthly and after use
Scott™ air packs (SCBA)	Dents, cracks, and/or signs of deterioration and low oxygen.	Monthly and after use
II. Facility Inspection		
Unexploded materials	Present	Prior to disposal operations
Metal fragments	Present	Prior to disposal operations
Cartridges	Present	Prior to disposal operations
Ash and residues	Present	Prior to disposal operations
Open burning containment device	Broken welds, holes, or cracks	Prior to disposal operations

Notes: OBA = oxygen breathing apparatus.
SCBA = self-contained breathing apparatus.

Inspector's name _____

Title _____

Date of Inspection_____

Time of Inspection_____ (Military Time)

EOD vehicles, and safety glasses. In addition, OBA canisters, full-face respirators, and Scott™ air packs are available for use if toxic fumes are to be generated. The Base Fire Department is capable of responding within 5 minutes to any emergency situation encountered at the OB/OD facility.

F.3.1.4 **Water for Fire Control** Fire hydrants nearest to the hazardous waste facility are identified on Figure D-1 and Figure G-2. In addition, the only fire hydrant near the OB/OD facility is identified on Figure B-2. These hydrants will provide water for fire fighting. Water pressure in the area of the proposed hazardous waste facility and the OB/OD facility ranges from 70 to 75 pounds per square inch.

F.3.2 **Aisle Space Requirements** Aisles in the hazardous waste facility will provide sufficient space to allow unobstructed movement of personnel for inspections. At a minimum, 2.5-foot aisles will be maintained between rows of hazardous waste. Aisle space requirements are further discussed in Section D.

The OB/OD facility does not store containers of waste and, therefore, the aisle space requirement does not apply directly. This facility is designed to allow ample room for vehicles to enter and leave and, in the event of an emergency, response personnel will have ample room to maneuver.

F.4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [40 CFR 270.14(b)(8)].

F.4.1 **Loading and Unloading Operations** All loading and unloading operations at the hazardous waste facility will take place at the loading dock and in the center aisle. The center aisle has been designed to contain spills that occur during these operations. The drums will be transported on pallets for safe handling.

There are no loading and unloading docks at the OB/OD facility. Safety procedures for unloading hazardous explosive materials have been discussed in Section D.

F.4.2 **Run-off** There will be no contaminated run-off from the hazardous waste facility under normal conditions. The facility will be completely curbed with interior sections designed to collect and hold all spills. The completely enclosed building will retard rainwater from entering the facility and protect runoff from contamination.

At the OB/OD facility, contaminated run-off during burning operations is prevented by conducting the burn in a secondary containment device. This device is suitable to contain all generated ash, which may be hazardous, as well as initiating liquids such as kerosene or diesel fuel. The open detonation exercises are conducted on the ground and there are no structures in place to prevent contaminated run-off. The logistics behind this is that containment devices will be destroyed during the detonation operations and it is assumed that the explosive will react to 99.999 percent complete.

F.4.3 **Water Supplies** Groundwater contamination at the hazardous waste facility is prevented by eliminating the discharge of hazardous waste onto unprotected ground. The storage cells are designed to contain spills and allow for cleanup, thus preventing groundwater contamination.

Groundwater contamination resulting from open burning is prevented by containing residual ash and initiating liquids resulting from open burning of waste explosives.

The nearby sources of surface water at the OB/OD facility include Marianna Creek, Kings Bay, and the Cumberland Sound. Destruction operations are not expected to contribute to surface water contamination due to the minute amount of generated by-product materials.

F.4.4 Equipment and Power Failure Electrical equipment used in the storage area of the hazardous waste facility includes lights. A translucent panel located in each bay will provide natural light. If a power failure occurs and there is not sufficient sunlight to continue operations, all handling operations will be discontinued. In this event, emergency lights located in the center aisle will provide sufficient light for safe exit from the building.

There are no electrical sources available at the OB/OD facility. Therefore, this regulatory guideline does not apply.

F.4.5 Personnel Protection Equipment Information on the characteristics of the hazardous wastes stored in the hazardous waste facility is provided in Section C. Protective equipment in the hazardous waste facility include an SCBA, acid resistant coveralls, gloves, and face shields. Further details may be found in Section G. Use of protective equipment is covered in the initial and annual personnel training program (Section H).

Personnel protective equipment used at the OB/OD facility include portable fire extinguishers, face shields, OBA canisters, full face respirators, and SCBA. The protective equipment is stored at the EOD office and maintained by the same group. Under normal operations, respiratory protection is not required.

F.5 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES [40 CFR 270.14(b)(9)].

F.5.1 Precautions to prevent Ignition or Reaction of Ignitable or Reactive Wastes The hazardous waste facility will be used to store ignitable wastes and incompatible wastes. Very small quantities of reactive wastes may also be stored in the facility. The OB/OD facility will only treat wastes that are reactive and ignitable. The precautions designed to prevent accidental ignition have been described in Section D. The following precautions will be taken to prevent reactions involving wastes stored at the hazardous waste facility.

The compatibility of all containers with the contained waste is ensured by the exclusive use of DOT specification containers appropriate to the waste (as determined from 49 CFR 172.101 and 173).

To prevent external ignition, signs bearing the legend "NO SMOKING" will be placed at the hazardous waste facility. In addition, spark-proof tools, bung pullers, wrenches, etc., will be used when working near ignitable wastes.

To prevent external ignition of explosive hazardous wastes, signs bearing the legend "NO SMOKING" have been posted and spark resistant tools will be used when working with explosive hazardous wastes. The requirements have been discussed in greater detail in Section D.

F.5.2 Management of Incompatible Wastes in Containers Incompatible wastes generated are identified in an incompatibility table in Section C (see Table C-2). To ensure that incompatible wastes are not mixed in the same container or in an unwashed container that previously held an incompatible waste, the Environmental Engineer will provide a copy of that table to each generating unit. Additionally, training for personnel handling hazardous waste includes a discussion of that table and instructions on segregating incompatible wastes. Personnel are specifically trained to compare wastes to be added to a drum with the label on the drum and to refer to the incompatibility table before adding waste. The Environmental Engineer and his staff provide assistance to each generating unit in selecting the proper container for each waste generated. Hazardous wastes are never placed in unwashed containers, except materials that are returned to their original containers as waste.

SECTION G
HAZARDOUS WASTE FACILITY CONTINGENCY PLAN

The information in this section is provided in accordance with the requirements of 40 CFR 270.14(b)(7) and Subpart D of 40 CFR 264.

SUBASE Kings Bay is essentially self-contained for emergency response to fires, explosions, and spills. The Base maintains a 24-hour fire department for response to fires and mobile spill control equipment for response to spills. The following Contingency Plan will be coordinated with each on-base department with emergency response duties. The Contingency Plan has been prepared as an independent document and is included here in its entirety.

G.1 INTRODUCTION AND GENERAL INFORMATION.

G.1.1 Introduction This Contingency Plan presents procedures and equipment maintained By SUBASE Kings Bay to respond to hazardous situations related to the generation, accumulation, treatment, and storage of hazardous wastes.

Responses to emergencies involving hazardous wastes will be supervised by an Emergency Coordinator. The Emergency Coordinator will have the ultimate authority and responsibility for the following:

1. determining if the emergency involves a spill of a reportable quantity of material (per 40 CFR 117),

2. assessing the immediate threat to the environment or human health beyond the boundaries of the Base,

3. determining when to initiate notification procedures to other agencies,

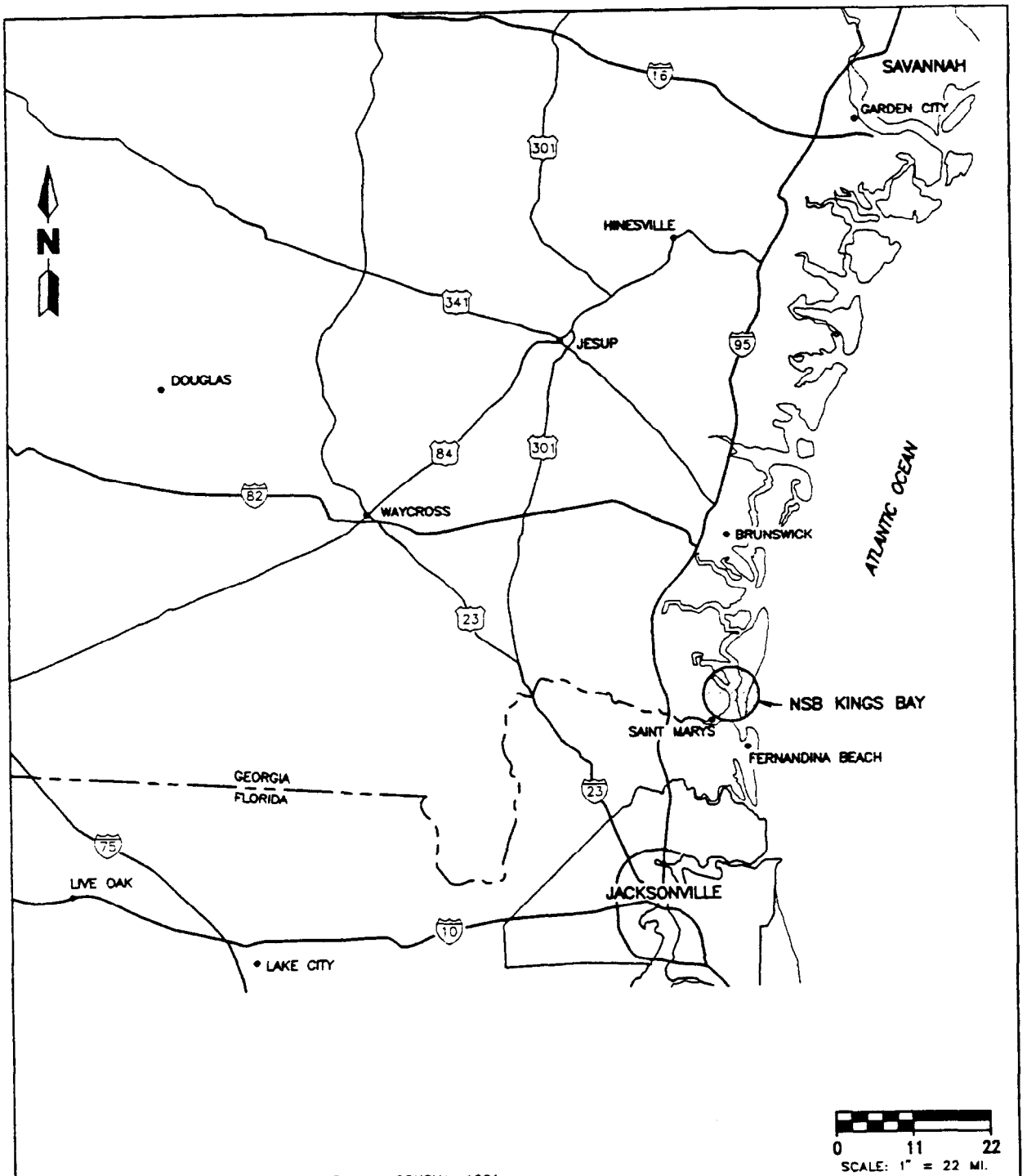
4. ensuring that proper cleanup equipment and procedures are available, and

5. providing assistance personnel and equipment to work centers for spill response.

Departments responsible for emergency response are identified in this plan. Specific methods of response to spill, fires, and flood emergencies involving hazardous waste are given. Emergency and protective equipment is also described.

G.1.2 General Information SUBASE Kings Bay is located in the southeast corner of Georgia, approximately 8 miles north of the Georgia-Florida border, in Camden County. The vicinity map presented on Figure B-1 depicts SUBASE Kings Bay with respect to the nearby cities of St. Marys, Georgia; and Jacksonville, Florida.

Naval Submarine Base Kings Bay is the Navy's newest major base. Its mission is the support of the submarine launched ballistic missile system and operation of facilities providing that support. The Base Commanding Officer has responsibility for operations of more than $150 million worth of facilities and cognizance



SOURCE: MODIFIED FROM GEORGIA ROADMAP, H.M. GOUSHA, 1991.

FIGURE G-1

REGIONAL LOCATION MAP

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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over activities on the more than 16,000 acres of property at Kings Bay. In addition to the Base's primary mission of support of submarine operations, support is provided to a growing number of tenant commands.

SUBASE Kings Bay generates, treats, and stores hazardous waste. A base map of SUBASE Kings Bay identifying the hazardous waste facility is included as Figure B-2 and is located in a pocket at the end of this permit application. A site plan of the hazardous waste facility is presented on Figure G-2 (located in the back of this permit).

G.2 EMERGENCY COORDINATORS. In an emergency, the Emergency Coordinator listed below (primary first, then alternate) will be contacted. The listed individuals have the authority to commit the necessary resources of the Base and have been trained in emergency response. Their authority to commit the resources of the Base is delegated from the Public Works Officer.

Primary Emergency Coordinator	Alternate Emergency Coordinator
Michael Anderson	James E. More
Environmental Engineer	Environmental Engineer
(912) 673-4620 (office)	(912) 673-4759 (office)
(912) 638-4981 (home)	(912) 882-2466 (home)
524 Wesley Circle	102 Partridge Lane
St. Simons Island, GA 31522	St. Marys, GA 31558

Other emergency organizations and telephone numbers are listed in Table G-1. The person who will call these numbers during normal working hours is the hazardous waste coordinator, Michael Anderson, at (912) 673-4620 and during off duty hours, it will be the Command Duty Watch Station Officer at (912) 673-4703 or 2020.

G.3 IMPLEMENTATION CRITERIA. The Contingency Plan must be implemented under the following circumstances.

1. Fire and Explosion

    a. Fire causes release of toxic fumes.
    b. Fire spreads beyond area of ignition.
    c. Fire threatens offsite areas.
    d. Fire-fighting agents result in contaminated runoff.
    e. Imminent threat of explosion.

2. Spills and Leaks

    a. Fire hazard exists due to spilled material.
    b. Toxic fume hazard exists.
    c. Groundwater may be threatened.
    d. Spill threatens offsite geography.
    e. Spill threatens navigable water.

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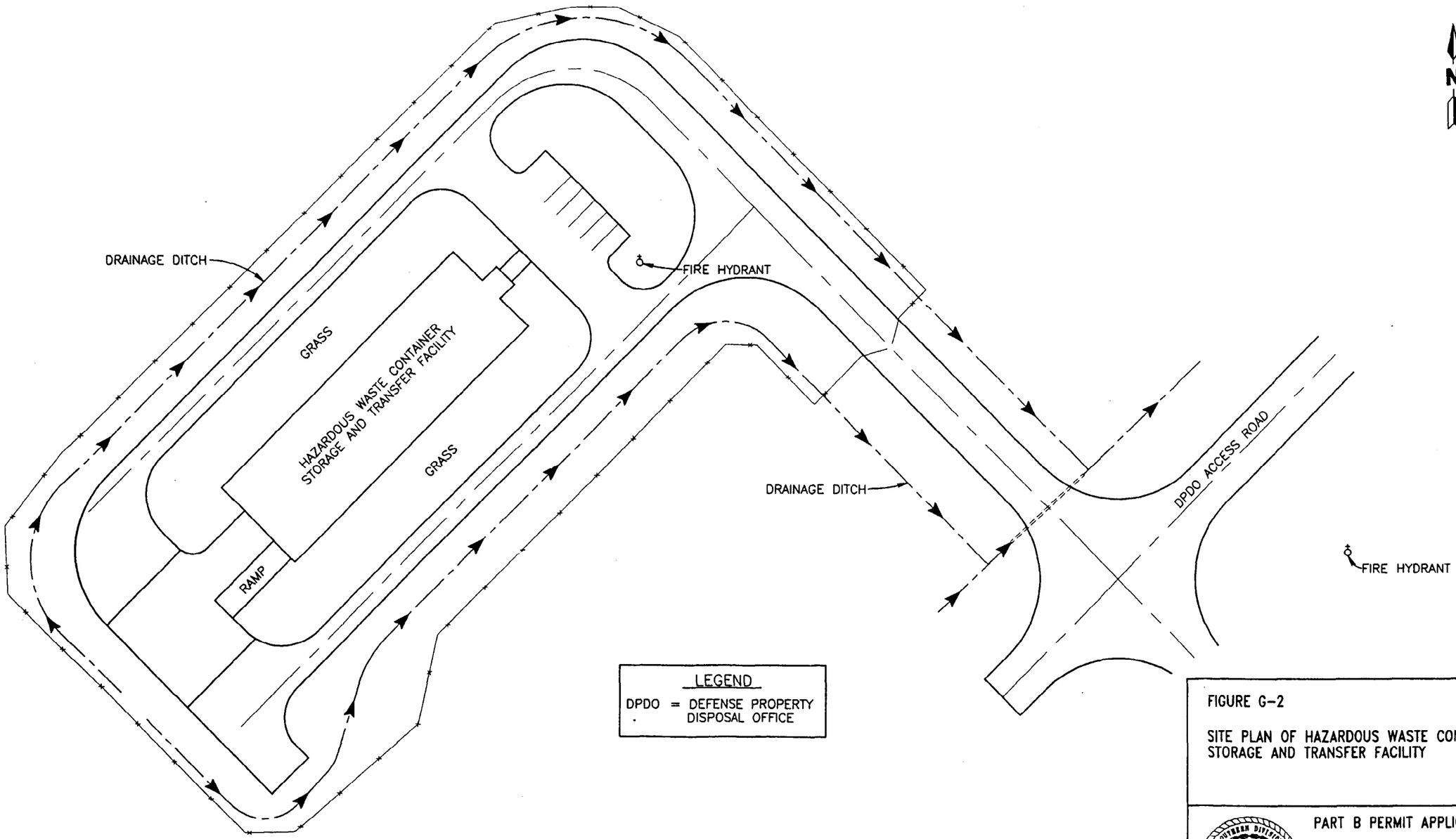

FIGURE G-2

SITE PLAN OF HAZARDOUS WASTE CONTAINER STORAGE AND TRANSFER FACILITY

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

SOURCE: Recreated from modification to the Part B Permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992) and as-built drawings of the storage facility. Some details deleted due to illegible type on original.

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Table G-1
Emergency Organization

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Emergency	Organization	Telephone[1]
Injury or chemical exposure	Base Clinic	673-4268 673-4247
Fire or explosion	Base Fire Department	673-3333
	Explosive Ordnance Disposal Detachment	673-2078
Hazardous material spill	Base Fire Department	673-2222
Spill in waterway	National Response Center	(800) 424-8802
	Operations Officer	673-2549
	USEPA Region IV	(404) 881-4062
Natural disaster	Base Security	673-2145
	Disaster Preparedness Defense	673-4802
All of the above	Georgia Emergency Response	(404) 656-4300

[1] All area codes are 912 unless otherwise specified.

Note: USEPA = U.S. Environmental Protection Agency.

G.4 EMERGENCY RESPONSE PROCEDURES.

G.4.1 Notification In the event of an emergency situation that meets the implementation criteria, the Emergency Coordinator must be notified by the discoverer. The Emergency Coordinator will make the Federal, State, local, and Navy-required official notifications, if necessary, after assessing the situation. The Emergency Coordinator will also notify the Base Security Office, Fire Department, and clinic, if necessary.

G.4.2 Identifying Types of Waste The Emergency Coordinator will determine the type of waste involved, or threatened, in the emergency by reference to the hazardous waste storage log. If the containers can be approached safely, this identification will be made from the labels on the containers.

G.4.3 Assessment The Emergency Coordinator, assisted by the Base Fire Department Response Unit, will determine whether the emergency poses a major threat sufficient to activate the Contingency Plan. If the Emergency Coordinator determines that an occurrence could threaten human health or the environment outside the facility, he must immediately notify the Georgia DNR (404/656-7802), the Georgia Emergency Response Center (404/656-4300), and/or the National Response Center (800/424-8802). The report must include:

1. name and telephone number of reporter;
2. name and address of facility;
3. time and type of incident (e.g., release or fire);
4. name and quantity of material(s) involved, to the extent known;
5. extent of injuries, if any; and
6. possible hazards to human health or the environment outside the facility.

G.4.4 Control Procedures Potential emergency incidents may be classified under one of the following: (1) fire and explosion or (2) spills and leaks. Additional guidance related to fires and spills is contained in the following paragraphs.

Fire and Explosion. The hazardous waste facility will have two ABC-type fire extinguishers mounted not more than 60 inches from the floor. In the event of a small fire, these extinguishers should be used.

If the fire cannot be extinguished with the extinguishers, the Base Fire Department and the Emergency Coordinator should be telephoned (call Fire Department first). Notify Fire Department Dispatcher that a fire has been seen in the hazardous waste facility.

The Base Fire Department will initiate immediate response as follows.

1. They will ensure that all personnel have evacuated the affected area and give first aid to injured personnel.

2. They will evacuate any loading and unloading vehicles if they are present.

3. They will contact the Emergency Coordinator (who will notify all proper Navy commands and Federal, State, and local officials as required) and Base Security.

4. If the Fire Commander orders a limited evacuation, the Emergency Coordinator will request Base Security to evacuate all personnel within a 1,000-foot radius of the area.

5. Fire Department will conduct fire extinguishing efforts.

6. If the situation warrants, the Fire Commander may telephone or radio for assistance from nearby municipal fire departments.

7. An "all clear" signal will be given when the Fire Commander and the Emergency Coordinator agree that the emergency is over.

Spills and Leaks. The most probable emergencies involving spills or leaks of hazardous waste from containers are:

- spills caused by accidents during loading of waste at generating work centers,
- spills as a result of vehicular accident during movement of waste,
- spills caused by accidents during loading and unloading operations at the storage building, or
- leaks from stored containers at the temporary collection areas and the storage building.

All loading, transfer, and unloading operations are conducted under the close and direct supervision of employees trained in emergency response. Therefore, a trained and qualified person will always be immediately available under the most probable spill scenarios.

In the event of a spill or leak from one or more containers, the Emergency Coordinator will make an immediate assessment of the degree of hazard posed by the spill. This assessment will include the type of material spilled, direction of movement of spill and associated vapors (if any), potential for injury, and the threat of fire or explosion. Based on this assessment, the Emergency Coordinator will initiate one or both of the following actions:

1. direct the Base Fire Department where to mobilize and stand by at the site for fire protection, and/or

2. request Public Works personnel and/or the Base Operating Services (BOS) contractor personnel to handle spill response under his supervision.

The area impacted by the spill will be evacuated for a distance of 100 feet in all directions. It is not probable that any spill or leak from a container will require greater evacuation.

The Emergency Coordinator will direct BOS contractor personnel to bring liquid spill absorbent material, 85-gallon recovery drums, and personal protective equipment to the spill location. The BOS contractor personnel, instructed in safety procedures and use of emergency equipment, will contain the spill with absorbent and load solidified material into recovery drums.

The Emergency Coordinator will initiate all required notifications for the spill of a reportable quantity of a hazardous substance (1 pound unless a higher or lower quantity has been specified in 40 CFR 117) or hazardous waste.

If the Emergency Coordinator determines that onsite efforts are insufficient or if navigable waters adjacent to SUBASE Kings Bay are threatened, he will notify the appropriate authorities.

The Emergency Coordinator will initiate all notifications required by the Contingency Plan. These notifications include the reporting of a spill of a reportable quantity of any hazardous material and reports to the appropriate Navy command. The procedures to be followed in the event of a spill include:

1. locate injured personnel, if any, and notify the Base clinic to mobilize ambulances and medical personnel;

2. evacuate area within 100-foot radius and alert downwind employees;

3. dispatch BOS contractor emergency personnel and associated response equipment to site of spill;

4. monitor progress to determine whether additional assistance is required;

5. clean-up personnel must use personal protective equipment (gloves, suits, and breathing apparatus);

6. remove leaking drums to recovery drums;

7. use absorbent material to contain and solidify liquid;

8. place all solidified spill material and contaminated spill debris in drums; and

9. dispose contaminated soil at a hazardous waste disposal facility.

After the immediate emergency, the Emergency Coordinator must assess whether unprotected soil has been contaminated and arrange for the containerization and removal of contaminated soil to protect groundwater supplies from contamination (it is unlikely that sufficient material can spill at one time to pose an immediate threat to groundwater). The Emergency Coordinator must also ensure that all emergency equipment and safety equipment is cleaned, decontaminated, and restored for immediate use. Stock of absorbent and recovery drums must be checked and replenished if necessary.

<u>G.4.5 Prevention of Recurrence of Fires, Explosions, or Releases</u> The Emergency Coordinator may order the temporary removal of containers of waste from the storage building or generating work center after an emergency until the area is safe and no recurrence can be expected.

G.4.6 Storage and Treatment of Released Material The Emergency Coordinator will order all spilled material, clean-up debris, and contaminated soil to be containerized and stored until transfer to an offsite treatment or disposal facility.

G.4.7 Incompatible Wastes The Emergency Coordinator will ensure that released material incompatible with other wastes is segregated during temporary storage and that incompatible wastes are not accidently mixed during clean up.

G.4.8 Post-Emergency Equipment Maintenance After an emergency event, all emergency equipment will be cleaned so that it is suitable for reuse or it will be replaced. Before operations are resumed, an inspection of all safety equipment will be conducted. The Georgia DNR (404/656-2833) will be notified that post-emergency equipment maintenance has been performed and operations will be resumed.

G.4.9 Container Spills and Leakage Response to container spills and leakage is discussed in Subsection G.4.4.

G.5 EMERGENCY AND PROTECTIVE EQUIPMENT. Materials and equipment stored and necessary for safe emergency response at SUBASE Kings Bay are listed in Table G-2. Personal protective equipment is stored at the hazardous waste container storage building, the generating work centers, and the Base Fire Station.

Emergency equipment, primarily fire extinguishers and absorbent material, must be located at all hazardous waste collection points and at the hazardous waste container storage building. Employees must be trained in the use of this equipment in case of a hazardous waste emergency.

Protective personal equipment, first aid kits, and fire extinguishers should be located at all hazardous waste generating work centers and at the hazardous waste container storage building. Specific personal protection equipment provided to employees handling hazardous waste include:

- gloves,
- safety boots,
- splash aprons,
- safety glasses,
- cartridge respirators, and
- chemical resistant suits (Tyvek™).

Additionally, SCBA and complete chemical suits are available at the fire station.

G.6 DISTRIBUTION AND COORDINATION. SUBASE Kings Bay has entered into a coordination agreement with the BOS contractor to provide hazardous substance spill cleanup. In addition, copies of the Contingency Plan will be sent to the Clinic, Fire Department, Safety Office, Security Officer, and EOD Group Two Detachment.

G.7 EVACUATION PLAN. The Emergency Coordinator and the Fire Chief have been trained in determining hazardous conditions and are responsible for determining

Table G-2
Materials and Equipment for Safe Emergency Response

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Material and Equipment[1]	Location	Function	Capabilities or Capacities
Dump truck (3)	Building 2007	Transport of contaminated earth to hazardous waste facility.	6 cubic yards
Pumper trucks	Building 2004	Fire fighting	One 1,000-gallon, two 750-gallon, light water and foam capability.
Front-end loader	Building 207	Excavate earth	1/2 cubic yard bucket
Road grader (2)	Building 2007	Scrape earth	10-foot-wide blade
Explosion-proof pump	Building 2010	Pump liquids	200 gallons per minute
85-gallon recovery drums.	Hazardous waste facility	Spill response and overpack	Overpack 55-gallon drums and containerize spilled materials and spill debris.
Absorbent	Hazardous waste facility	Spill response	Use to solidify and contain spills and leaks from containers. Do not use on unneutralized acids or caustics.
Forklift	Hazardous waste facility	Drum removal	Use to move drums of waste that are leaking.
Self-contained breathing apparatus (SCBA).	Building 2004	Personal protection	
Fire extinguishers	Hazardous waste facility	Spill clean up	1.1 gallons per minute
Telephone	Hazardous waste office	Obtain assistance	Onbase and offbase contact with emergency response agencies.
Fire alarm	Hazardous waste facility	Obtain assistance	Direct contact with Base Fire Department.
Fire hydrants	See Figure G-2	Fire protection	Water supply at adequate volume and pressure.
Eyewash and shower	Hazardous waste facility	Decontamination	Decontaminante personnel assigned to hazardous waste building.
Safety glasses	Hazardous waste facility	Personal protection	Protect eyes
Rubber gloves	Hazardous waste facility	Personal protection	Hand protection
Safety boots	Hazardous waste facility	Personal protection	Foot protection
Cartridge respirators	Hazardous waste facility	Personal protection	Respiratory protection
Chemical resistant suits (Tyveks™)	Hazardous waste facility	Personal protection	Body protection
First aid kit	Hazardous waste facility	First aid	Minor treatment
Disaster recovery van	Building 2012		
Disposable clothing		Personal protection	
Scott™ air packs		Personal protection	

See notes at end of table.

Table G-2 (Continued)
Materials and Equipment for Safe Emergency Response

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Material and Equipment[1]	Location	Function	Capabilities
Disaster recovery van (continued)			
Full-face respirators and assorted cartridges		Personal protection	
Face shields		Personal protection	
Rubber gloves		Personal protection	
Soap		Decontamination	
Plastic bags		Decontamination	
Metal trash cans		Decontamination	
Absorbent materials		Decontamination	
Towels		Decontamination	
Mercury vacuum cleaner		Decontamination	
Mercury spill kits		Decontamination	
Shovels		Excavate and decontaminate	
Pry bars		Removal of lids	
Draeger™ multigas detector.		Detection of over 50 chemicals.	
Mercury sniffer		Mercury detection	
Combustible gas indicator.		Methane calibrated	
Oxygen meter		Determines adequacy of available oxygen.	
Atmosphere monitor		Detect hydrogen sulfide, carbon dioxide, and oxygen	
Radio and/or transmitter		Emergency frequencies	
Atmosphere monitoring		Detect hydrogen sulfide, carbon dioxide, and oxygen	

[1] The number in parenthesis represents the quantity of equipment available.

whether evacuations are necessary in the event of an emergency (except for evacuation due to destructive weather). Indication of the need to evacuate include conditions such as hissing drums, visible chemical clouds, or explosive conditions.

If the Emergency Coordinator determines that an evacuation of the area is necessary, Security will notify occupants and instruct them to leave the immediate vicinity.

Re-entry to the area will be allowed only when the Emergency Coordinator gives an "all clear" instruction.

G.8 REQUIRED REPORTS. In addition to the verbal notifications to be initiated by the Emergency Coordinator, written follow-up reports will be prepared. All emergencies that require the implementation of the Contingency Plan will be incorporated into the operating record of the facility and will be reported in writing within 15 days to the Director of the Georgia DNR. The report will detail name of the facility; date, time, and type of accident; type and quantity of material involved; extent of injuries; assessment of the impact on human health and the environment; and the quantity and disposition of material released. In addition, reports must be filed with the Public Works Officer and other Navy officials. After an emergency, the Emergency Coordinator will review the Contingency Plan for effectiveness and make changes as are appropriate. The plan will also be reviewed when emergency coordinators, emergency equipment, or the hazardous waste management plan are altered.

SECTION H
PERSONNEL TRAINING

The information in this section is provided in accordance with the requirements of 40 CFR 270.14(b)(12) and 40 CFR 264.16.

H.1 OUTLINE OF THE TRAINING PROGRAM. Hazardous waste handling personnel at SUBASE Kings Bay must successfully complete a training program that teaches them to perform their duties in a way that ensures compliance with the Hazardous and Industrial Waste Management Plan and the regulations. Personnel must be trained either before or within 6 months after assignment to a position that includes duties involving hazardous waste and may not work unsupervised until they have completed the training. However, respiratory training must be performed before any worker is required to wear a respirator. Additionally, personnel with duties that involve hazardous waste must take part in an annual review of the initial training.

The responsibilities and qualifications of designated employees in the hazardous waste generating units are detailed in a plan manual published by the Naval Energy and Environmental Support Activity (NEESA), *Navy Hazardous Material Environmental Management Program: Guide for the Hazardous Waste Management Plan*, NESO 20.2-029A, November 1981.

Table H-1 presents a syllabus for a Navy hazardous waste facility operator's course, which is used to meet SUBASE training needs.

H.1.1 Job Title and Job Description

Position Title: Environmental Engineer

Responsibilities:

- coordinator under delegation from Commanding Officer for all hazardous waste activities;
- liaison with generating units;
- obtain all necessary permits, licenses, and liaison with Federal, State, and local environmental regulatory agencies;
- initiate purchase of emergency equipment, waste handling equipment, and reference materials;
- acquire analytical tests of wastes and provide liaison with contract laboratory;
- supervise loading and unloading of hazardous wastes for disposal and provide liaison with disposal vendor;
- coordinate temporary collection areas in accordance with the waste management plan and appropriate regulations and permit conditions;

Table H-1
Course Syllabus from the Hazardous Waste Facility Operator's Course

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Introduction

A. Clean Water Act
B. Clean Air Act
C. Transportation Safety Act
D. Occupational Safety and Health Act (OSHA)
E. Toxic Substances Control Act (TSCA)
F. Resource Conservation and Recovery Act (RCRA)
G. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), i.e., Super fund
H. State regulations
I. Local regulations

Key Elements of RCRA

A. Definition of a hazardous waste
B. Manifest system for tracking hazardous waste from cradle to grave
C. Standards for generators and transporters
D. Permits for treatment, storage, and disposal facilities
E. Requirements for State programs
F. Requirements for waste analysis, facility inspection, personnel training, emergency and contingency plans, and closure plans.

Navy Directives and Policy

A. OPNAVINST 5090.1

Responsibilities

A. Commanding Officer
B. Supply Officer
C. Supervisory personnel
D. Hazardous Material and Environmental Engineer

Hazardous Material and Hazardous Waste Identification and Sources

A. Definitions
B. Hazardous waste inventory
C. Hazardous waste found in significant quantities
D. Significantly hazardous substances
E. Bulk waste
F. HMTA
G. Overhaul and decommissioning
H. PCBs
I. NRP
J. Ordnance waste
K. Consolidated hazardous item list
L. Hazardous Material Information System (HMIS)
M. Hazardous Material Safety Data Sheets
N. Chemical Hazardous Response Information System (CHRIS)
O. OHMTADS
P. CHEMTRAC (800 424-9300)

Collecting, Handling, and Storing Procedures

A. Introduction and general information
B. Proper collection, handling, and storing
C. Waste generation locations
D. Prevention of spills
E. Solvents (including organic solvents)
F. Plastics (problems in case of fire)
G. Metals
H. Significantly toxic metals
I. Asbestos
J. Safety practices and protective clothing
K. Fire classifications

See notes at end of table.

Table H-1 (Continued)
Course Syllabus from the Hazardous Waste Facility Operator's Course

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Labeling and Containerization

A. Department of Transportation labels
B. Chill label
C. Hazardous waste label
D. Types of containers

Facilities and Services Division Responsibility

A. Types of treatment systems
B. Disposal systems
C. Manifest systems

Spill Prevention Control and Countermeasures (SPCC)

Spill Contingency Planning

A. Definition of SPCC and Spill Contingency Plan
B. Responsibilities
C. Objectives of plan
D. Spill cleanup materials (small scale)
E. Spill response contacts
F. Spill response actions (small and large scale)
G. Knowledge of spilled material
H. Booms, skimmers, pumps, and dredging
I. Examples of good versus poor response actions
J. U.S. Navy discharge restrictions
K. Communications in an emergency

Onsite Training Procedures

Notes: OPNAVINST 5090.1 =
HMTA =
PCB = polychlorinated biphenyl.
NRP =
OHMTADS =
CHEMTRAC =

- maintain Spill Prevention Containment and Control (SPCC) plan and Contingency Plan, upgrade or modify plans, as required, and review plans after incidents;

- train SUBASE Kings Bay personnel in proper handling and storage of hazardous wastes; and

- prepare manifests and hazardous waste reports.

Qualifications: Must have knowledge of appropriate Federal, State, and local regulations; basic chemical principles; and hazardous waste handling procedures. In addition, a 4-year Bachelor of Science degree in the engineering field and 1 to 3 years experience in industrial pollution control is required for this position.

Position Title: Disaster Preparedness Officer

Responsibilities:

- inspects all safety equipment for applicability, conditions, and efficiency;

- performs safety audits to ensure safety operations of facility and compliance with Occupational Safety and Health Administration (OSHA) standards, American National Standards Institute (ANSI) standards, and Navy requirements; and

- recommends facility modifications when required to increase safe handling procedures.

Qualifications: Must have knowledge of appropriate OSHA, ANSI, and Navy standards.

Position Title: Hazardous Waste Facility Operator

Responsibilities:

- operates hazardous waste storage facility in accordance with hazardous waste management plan and the appropriate regulations and permit conditions;

- maintains operating log, performs regular inspections, and schedules maintenance; and

- requests purchase of waste handling equipment and reference materials.

Qualifications: Must have knowledge of appropriate Federal, State, and local regulations; base chemical principles; and hazardous waste handling procedures. In addition, the hazardous waste Facility Operator must have at least 6 months experience in industrial pollution control and have successfully completed the Hazardous Waste Facility Operator's Course conducted by NEESA.

Position Title: Hazardous Waste Handlers (May have various other internal job and/or position titles, referred to as hazardous waste handlers for permit purposes.)

Responsibilities:

- operates forklift and other material handling equipment,
- repackages materials as may be required,
- notifies Emergency Coordinator in the event of an emergency, and
- accepts instructions of hazardous waste Facility Operator.

Qualifications: Must be trained in implementation of hazardous waste management plan requirements, material handling equipment operations, packaging of hazardous materials, hazardous waste incompatibilities, and segregation of incompatibles.

Position Title: Emergency Responders

Responsibility:

- provide response to hazardous waste incidents requiring Contingency Plan implementation.

Qualifications: Must be trained in use of personal protective equipment, containment equipment and procedures, specialized removal equipment, and containerization of hazardous waste.

H.1.2 Training Content, Frequency, and Techniques

H.1.2.1 **Environmental Engineer** Training for the Public Works Environmental Engineer will consist of the Hazardous Waste Facility Operator's Course and Trainers Workshop conducted by NEESA and Defense Packaging of Hazardous Materials for Transportation course conducted by the Joint Military Packaging Training Center or equivalent.

H.1.2.2 **Disaster Preparedness Officer** The Disaster Preparedness Officer is trained by attendance at the Navy's Hazardous Waste Facility Operator's Course or equivalent.

H.1.2.3 **Hazardous Waste Facility Operator** Training for the Hazardous Waste Facility Operator will consist of the Hazardous Waste Facility Operator's Course which is a 4-day course developed by the U.S. Navy. The course syllabus is shown in Table H-1. This training will be supplemented by site-specific information provided by the Training Director.

H.1.2.4 **Hazardous Waste Handlers** The Training Director will be responsible for providing on-the-job training for the hazardous waste handlers. The hazardous waste handlers must be familiar with the handling practices that will minimize the possibility of fires, explosions, and releases of hazardous wastes; inspection requirements; and in the use of safety and emergency response equipment.

Otto fuel and Otto fuel wastes are materials that require careful handling and extensive training for handlers. Therefore, all employees associated with the fuel and/or its wastes are given detailed on-the-job training. The basis for this training is the Otto fuel manual. The training will be given by the Waste

Coordinator at Defensive Ordnance. The Otto fuel manual contains sections dealing in detail with the following topics: an introduction, which contains a summary of warnings, precautions, and safety rules; general information including sources of additional assistance within the Navy; the chemical and physical properties of Otto fuel; specific health and safety precautions and equipment; shipping information; storage and handling procedures, including response to spills, fires, and instructions on decontamination of personnel and equipment; and spill reporting requirements.

H.1.2.5 **Emergency Responders** The Public Works Environmental Engineer is primarily responsible for coordinating responses to emergencies. He is responsible for instructing other personnel in response to emergencies. The instruction should include:

- emergency communications and alarm systems,
- procedures for response to liquid spills,
- power failure response procedures,
- evacuation routes and procedures,
- response to fires and explosions,
- decontamination procedures, and
- procedures for removal and containerization of released material, contaminated soil, or surface water or any other material that results from a release, fire, or explosion.

H.1.3 Training Director The formal training courses are conducted by Navy hazardous waste specialists, who have been pre-selected for extensive professional experience and education in environmental control. The on-base training director will be the Public Works Environmental Engineer.

H.1.4 Relevance of Training to Job Position Representatives of generating units receive broad training to ensure their awareness of the hazardous waste management plan and the procedures to be followed. All other personnel who may be involved in the hazardous waste storage operations are closely supervised by the Environmental Engineer, the Disaster Preparedness Officer, or the hazardous waste Facility Operator. The Environmental Engineer receives broadly based instruction on a continuing basis.

H.1.5 Training for Emergency Response The Emergency Coordinator is primarily responsible for coordinating responses to emergencies. He is responsible for personally instructing other personnel (such as clean up contractors) in response to emergencies.

The instructions provided include:

- emergency communications and alarm systems,
- procedures for response to liquid spills,
- power failure response procedures,
- evacuation routes and procedures,

- response to fires and explosions, and
- decontamination procedures.

In addition, there are two types of emergency response training. SUBASE Kings Bay maintains a full-time, 24-hour Fire Department whose employees undergo continuing training for response to fires and explosions. SUBASE Kings Bay also conducts two yearly hurricane evacuation drills for training purposes.

The BOS contractor is responsible for maintaining all non-shipboard equipment and structures on the Base. They are given continual on-the-job training in the performance of their duties. Fire Department personnel are trained in the maintenance of all fire-fighting equipment on a continuing basis.

The hazardous waste management system at SUBASE Kings Bay does not employ any automatic waste feed cut-off systems; therefore, no training is necessary on the parameters of such a system.

H.2 IMPLEMENTATION OF TRAINING PROGRAM. All new personnel will complete this training program within 6 months of assignment to the hazardous waste storage facility or within 6 months of their date of employment, whichever is later. No employee hired or assigned to work at this facility will work unsupervised prior to completion of the training program.

Records documenting the job title, job description, name of employee, and completed training programs are maintained onsite and retained until closure of the facility.

H.3 PERSONNEL TRAINING FOR OB/OD. The following section details the training programs required for personnel at SUBASE Kings Bay who handle explosive hazardous wastes as required by 40 CFR 270.14(b)(12) and 40 CFR 264.16.

H.3.1 Outline of Training Program Hazardous waste handling personnel at SUBASE Kings Bay must successfully complete a training program that ensures compliance with the hazardous waste management plan. Personnel must be trained within 6 months after assignment to a position that includes duties involving hazardous waste and may not work unsupervised until they have completed the training. Additionally, personnel with duties that involve hazardous waste must take part in an annual review of the initial training. The training for EOD personnel at SUBASE Kings Bay is conducted at Indian Head, Maryland, and is a joint effort by the U.S. Navy, Army, and Air Force. This training class is specifically designed to train personnel in all phases of explosives handling and destruction operations.

H.3.2 Job Titles and Description

Officer in Charge of Explosive Ordnance Disposal. The officer in charge of EOD is responsible for ensuring that all personnel involved in the handling of explosive hazardous wastes receive proper training in the areas of hazardous waste management. Typical duties of the officer in charge may include:

1. ensuring that all personnel involved in explosive disposal operations are trained in the proper management of such hazardous

explosives and the use of emergency equipment and procedures as established in NAVSEA OP 5;

2. assigning personnel for disposal operations;

3. maintaining operating records, contingency plans, and inspection check lists;

4. ensuring that inspections of the OB/OD areas are conducted after each disposal operation; and

5. monitoring any explosive hazardous wastes received from offsite facilities.

EOD Technicians. The EOD technicians are responsible for a number of duties related to the transporting and treatment of explosive hazardous waste including:

1. ensuring that all containers of hazardous waste are in good condition prior to transportation to the open detonation unit;

2. ensuring that all containers of hazardous waste are secured in the vehicle prior to transporting to the OB/OD unit as required per NAVSEA OP 5;

3. ensuring proper unloading and placement of waste explosives at the treatment area; and

4. ensuring that proper disposal operations, inspections, and removal of any unexploded debris or residues are conducted as specified per NAVSEA OP 5.

H.3.3 Training Content The hazardous waste training program for facility personnel at EOD consists of onsite disposal instructions, as well as classroom instruction.

In addition, all personnel involved in disposal operations will be fully capable of performing the following operations:

1. be able to identify, assemble, disassemble, prepare, and use successfully all EOD-unique tool sets in each of their inherent modes;

2. be able to identify, render safe, recover, and dispose all conventional ordnance;

3. be able to perform the procedures to safely remove any AEHs involving the ejection system and/or ordnance stores;

4. know all the procedures to follow in fragmentation, identification, and ordnance exploitation;

5. be familiar with all of the current trends in countermeasure improvised explosive devices (IEDs);

6. be able to successfully identify, decontaminate, render safe, package, and dispose of chemical munitions and be able to detect, neutralize, decontaminate, and dispose of chemical agents;

7. be able to identify, render safe, and package components of all weapons used by the U.S. Marine Corps and be familiar with all special weapons used by other services; and

8. be able to perform all administrative and logistical tasks inherent to the EOD mission.

H.3.4 Training Director All training is conducted under the direct supervision of a person knowledgeable in all aspects of hazardous waste management activities pertinent to operations at the open detonation unit. Onsite instruction is provided by the officer in charge at EOD. All training at SUBASE Kings Bay, including hazardous waste training, will be monitored by the Base Environmental Engineer at Public Works.

H.3.5 Implementation of the Training Program All new personnel will complete this training program within 6 months of assignment to the hazardous waste disposal area or within 6 months of their date of employment, whichever is later. No employee hired or assigned to work at this facility will work unsupervised prior to completion of the training program.

The training program is presented once for each new employee on an individual basis by a professional representative of a hazardous waste training contractor designated by the Navy. Retraining in the area of specific waste handling procedures are conducted quarterly for all personnel involved in disposal operations.

Training records are currently kept in each EOD personnel's personal file. The Environmental Engineer at Public Works will be responsible for maintaining training records. In addition, training records will be kept for a minimum of 3 years for all personnel at EOD.

SECTION I
CLOSURE PLAN, POST-CLOSURE PLAN, AND FINANCIAL REQUIREMENTS

This section is submitted in accordance with the requirements of 40 CFR 270.14(b)(13), 264 Subpart G, 264.178, and 264.602. This plan identifies steps that will be necessary to completely close the facility at the end of its intended operating life. The designs of the hazardous waste facility and the OB/OD facility are not conducive to partial closure; therefore, no partial closure is intended. A post-closure plan is not required for the hazardous waste storage facility and all wastes shall be removed at closure. A detection monitoring program is being implemented at the OB/OD facility to detect possible surface contamination resulting from airborne deposition and inadequate treatment. At this time, it is assumed that contaminated soils, if any, will be removed or remediated to attain clean closure. Because clean closure will be achieved, a post-closure plan is not required.

SUBASE Kings Bay will maintain an onsite copy of the approved closure plan and all revisions to the plan until the certification of closure completeness has been submitted and accepted by Georgia DNR. The Base Commander or authorized representative will notify the Georgia DNR at least 180 days prior to the date final closure is expected to begin. Upon completion of closure, SUBASE Kings Bay will submit to the Georgia DNR a certification that the facilities have been closed in accordance with the specifications in the approved closure plan; the certification will be completed by both SUBASE Kings Bay and by an independent registered professional engineer.

Since SUBASE Kings Bay is owned by the Federal government, 40 CFR 264.140(c) exempts SUBASE Kings Bay from the requirements of 40 CFR 264 Subpart H, "Financial Requirements." The exempted requirements include, but are not limited to, closure and post-closure cost estimates, financial assurance mechanisms for closure and post-closure, and liability insurance.

Partial closure of the hazardous waste management units is not planned. However, if future circumstances or decisions force the discontinuation of one of the units, Sections I.1 and I.2 of the closure plan present procedures for final closure of each hazardous waste unit.

I.1 CLOSURE PLAN FOR HAZARDOUS WASTE STORAGE FACILITY.

I.1.1 Closure Performance Standard Closure of the hazardous waste facility will ensure that the hazardous waste storage facility requires no further maintenance; eliminates threats to human health and the environment; and prevents the escape of hazardous wastes, hazardous waste constituents, leachate, contaminated rainfall, and waste decomposition products to the surface waters, groundwater, or atmosphere.

The hazardous waste storage facility provides containment for all internal spills or leaks. The SUBASE Kings Bay Contingency Plan requires the immediate removal of contaminated soil in the event of a spill or leak during loading, unloading, or transfer to the hazardous waste storage facility. These preventive measures minimize the extent of decontamination at closure.

I.1.2 Final Closure Activities Final closure will include transportation of the final inventory of waste to a permitted disposal facility, washdown of the hazardous waste facility, and removal of any residual contaminated soil in the loading and unloading area. Soil sampling and analysis will be performed during closure to verify the existence or absence of soil contamination.

If contamination is detected, further soil sampling and analysis will be required to determine the extent of contamination. Upon delineating the area and depth of contamination, soil removal operations may begin. Contaminated soils will be transported off the site to a permitted disposal facility. Specific information regarding the sampling and analysis operations is further discussed in Subsection I.1.5.

I.1.3 Maximum Waste Inventory The maximum inventory of wastes in storage at the hazardous waste storage facility at any time during the operating life will be 59,840 gallons (equivalent to 1,088 55-gallon drums).

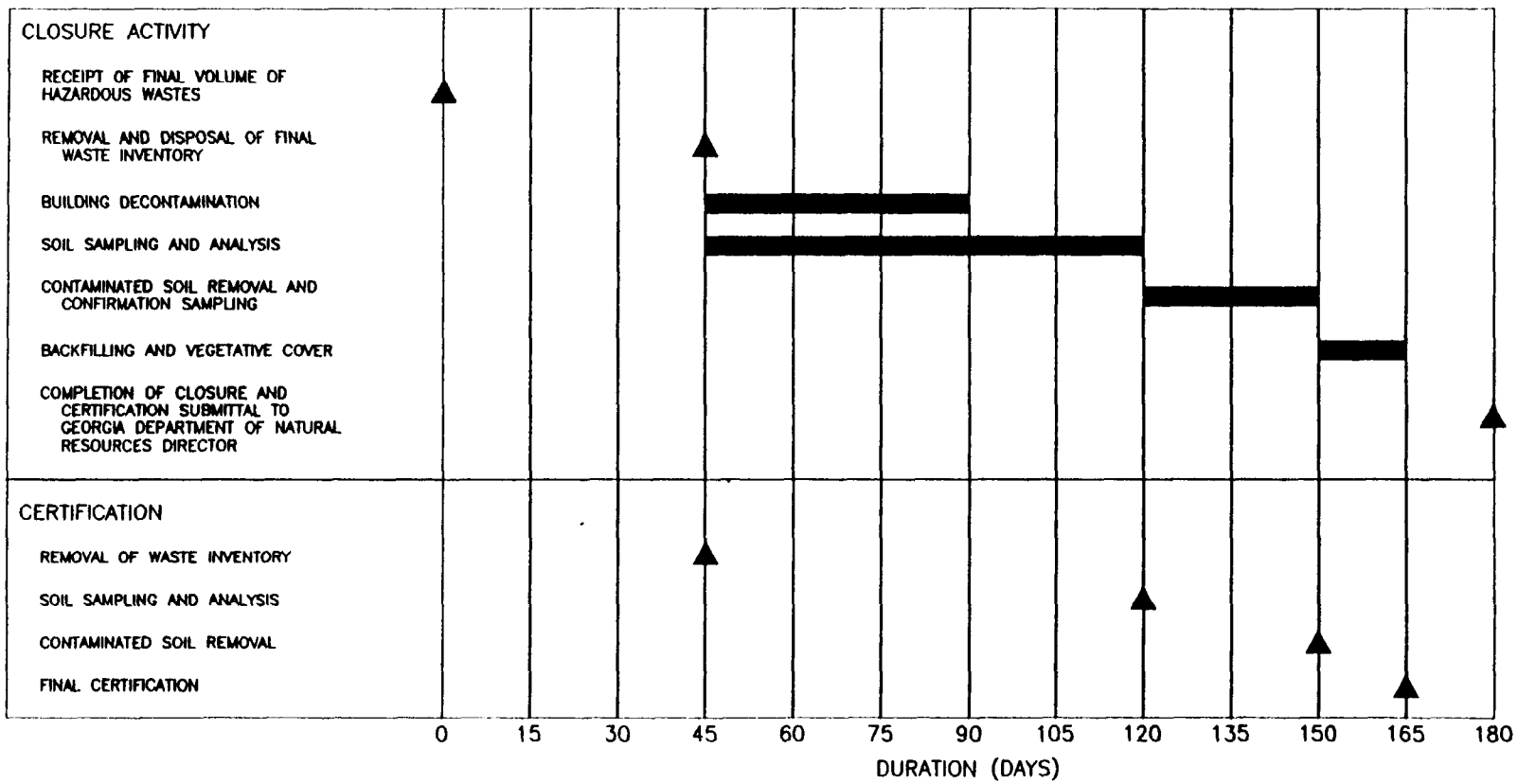
I.1.4 Schedule for Closure Within 90 days after receipt of the final volume of hazardous wastes, all hazardous wastes will be removed from site. The Georgia DNR will be notified by SUBASE Kings Bay 180 days before beginning final closure activities. The proposed schedule for closure of the hazardous waste storage facility is shown in Figure I-1. Closure will be completed within 180 days after receiving the final volume of wastes.

I.1.5 Facility Closure The final inventory of wastes will be removed from the hazardous waste facility and transported to a commercial hazardous waste disposal facility. All drums will be sealed and labeled prior to shipment.

After the final inventory of waste has been removed, the hazardous waste coordinator will inspect the area and have all loose items (i.e., papers, pallets, or empty containers removed and packaged for disposal as hazardous waste, as appropriate). An independent Georgia-registered professional engineer will certify that all wastes have been removed and that the building is ready for decontamination. Under the direction of the hazardous waste coordinator, personnel trained and monitored in accordance with OSHA 1910.120 regulations and wearing suitable personal protective equipment will wash each bay of the storage facility with water containing ionic surfactant.

Wash water will be collected and characterized to make an RCRA hazard determination prior to disposal. Wash water that meets criteria for classification as nonhazardous waste will be discharged to the sanitary sewer if approved by the operator of the sanitary waste water treatment facility.

Each storage bay will be rinsed until visual inspection indicates that the cleansing solution has been removed. The completeness of decontamination will be evaluated by collecting samples of rinse water and submitting the samples for analyses of constituents suspected to be present based on knowledge of the wastes handled at the facility. Based on the results of these analyses, the storage bays may be cleaned a second time, rinsed, and samples of rinse water collected for analyses. The analyses will be selected based on the types of residual constituents present in the initial rinse samples. The storage bays will be considered decontaminated when analytical results for rinsate samples are no longer RCRA hazardous as defined in 40 CFR Part 261.



SOURCE: Recreated from modification to the Part B permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992).

FIGURE I-1

CLOSURE SCHEDULE FOR HAZARDOUS WASTE CONTAINER STORAGE AND TRANSFER FACILITY

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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Once decontamination of the storage facility is completed, the hazardous waste coordinator will certify the results of all tests and an independent Georgia-registered professional engineer will visually inspect the storage building and review the test results of each bay. If all criteria described above are met, the Georgia-registered professional engineer will certify the facility decontamination.

Four samples of the top 6 inches of soil will be collected along each edge of the drive at the truck entrance and exit ramp. A background sample will be collected from an area known not to be impacted by hazardous wastes. Each of the four samples and the background sample will be analyzed for hazardous constituents applicable to hazardous waste routinely stored in the building. Analytical methods for these analyses will be as specified in USEPA Publication SW-846 for soil tests. If any contaminated soils are found, further sampling and analyses will be conducted to determine the extent of contamination. All contaminated soils will be removed and transported to an appropriate waste disposal facility based on the constituents present.

To determine if the soil is contaminated, the concentrations of hazardous constituents detected in the soil samples will be compared to USEPA health-based criteria or to qualified background values if no health-based values are available.

Following soil removal, at least five samples will be collected from the area from which soils were removed to verify successful removal of contaminated soils. Soils will be removed until this verification is successful. Any area from which soil is removed will be restored using uncontaminated topsoil, and appropriate vegetative cover will be established.

Expendable items used in the decontamination process such as mops, brooms, hand tools, buckets, gloves, coveralls, and boots will either be decontaminated or containerized and properly disposed. All wash and rinse waters will be contained and samples will be collected for waste characterization analyses. Excavation vehicles will be decontaminated by scraping and/or brushing solids from the blades and tires which contacted the contaminated soil. The scrapings will be properly handled and disposed. Evacuation vehicles will be pressure washed, with all wash water collected, characterized, and properly disposed.

<u>I.2 CLOSURE PLAN FOR OB/OD FACILITY</u>. This section provides a closure plan for the SUBASE Kings Bay OB/OD facility. This facility is utilized for the OB/OD of waste military ordnance and pyrotechnics that, upon declaration as waste products, are classified as hazardous waste. This plan was prepared in accordance with 40 CFR 270.14(6)(13), 264 Subpart G, and 264.602.

The OB/OD facility is an existing structureless U-shaped unit approximately 500 feet long and 200 feet wide, with the open end to the north. The berm walls of this unit have been constructed approximately 20 feet above original grade and serve as a protective barrier. Burning and detonation activities occur in the southern part of the unit and are controlled from a bunker adjacent to the entrance of the bermed area. The compound is open air with no protection from the weather. The topography of the area within the berm is nearly flat with a slight slope from the north to the south. Parts of the site are topped with a grass cover, but the majority of the surfaces are bare earth.

Two types of thermal treatment are conducted at the OB/OD facility. Treatment operations include open burning of waste pyrotechnics in a containment device and open detonation for waste explosives on the ground. The containment device for open burning operations consist of a 55-gallon steel drum capable of withstanding intense heat and capable of containing initiating liquids, residual ash, and debris. The drum is situated within a 4-foot by 8-foot secondary containment pan with a 1-foot lip. The secondary containment pan is constructed of 0.25-inch boiler plate and is capable of containing the entire contents of the burning drum. The burning drum and secondary containment pan are expected to contain hazardous constituents and minimize the extent of decontamination at closure. No burning activities have been conducted on the bare ground at SUBASE Kings Bay.

Open detonation operations are conducted on the ground without a containment device. At this time, there is no feasible way to utilize a containment device due to the inherent nature of treatment. Therefore, sampling operations will be conducted to determine the extent of contamination resulting from atmospheric dispersion and infiltration of contaminants. Such sampling operations are described in Subsection I.2.5.

This closure plan conforms to the requirements of 40 CFR 264 Subpart G and Subpart X and identifies steps that are necessary to close the existing hazardous waste facility. The design of the facility is not conducive to partial closure; therefore, no partial closure is intended.

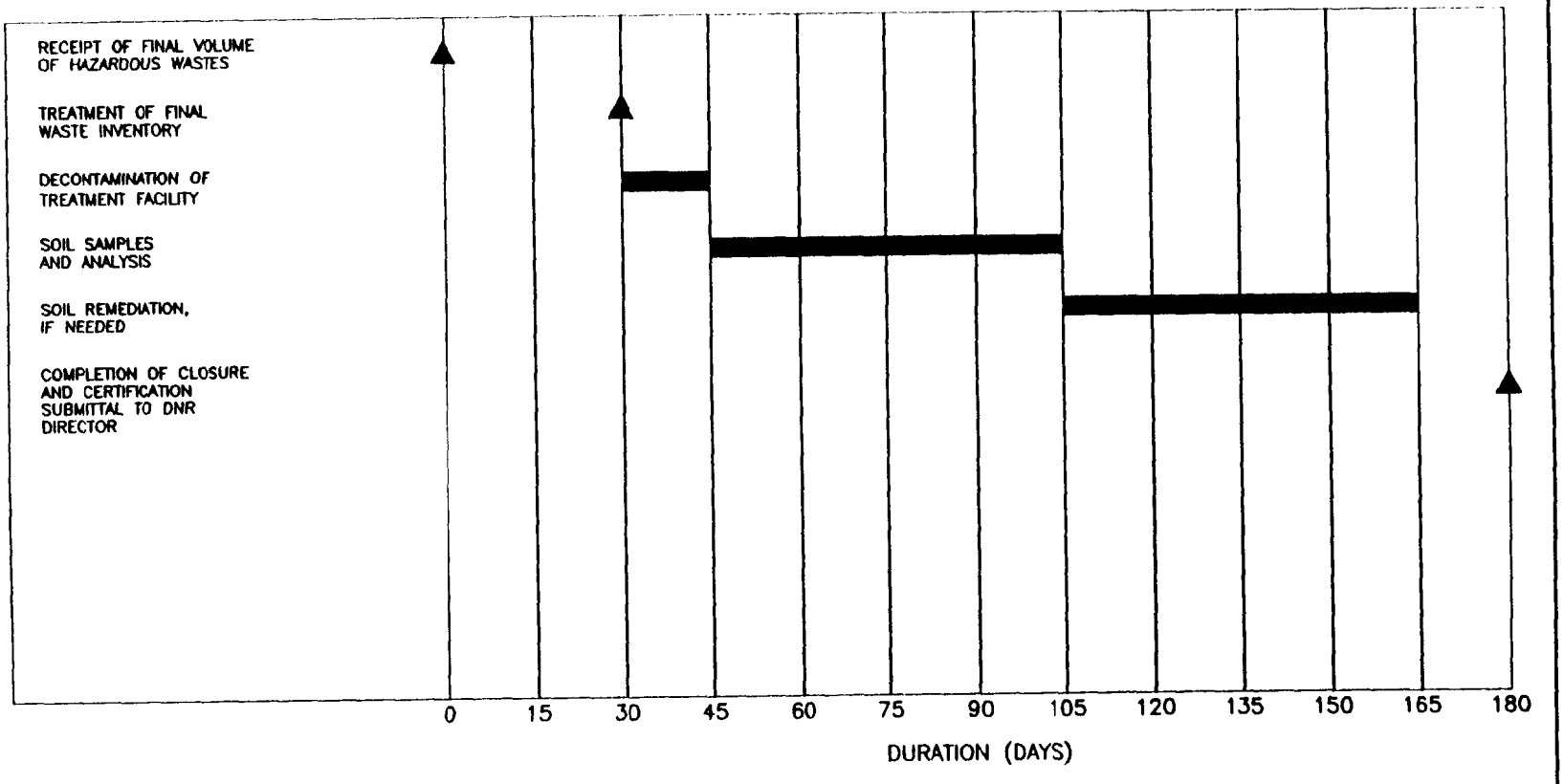
SUBASE Kings Bay will maintain an onsite copy of the most current closure plan. Until final closure is completed and certified in accordance with 40 CFR 264.115, a copy of the most current plan will be furnished to the USEPA and the Georgia DNR upon request; including request by mail. The most current written plan will be provided during site inspections to any officers, employees, or representatives of USEPA or Georgia DNR who are duly designated by the USEPA Regional Administrator or the Georgia DNR.

I.2.1 Closure Performance Standard The OB/OD facility will be closed in a manner that minimizes the need for further maintenance; controls, minimizes or eliminates, to the extent necessary to prevent threats to human health or the environment, post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or the atmosphere.

I.2.2 Final Closure Activities Final closure of the OB/OD facility will include treatment of the final inventory of waste, characterization of environmental media, and corrective action for environmental media, if necessary.

I.2.3 Maximum Waste Inventory The OB/OD facility is a Class C range. As such, the explosive limits for this range are established at 150 pounds of explosive per detonation and 4,000 pounds of explosive per burn. Therefore, the maximum quantity of explosives which may be treated at any time during the operating life of the facility is 4,150 pounds.

I.2.4 Schedule for Closure Final closure activities for the OB/OD facility will be completed per the schedule shown in Figure I-2 assuming groundwater remediation is not necessary. If groundwater remediation is necessary, the closure schedule will have to be extended based on the extent of groundwater remediation required. Within 90 days after receipt of the final volume of hazardous waste, all hazardous wastes will be treated or removed from the site. The Georgia DNR



SOURCE: Recreated from modification to the Part B permit application for Naval Submarine Base, Kings Bay, Georgia (March 1992).

FIGURE I-2

CLOSURE SCHEDULE FOR
OPEN BURNING AND OPEN DETONATION FACILITY

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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required. Within 90 days after receipt of the final volume of hazardous waste, all hazardous wastes will be treated or removed from the site. The Georgia DNR will be notified by SUBASE Kings Bay 180 days before beginning final closure activities. Closure will be completed within 180 days after receiving the final volume of wastes. Final closure will be supervised and certified by an independent Georgia-registered professional engineer, in addition to the owner and operator. SUBASE Kings Bay does not anticipate a need for an extension of closure time; therefore, no extension is requested at this time.

I.2.5 Facility Closure The first step in closure of the OB/OF facility will be treatment of the remaining inventory of waste.

The second step of closure will be to evaluate environmental media for residual contamination resulting from operations at the OB/OD area. Characterization of environmental media will be conducted using a phased approach. The initial phase will involve characterization of surface soil. If surface soil contains residual contamination, then groundwater and subsurface soil sampling will be conducted to determine if migration of contaminants into subsurface media has occurred. If results of the surface soil sampling program do not indicate residual contamination from site operations, then the potential for migration of contaminants to subsurface media is not present and no further characterization is necessary.

The third and fourth steps of closure involve corrective action for contaminated media and certification of closure, respectively. Corrective action is contingent upon identification of contaminated media. Evaluation of contaminated media and subsequent corrective action are discussed in more detail in the remainder of this subsection.

Characterization of Environmental Media. Based on the nature of wastes handled at the OB/OD area, potential contaminants include metals and residual explosive material. Laboratory analyses for characterization of environmental media will include TCLP metals, nitroaromatics, and nitroamines using SW-846 analytical methods (USEPA, 1986).

The initial phase of characterization involves collection and analyses of surface soil samples. Surface soil samples will be collected from within 0 to 1 foot bls. Sample locations will be on 50-foot centers inside the bermed area and on the walls of the berm. If necessary, the sampling grid will be expanded to delineate contaminated areas.

If the analytical data from the surface soil samples indicates that contaminants are present, a subsurface soil sampling program will be implemented. Locations for subsurface soil sampling will be selected based on surface soil analytical data. Subsurface soil sampling will target potentially contaminated areas. At each subsurface soil sample location, samples will be collected at 2-foot intervals, beginning at a depth of 2 feet bls and extending to 10 feet bls. Additional sampling will be conducted if necessary to define the vertical extent of contamination.

Groundwater will be evaluated for contamination if contaminated surface soil is found at the site. Contaminants in solution may migrate to the water table without causing discernible contamination of subsurface soil, so contaminated subsurface soil is not the sole prerequisite for groundwater characterization. The horizontal and vertical extent of groundwater contamination, if any, will be defined.

Sampling equipment and methodology for surface soil, subsurface soil, and groundwater will be selected based on standard practices at the time of closure. Because closure of the OB/OD facility is not eminent, and considering the advancements in investigative technologies that are likely, present practices may not represent the best available means of site characterization. Presently, hand augers, trowels, or spoons made of stainless steel are used for collection of surface soil samples. Subsurface soil samples are collected using split-spoon samplers, or a similar device, to obtain relatively undisturbed core samples. Hollow stem auger drilling or direct push methods are used to advance the borehole between sampling intervals. Groundwater characterization includes drilling and installation of monitoring wells, well development, well purging, and collection of groundwater samples.

The presence of contamination will be assessed by comparing analytical data for the samples of environmental media to corresponding USEPA health-based criteria or to qualified background values if no health-based values are available. The need for corrective action will be based on this assessment.

Corrective Action. Corrective action will be required if the results of characterization analyses indicate contaminated environmental media are present at the OB/OD area as a result of site operations. The process of selecting a corrective action for a particular media generally involves an evaluation of several possible remedies. The types and concentrations of contaminants, media, and volume effected, cleanup criteria, time, and cost are considered during the evaluation and selection of corrective action technologies. For example, it may not be feasible to remove all soil containing elevated concentrations of a contaminant. In this situation, notification will be made to the Georgia DNR and to USEPA Region IV. The approach presented in this closure plan may not be appropriate for all contamination scenarios, but represents an approach appropriate for the most likely scenarios and considers present trends in remedial technologies.

Corrective action for soil will involve excavation followed either by offsite disposal or onsite treatment to remove or reduce contaminant concentrations to allowable levels. Onsite treatment may include stabilization of contaminants such that the material is suitable for disposal at a Subtitle D facility, or a soil washing technology might be appropriate to reduce the volume of material that has to be disposed as hazardous waste. If it is not feasible to excavate the contaminated soil because of the volume effected and depth of contamination, an *in-situ* technology may be selected, such as bioremediation. Details of the selected corrective action for contaminated soil will be submitted to Georgia DNR for approval.

Corrective action for groundwater will involve design and construction of extraction, conveyance, and treatment systems or an *in-situ* treatment technology. The nature of the contaminants and volume of affected groundwater will determine which type of treatment is selected. The details of corrective action for groundwater, if needed, will be submitted to Georgia DNR for approval prior to implementation.

I.2.6 Certification of Closure Within 60 days of completion of final closure, SUBASE Kings Bay will submit to the Georgia DNR, by registered mail, certification by SUBASE Kings Bay and by an independent professional engineer registered in the State of Georgia, that the OB/OD hazardous waste management unit has been closed in accordance with specifications in the approved closure plan. The

Certification of Closure must be submitted to the Georgia DNR within 60 days of completion of final closure as required by 40 CFR 265.115.

I.3 POST-CLOSURE CARE. Post-closure care is not expected to be needed at the hazardous waste container storage and transfer facility or at the OB/OD facility because clean closure is anticipated. Any post-closure care requirements for the SWMUs that are discussed in Section K will be addressed in future modifications so that the post-closure activities can be designed to address actual site conditions. Post-closure activities at the SWMUs might include routine inspections and groundwater monitoring.

I.4 NOTICES IN DEEDS. Notices in Deeds are not required for storage and treatment facilities, which includes the SUBASE Kings Bay hazardous waste container storage/transfer facility and OB/OD facility. Notices in Deeds for the SWMUs will be recorded within 60 days following certification of closure.

SECTION J
OTHER FEDERAL LAWS

Information will be provided in accordance with the requirements of 40 CFR 270.14(b)(20) at the request of USEPA and DNR. At this time, however, the Navy believes the hazardous waste and the OB/OD facilities are in compliance with the following Federal laws: Wild and Scenic Rivers Act, National Historic Preservation Act of 1966, Endangered Species Act, Coastal Zone Management Act, the Fish and Wildlife Coordination Act, Clean Water Act, Clean Air Act, and the Toxic Substances Control Act.

SECTION K
SOLID WASTE MANAGEMENT UNITS

The following information is submitted in accordance with requirements outlined in 40 CFR 270.14(d).

An Initial Assessment Study (IAS) was conducted at SUBASE Kings Bay in 1985 to identify potential SWMUs. The IAS included records searches, interviews, and ground and aerial tours. During the IAS, 16 potential SWMUs were identified, but none were recommended for further investigation. The IAS report is included in Appendix K-1.

The Georgia DNR, Environmental Protection Division, issued a Hazardous and Solid Waste Amendments permit to SUBASE Kings Bay on September 29, 1989. The permit specified four SWMUs suspected to be sources of current or past releases of hazardous substances to the environment:

- Site 5, Army Reserve Disposal Area, Towhee Trail;
- Site 11, Old Camden County Landfill;
- Site 12, Army Reserve Disposal Area, Future Dry Dock (now referred to as the Current Dry Dock); and
- Site 16, Army Reserve Disposal Area, Motor Missile Magazines.

Site 12 was remediated during construction of the dry dock and was approved for No Further Action. Site 2, the former fire-fighting training pit, is located within Site 12. In correspondence from the Georgia Department of Environmental Protection dated January 13, 1994, the Georgia Department of Environmental Protection stated that Site 2 will require further investigation and is not included in the No Further Action recommendation approved for Site 12. Site 2 was identified as a potential SWMU during the IAS (1985). During 1994, the SUBASE Public Works office conducted interviews and reviewed aerial phtographs with individuals familiar with the operations at Site 2 to define the area that will be investigated. Figure K-1 shows the locations of the SWMUs identified in the Hazardous and Solid Waste Amendments (HSWA) permit.

The SUBASE is modifying this Part B permit application to incorporate the No Further Action decision for Site 12 and to add Site 2 as a SWMU requiring further investigation.

K.1 DESCRIPTION OF SOLID WASTE MANAGEMENT UNITS.

Site 2: Former Fire-fighting Training Pit

Description. Unlined pit approximately 30 feet by 30 feet by 2 feet deep used for fire-fighting training exercises between 1979 and 1981. Approximately 1,500 gallons of diesel fuel, paints, and paint thinners were burned at the site. An unknown amount of hydrazine was burned at the site during one fire-fighting training exercise.

Location. Waterfront area near the dry dock.

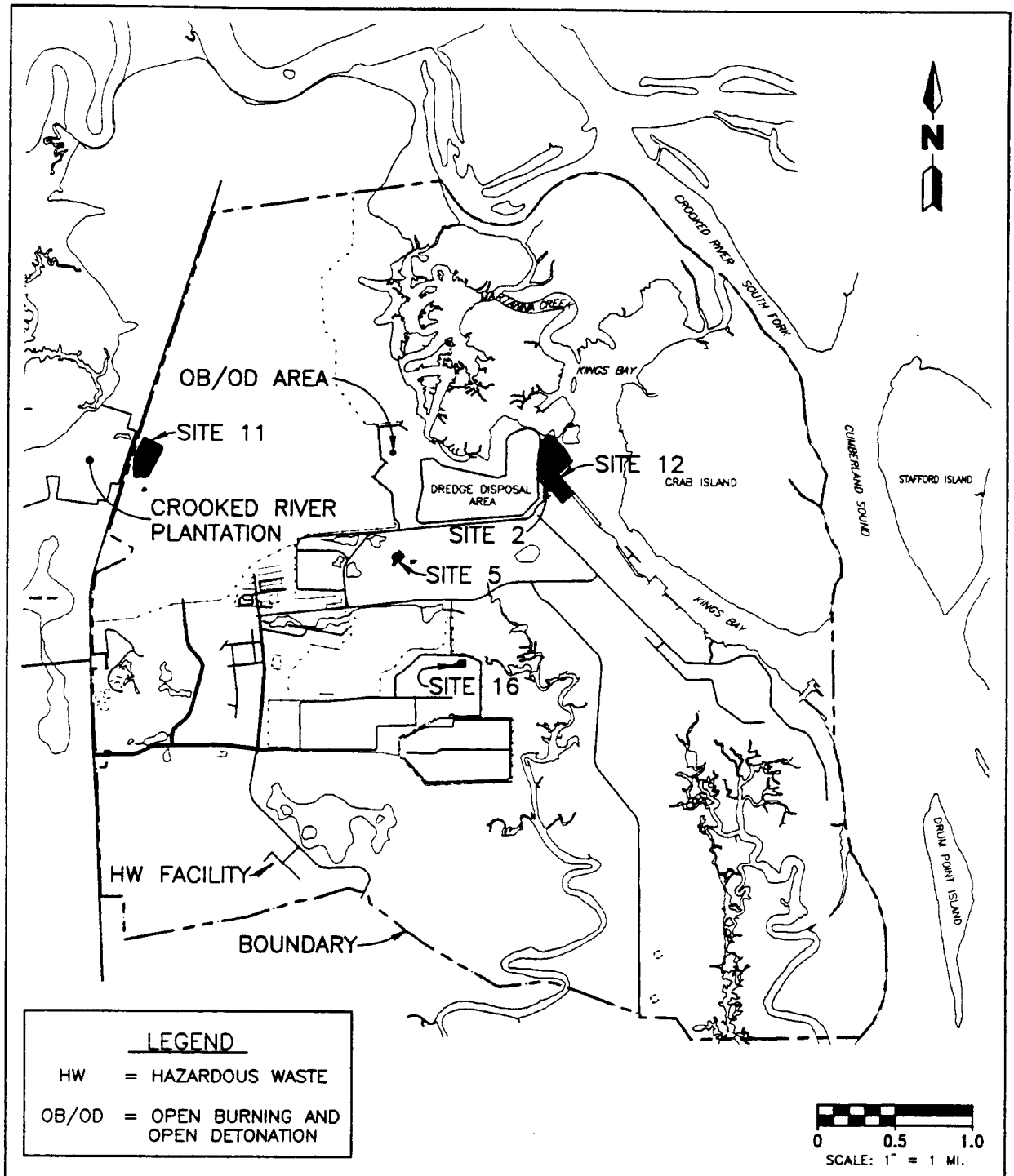

FIGURE K-1

SITE LOCATION MAP

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

D:\DWG\ABB\08523-18\PART_B\FIG_K-1\DMF\950315
KB Site 11 [PART_B.per]#038
mlv.04.95

Disposition. RCRA Facility Investigation (RFI) in planning stages.

Site 5: Army Reserve Disposal Area, Towhee Trail

Description. Approximately 69,000 cubic yards of waste were disposed between 1969 and 1974, and included tree stumps, wooden pallets, metal ammunition boxes, aluminum sheeting, concrete blocks, and kitchen waste.

Location. West-central part of the SUBASE.

Disposition. Currently under investigation.

Site 11: Old Camden County Landfill

Description. Approximately 500,000 cubic yards of waste, including general household and office waste, scrap paper, wood, and sludge and grit from the SUBASE sewage treatment plants were disposed from 1974 to October 1981.

Location. Near western property boundary north of USS Andrew Jackson Drive.

Disposition. RFI completed. Interim Measure groundwater extraction and treatment system in place to control migration of groundwater contaminated with chlorinated and non-chlorinated solvents. Treatability study and Corrective Measure Study initiated. Corrective Action Plan will be incorporated into Part B Permit Application during future modification.

Site 12: Army Reserve Disposal Area, Current Dry Dock

Description. Training area used 1974 to 1978 for amphibious ship-to-shore materials loading and off-loading exercises. Wastes handled at the site included approximately 467,000 cubic yards of empty wooden and metal ammunition boxes, concrete slabs, and dummy cargo. In the early 1980's, during construction of the dry dock, crews excavated scrap metal, dunnage, nail kegs, and oxygen breathing apparatus cannisters from Site 12. Six to eight 55-gallon drums of waste oil were removed from the site and manifested offsite for disposal. Construction activities resulted in removal and dredging of much of the area of Site 12, including disposed material. The remainder of the site is covered with asphalt.

Location. Waterfront area on northeastern boundary of SUBASE Kings Bay.

Disposition. No further action required.

Site 16: Army Reserve Disposal Area, Motor Missile Magazines

Description. Approximately 4,000 cubic yards of waste were disposed between 1954 and 1964. Waste disposed included food, wood, trash, scrap metal, tree limbs, and empty paint and solvent cans.

Location. South-central part of the SUBASE.

Disposition. Under investigation.

K.2 INFORMATION PERTAINING TO RELEASES. Information collected to date pertaining to releases of hazardous waste or hazardous constituents from the SWMUs at the SUBASE are included in Section K.1.

APPENDIX K-1

INITIAL ASSESSMENT STUDY REPORT

Mike Anderson, E.I.T.

SEPTEMBER 1985

INITIAL ASSESSMENT STUDY OF NAVAL SUBMARINE BASE KINGS BAY, GEORGIA

NEESA 13-086

NAVAL ENERGY AND ENVIRONMENTAL SUPPORT ACTIVITY

Port Hueneme, California 93043

Release of this document requires prior notification of the chief official of the studied activity.

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INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE, KINGS BAY, GEORGIA

UIC: N42237

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OF INSTALLATION POLLUTANTS PROGRAM
Naval Energy and Environmental Support Activity
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September, 1985

EXECUTIVE SUMMARY

This report presents the results of an Initial Assessment Study (IAS) conducted at the Naval Submarine Base (SUBASE) Kings Bay, Georgia. The purpose of the IAS is to identify and assess sites posing a potential threat to human health or to the environment due to contamination from past hazardous materials operations.

SUBASE Kings Bay is located on an arm of Cumberland Sound called Kings Bay. It is between the St. Marys River and Crooked River and connected to the sea by a 12-mile access channel which passes through the St. Marys Inlet. Potential migration pathways of pollutants from past waste disposal and spill sites are through surface water runoff to intermittent streams, the St. Marys River, the Satilla River, and the Crooked River or by infiltration from the surface into ground water. Surface runoff at SUBASE Kings Bay is slow because of the flat slopes and the amount and intensity of the rainfall. The mean annual precipitation at SUBASE Kings Bay is approximately 54 inches. The presence of permeable sands in the area is conducive to rainfall percolation directly into the water table aquifer forming a potential migration pathway. The water eventually migrates eastward through the water table aquifer (which ranges in thickness from 40 to 90 feet) and discharges into streams and springs including the North River, Crooked River and Marianna Creek. These rivers eventually flow to Kings Bay and Cumberland Sound. Two additional aquifers, the secondary artesian aquifer and the primary artesian aquifer exist at SUBASE Kings Bay.

The primary artesian aquifer is approximately 470 to 570 feet below the ground surface. There are 22 known water table aquifer wells and five production wells which tap the primary artesian aquifer at the activity. The water table aquifer wells have been unused since the Navy occupied the activity in 1978. The five wells in the primary artesian aquifer are used by SUBASE for drinking water supply. Only the water table aquifer would pose a potential migration pathway as both the artesian aquifers are under pressure and not recharged from areas within SUBASE Kings Bay.

Potential contaminant receptors include humans, and endangered, threated and rare plants and animals. Since the water table aquifer is hydraulically isolated from any domestic supply aquifers, direct exposure (consumption or contact) to humans would only be through surface water which is not likely as most of the surface waters are used only for recreational boating and navigation. Indirect exposure through the food chain is more likely since Cumberland Sound is a recreational as well as commercial fishery. Contaminants may migrate to Cumberland Sound by way of surface runoff or through sub-surface flow in the water table aquifer and subsequently enter the food chain. Humans consuming fish taken from the Sound could then be exposed to levels of contaminants actually higher

than those found in the water due to food-chain amplification. The Sound also provides a habitat for two endangered fish species, the Atlantic and Short-nose Sturgeous. These specfes are not consumed by humans, but should be considered potential receptors because of their endangered status.

Based on information from historical records, aerial photographs, field inspections and personnel interviews, a total of sixteen potentially contaminated sites were identified at SUBASE Kings Bay. Each of the sites was evaluated with regard to contamination characteristics, migration pathways and pollutant receptors.

The study concludes that none of the sixteen sites pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for any of the sixteen sites.

NEPSS

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FOREWORD

The Department of the Navy developed the Navy Assessment and Control of Installation Pollutants (NACIP) program to identify and control environmental contamination from past use and disposal of hazardous substances at Navy and Marine Corps Installations. The NACIP program is part of the Department of Defense Installation Restoration Program, and is similar to the Environmental Protection Agency's "Superfund" program authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

In the first phase of the NACIP program, a team of engineers and scientists conducts an Initial Assesment Study (IAS). The IAS team collects and evaluates evidence of contamination that may pose a potential threat to human health or to the environment. The IAS includes a review of archival and activity records, interviews with activity personnel, and an on-site survey of the activity. This report documents the findings of an IAS at the Naval Submarine Base (SUBASE), Kings Bay, Georgia.

A total of sixteen sites were identified at SUBASE Kings Bay. None of the sites at the SUBASE Kings Bay require Confirmation Studies or Remedial Measures under the NACIP program.

Questions regarding this report should be referred to the Naval Energy and Environmental Support Activity, 112N, at AUTOVON 360-3351, FTS 799-3351, or commercial (805) 982-3351. Questions regarding confirmation work or other follow-on efforts should be referred to SOUTHNAVFACENGCOM, 11421, at AUTOVON 794-5510, FTS 679-5510, or commercial (803) 743-5510.

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ACKNOWLEDGEMENT

The Initial Assessment Study team commends the support, assistance, and cooperation provided by personnel at Naval Submarine Base (SUBASE), Kings Bay, Georgia; Naval Energy and Environmental Support Activity (NEESA); and Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). In particular the team gratefully acknowledges the outstanding effort provided by the following people, who participated in the successful completion of the study.

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CHAPTER 1. INTRODUCTION

1.1 PROGRAM BACKGROUND. Past hazardous waste disposal methods, although acceptable at the time, have often caused unexpected long-term problems through release of hazardous pollutants into the soil and ground water. In response to increasing national concern regarding these problems, Congress directed the Environmental Protection Agency (EPA) to develop a comprehensive national program to manage past disposal sites. The program is outlined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of December 1980.

1.1.1 DOD Program. Department of Defense (DOD) efforts in this area preceded the nationwide CERCLA program. In 1975, the U.S. Army developed for DOD a pilot program to investigate past disposal sites at military installations. DOD defined the program as the Installation Restoration Program in 1980, and instructed the services to comply with program guidelines.

1.1.2 Navy Program. The Navy manages its part of the program, the Navy Assessment and Control of Installation Pollutants (NACIP), in three phases. Phase one, the Initial Assessment Study (IAS), identifies disposal sites and contaminated areas caused by past hazardous substance storage, handling, or disposal practiced at naval activities. These sites are then individually evaluated with respect to their potential threat to human health or to the environment. Phase two, the Confirmation Study, verifies or characterizes the extent of contamination present and provides additional information regarding migration pathways. Phase three, Remedial Measures, provides the required corrective measures to mitigate or eliminate confirmed problems.

1.2 AUTHORITY. The Chief of Naval Operations (CNO) initiated the NACIP program in OPNAVNOTE 6240 of 11 September 1980, superseded by OPNAVINST 5090.1 of 26 May 1983. Commander, Naval Facilities Engineering Command (COMNAVFACENGCOM), manages the program within the existing structure of the Naval Environmental Protection Support Services (NEPSS) which is administered by the Naval Energy and Environmental Support Activity (NEESA). NEESA conducts the program's first phase, the IAS, in coordination with COMNAVFACENGCOM Engineering Field Divisions (EFDs). Activities are selected for an IAS by CNO, based on recommendations by COMNAVFACENGCOM, the EFDs, and NEESA. Approval of the Naval Submarine Base (NSB) Kings Bay, Georgia for an IAS is contained in CNO letter ser. 451/4U383534 of 26 March 1984.

1.3 SCOPE

1.3.1 Past Operations. The NACIP program focuses attention on past hazardous substance storage, use, and disposal practices on Navy property. Current practices are regularly surveyed for conformity to state and federal regulations and, therefore, are not included in the scope of the NACIP program. The IAS report addresses operational

nonhazardous disposal and storage areas only if they were hazardous waste disposal or storage areas in the past. Current operations are investigated solely to determine what types and quantities of chemicals or other materials were used and what disposal methods were practiced in the past.

1.3.2 Results. If necessary, an IAS recommends mitigating actions to be performed by the activity or EFD, or recommends Confirmation Studies to be administered by the EFD under the NACIP Program. Based on these recommendations, COMNAVFACENGCOM schedules Confirmation Studies for those sites which have been determined by scientific and engineering judgement to be potential hazards to human health or to the environment.

1.4 INITIAL ASSESSMENT STUDY

1.4.1 Records Search. The IAS begins with an investigation of activity records followed by a records search at various government agencies including EFDs, national and regional archieves and records centers, and U.S. Geological Survey offices. In this integral step, study team members review records to assimilate information about the activity's past mission, industrial processes, waste disposal records, and known environmental contamination. Examples of records include activity master plans and histories, environmental impact statements, cadastral records, and aerial photographs. Appendix A lists the agencies contacted during this study.

1.4.2 On-Site Survey. After the records searches, the study team conducts an on-site survey to complete documentation of past operations and disposal practices and to identify potentially-contaminated areas. With the assistance of an activity point-of-contact, the team inspects the activity during ground and aerial tours, and interviews long-term employees and retirees. The on-site survey for NSB Kings Bay was conducted from 11-14 March 1985. Information in this report is current as of those dates.

Information obtained from interviews is verified by data from other sources or from corroborating interviews before inclusion in the report. If information for certain sites is conflicting or inadequate, the team may collect samples for clarification. No samples were collected at the Naval Submarine Base during the IAS.

1.4.3 Confirmation Study Ranking System. With information collected during the study, team members evaluate each site for its potential hazard to human health or to the environment. A two-step Confirmation Study Ranking System (CSRS), developed at NEESA is used to systematically evaluate the relative severity of potential problems. The two steps of the CSRS are a flowchart and numerical ranking model. The first step is a flow chart based on type of waste, type of containment, and hydrogeology. This step eliminates innocuous sites from further consideration. If the flow chart indicates a site poses a potential threat to human health or to the environment, the second step, the model,

is applied. This model assigns a numerical score from 0 to 100 to each site. The score reflects the characteristics of the wastes, the potential migration pathways from the site, and possible contaminant receptors on and off the activity.

1.4.4 Site Scoring. After scoring a site, engineering judgment is applied to determine the need for a Confirmation Study or for immediate mitigating measures. At sites recommended for further work, CSRS scores are used to rank the sites in a prioritized list for scheduling project. For a more detailed description, refer to NEESA 20.2-042, Confirmation Study Ranking System.

1.4.5 Confirmation Study Criteria. A Confirmation Study is recommended for sites at which (1) sufficient evidence exists to indicate the presence of contamination, and (2) the contamination poses a potential threat to human health or to the environment.

1.5 CONFIRMATION STUDY. Generally, the EFD conducts the Confirmation Study in two phases—verification and characterization. In the verification step, short-term analytical testing and monitoring determines whether specific toxic and hazardous materials, identified in the IAS, are present in concentrations considered to be hazardous. Normally, the IAS recommends verification phase sampling and monitoring. The design of the characterization phase usually depends on results from the verification phase. If required, a characterization phase, using longer-term testing and monitoring, provides more detailed information concerning the horizontal and vertical distribution of contamination migrating from sites, as well as site hydrogeology. If sites require remedial actions or additional monitoring programs, the confirmation study recommendations include the necessary planning information for the work, such as design parameters.

1.6 IAS REPORT CONTENTS. In this report, the significant findings and conclusions from the IAS are presented in Chapter 2. Recommendations are presented in Chapter 3. Chapter 4 describes general activity information, history, biology, and physical features. Chapters 5 through 8 trace the use of chemicals and hazardous materials from storage and transfer, through manufacturing and operations, to waste processing and disposal. The latter chapters provide detailed documentation to support the findings and conclusions in Chapter 2. Figure 1-1 shows the location of the Naval Submarine Base, Kings Bay, Georgia.

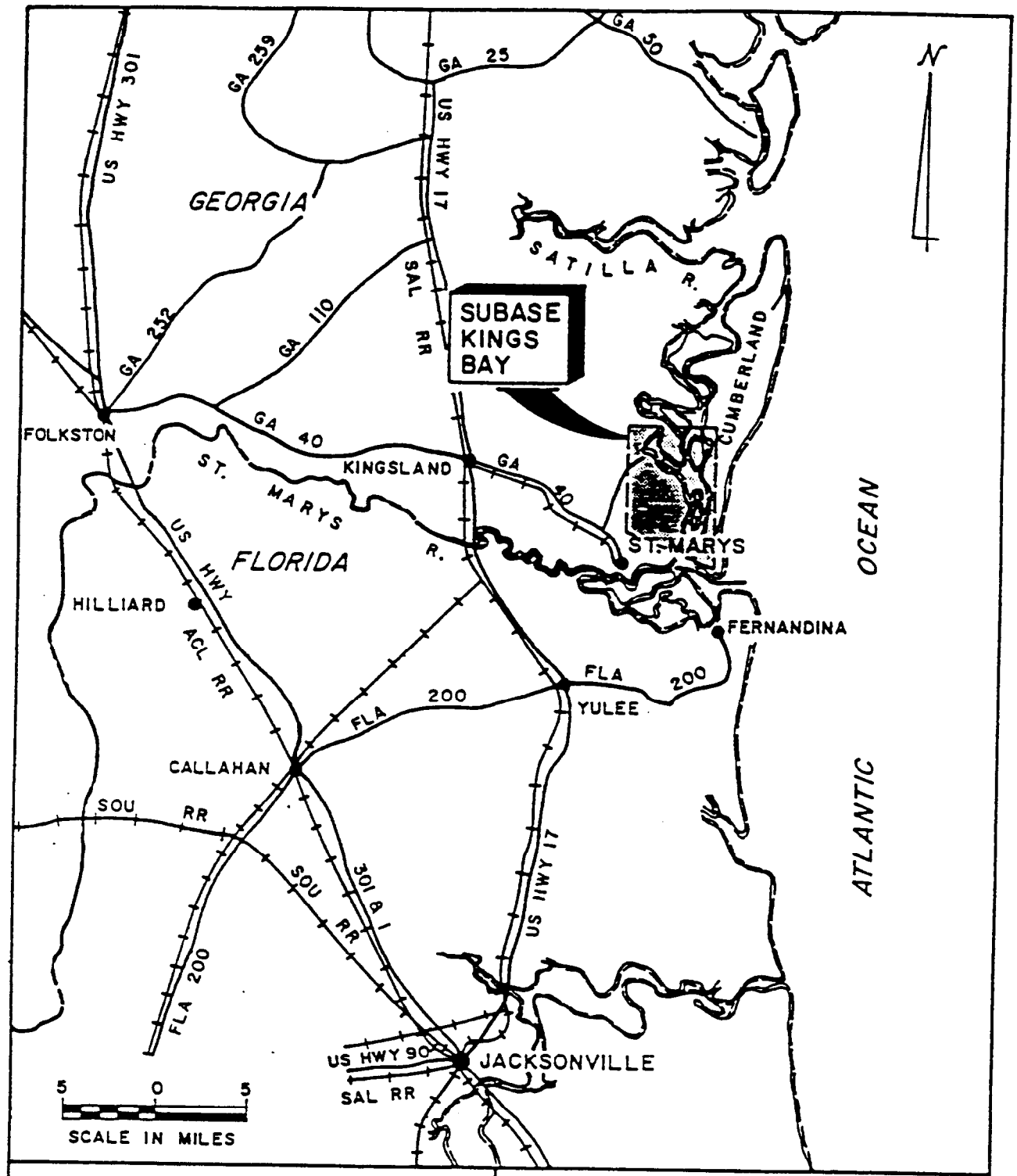


FIGURE 1-1
VICINITY MAP
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

CHAPTER 2. SIGNIFICANT FINDINGS AND CONCLUSIONS

2.1 INTRODUCTION. This chapter summarizes the significant findings and conclusions of the Initial Assessment Study (IAS) team regarding the potential contamination migration pathways, the potential contaminant receptors, and other characteristics of the waste disposal and spill sites identified at SUBASE Kings Bay. Sixteen waste disposal and spill sites at SUBASE Kings Bay were identified during the IAS. None of the sixteen sites require further action under the NACIP program. Figure 2-1 identifies the locations of the sixteen sites at SUBASE Kings Bay.

2.1.1 Hydrogeology and Migration Potential. SUBASE Kings Bay is located on an arm of Cumberland Sound called Kings Bay. It is between the St. Marys River and Crooked River and connected to the sea by a 12-mile access channel which passes through the St. Marys Inlet. Potential migration pathways for pollutants from past waste disposal and spill sites are through surface runoff to unnamed streams or ditches which drain to Kings Bay and its tributaries. An additional potential migration migration is through infiltration from surface water into ground water. Surface runoff at SUBASE Kings Bay is slow because of the highly permeable soils, flat slopes, and the amount and intensity of rainfall. The average elevation is 30 feet above mean sea level (MSL). About one-half of SUBASE Kings Bay, the eastern and south eastern portions, would be inundated by a 100-year flood. The mean annual precipitation at SUBASE Kings Bay is approximately 54 inches. The presence of permeable sands in the area is conducive to rainfall percolation directly into the water table aquifer, which is generally found within ten feet of the ground surface. The depth of the water table aquifer ranges from 40 to 90 feet below the ground surface and is isolated from the underlying artesian aquifers by confining layers of relatively impermeable clays and limestones. Water in the water table aquifer generally migrates along the confining layer and discharges into streams and springs including North River, Crooked River, and Marianna Creek. These streams eventually flow east or southeast to Kings Bay and Cumberland Sound. There are 22 known wells which tap the water table aquifer located on the activity. All of these wells were abandoned in 1978 when the Navy took over the base.

Fresh water at SUBASE occurs in two additional aquifers: the secondary artesian and the primary artesian. Water in the secondary artesian aquifer is generally isolated from the other aquifers by clay and limestone layers within which it occupies only isolated pockets. The secondary artesian aquifer is generally composed of isolated water containing lenses within the randomly layered clay, silt and limestones located between the water table aquifer and the principal artesian aquifer. It is believed that the water of the secondary artesin aquifer can be found at depths anywhere from 40 to 570 feet below the ground surface.

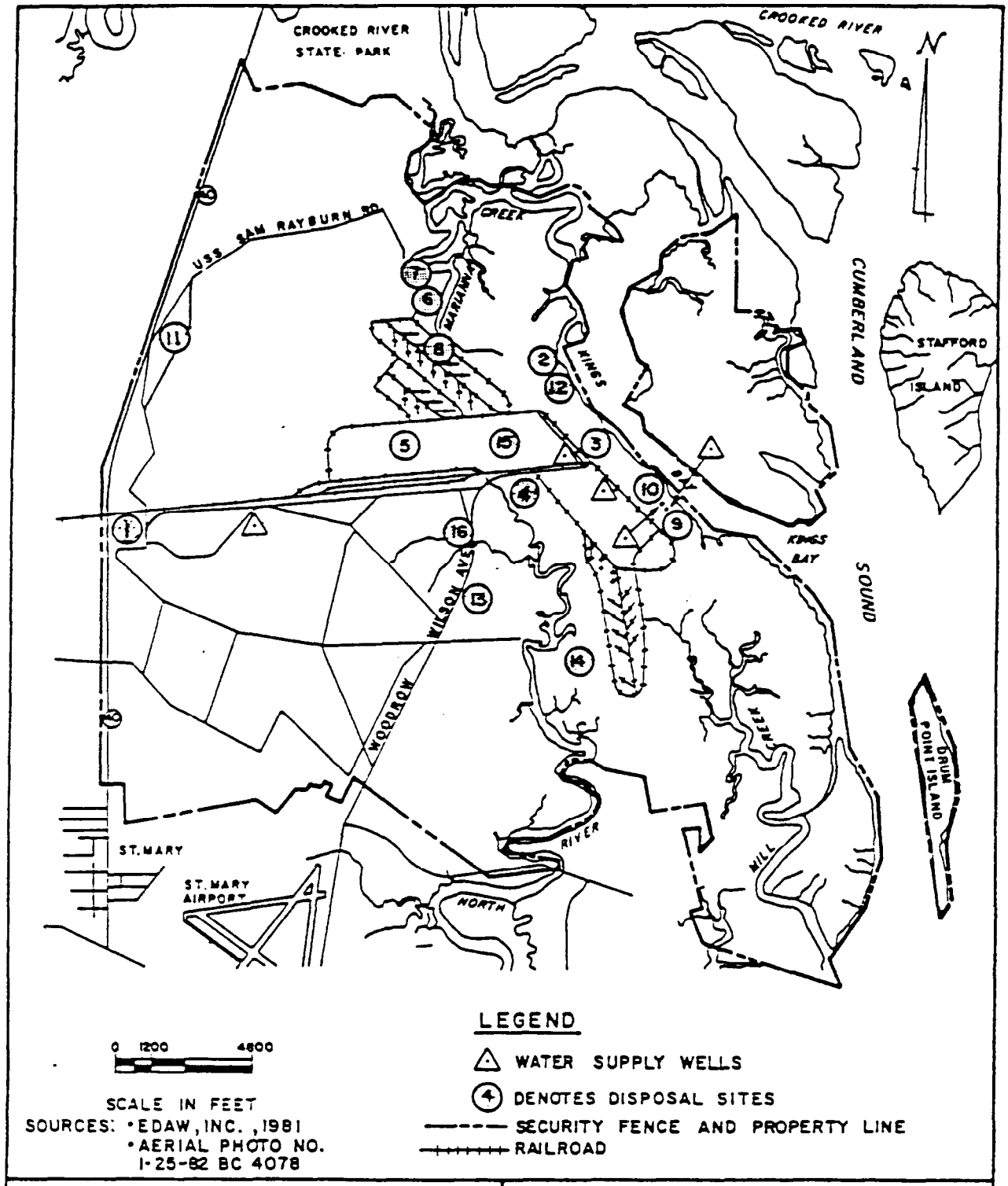


FIGURE 2-1
LOCATION OF DISPOSAL SITES AND POTENTIAL CONTAMINATION AREAS
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

The primary artesian aquifer consists of limestones beginning approximately 470 to 570 feet below the ground surface and extending to approximately 2000 feet below the ground surface. The aquifer is divided into two water bearing zones made up of two different types of limestone and separated by a 100 to 150 feet thick confining layer of dense limestone. Combined, these two zones make up the most productive aquifer in south east Georgia and are used to supply potable water to the base and all the nearby communities. There are five production wells which tap the principal artesian aquifer located at the activity (for locations, see Figure 2-1). The yield of these wells is estimated to be in excess of 1,000 gallons per minute per well. It is unknown which zone of the aquifer the wells located at the activity tap.

It appears that the water table aquifer represents the only potential contaminant migration pathway as both artesian aquifers are under pressure and are not recharged from the water table aquifer in the area of SUBASE Kings Bay.

2.1.2 Potential Contaminant Receptors. Potential contaminant receptors include humans and endangered, threatened and rare plants and animals. Since the water table aquifer is hydraulically isolated from any domestic supply aquifers, direct contact (exposure by consumption or contact) with humans could only be through surface water. This is not likely as most of the surface waters are used only for recreational boating and navigation. Indirect contact through the food chain is more likely since Cumberland Sound is a recreational and commercial fishery. Contaminants may migrate to Cumberland Sound by way of surface runoff or through subsurface flow in the water table aquifer and thereby enter the food chain. Humans consuming fish taken from the Sound could be exposed to levels of contaminants actually higher than levels in the water due to food-chain amplification. The Sound also provides a habitat for two endangered fish species, the Atlantic and Short-nose Sturgeons. These species are not consumed by humans, but should be considered potential receptors because of their endangered status.

2.2 WASTE DISPOSAL SITES AND POTENTIALLY CONTAMINATED AREAS. Table 2-1 lists the types and estimated quantities of wastes disposed of at the sites. The following are brief descriptions of these sites.

2.2.1 Site 1, PCB Transformer Storage Area No. 1. This site, used from 1979 to 1982, was located approximately 80 feet north of the old vehicle maintenance building (Building 1016) in the far western area of the activity (see Figure 2-2). The area was a fenced, unpaved impoundment, 120 square feet in size, where 10 PCB transformers were stored awaiting disposal. The transformers were acquired from the Army when the Military Ocean Terminal became Navy property. Less than one gallon of PCB oil leaked from the transformers. In 1981, plastic sheets were placed above and below the transformers and a earthen berm was constructed.

TABLE 2-1

AREAS OF CONTAMINATION-NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

AREA OF CONCERN	PERIOD OF OPERATION	TYPES OF WASTES DISPOSED OR SPILLED	MAP COORDINATES ESTIMATED TOTAL QUANTITY	COMMENTS
Site 1, PCB Transformer Storage Area No. 1	1979 to 1982	Polychlorinated Biphenyls	N290,000-E686,000 less than one gallon	Site cleaned up in September 1982
Site 2, Fire Fighting Pit	1980 to 1981	Waste oil, diesel fuel paint thinner, hydrazine	N294,000-E700,000 100 cubic yards	Site excavated and material sent to the currently operated Camden County Landfill in 1982
Site 3, PCB Transformer Storage Area No. 2	1979 to 1982	Polychlorinated Biphenyls	N292,000-E696,000 less than one gallon	Site cleaned up in 1982
Site 4, PCB Transformer Storage Area No. 3	Early 1980s to 1983	Polychlorinated Biphenyls	N290,000-E700,000 one gallon	Soil and transformer hauled off-base by a waste disposal contractor

TABLE 2-1 (Continued)

AREAS OF CONTAMINATION-NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

AREA OF CONCERN	PERIOD OF OPERATION	TYPES OF WASTES DISPOSED OR SPILLED	MAP COORDINATES ESTIMATED TOTAL QUANTITY	COMMENTS
Site 5, Army Reserve Disposal Area, Towhee Trail	1969 to 1974	Tree stumps, wooden pallets, metal ammo boxes, aluminum sheeting, concrete block, kitchen garbage	N292,000-E696,000 69,000 cubic yards	Wastes were disposed into pits; some were burned
Site 6, Army Reserve Disposal Area No. 1	At least 1975 to 1979	Dry wastes, office wastes, garbage	N292,000-E696,000 1600 cubic yards	Wastes were disposed into pits and covered with topsoil
Site 7, Army Reserve Disposal Area No. 2	1971 to 1977	Kitchen garbage	N298,000-E696,000 6500 cubic yards	Used during summer training camps
Site 8, Army Reserve Disposal Area No. 3	1973 to 1974	Paper, wood, kitchen garbage	N296,000-E698,000 350 cubic yards	Depression and 1 totally corroded 55-gallon drum were noticed in the area at the time of the IAS on-site visit
Site 9, Blue Star Shipping Disposal Area, Parking Lot	1959 to 1974	Pallets, paper, dunnage, old dynamite	N290,000-E706,000 1400 cubic yards	This area has been completely excavated during construction activities

TABLE 2-1 (Continued)

AREAS OF CONTAMINATION-NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

AREA OF CONCERN	PERIOD OF OPERATION	TYPES OF WASTES DISPOSED OR SPILLED	MAP COORDINATES ESTIMATED TOTAL QUANTITY	COMMENTS
Site 10, Blue Star Shipping Disposal Area, T-Shed	1974 to 1979	Pallets, paper, dunnage, old dynamite	N290,000-E704,000 1400 cubic yards	This site has been completely excavated
Site 11, Old Camden County Landfill	1974 to 1981	General household and office wastes, scrap paper, wood, treatment plant sludge and grit	N295,000-E687,000 500,000 cubic yards	
Site 12, Army Reserve Disposal, Area Future Dry Dock	1974 to 1978	Wooden and metal ammo boxes, concrete slabs dummy cargo, waste oil drums	N295,000-E701,000 467,000 cubic yards	The area was excavated in 1983
Site 13, Old DPDO Yard	1979 to 1983	Paints, solvents, antifreeze, waste oil, PCB transformers	N-286,000-E698,000 unknown quantities	The site was closed in 1983 and cleaned up
Site 14, Army Reserve Disposal Area, Kamehameha Avenue	1958 to 1978	Lube oil, diesel fuel, paint	N284,000-E702,000 100 to 200 gallons	Several drums were found during the IAS on-site visit

TABLE 2-1 (Continued)

AREAS OF CONTAMINATION-NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

AREA OF CONCERN	PERIOD OF OPERATION	TYPES OF WASTES DISPOSED OR SPILLED	MAP COORDINATES ESTIMATED TOTAL QUANTITY	COMMENTS
Site 15, Army Reserve Disposal Area near Water Treatment Plant, Stimson Drive	1970 to 1971	Methanol	N292,000-E700,000 50 to 100 gallons	Drums were observed during the IAS on-site visit
Site 16, Army Reserve Disposal Area near Old Sewage Lagoon 3990	1958 to 1964	Food, trash, scrap metal, tree limbs, empty paint and solvent cans	N288,000-E698,000 4000 cubic yards	Site was covered with soil upon closure

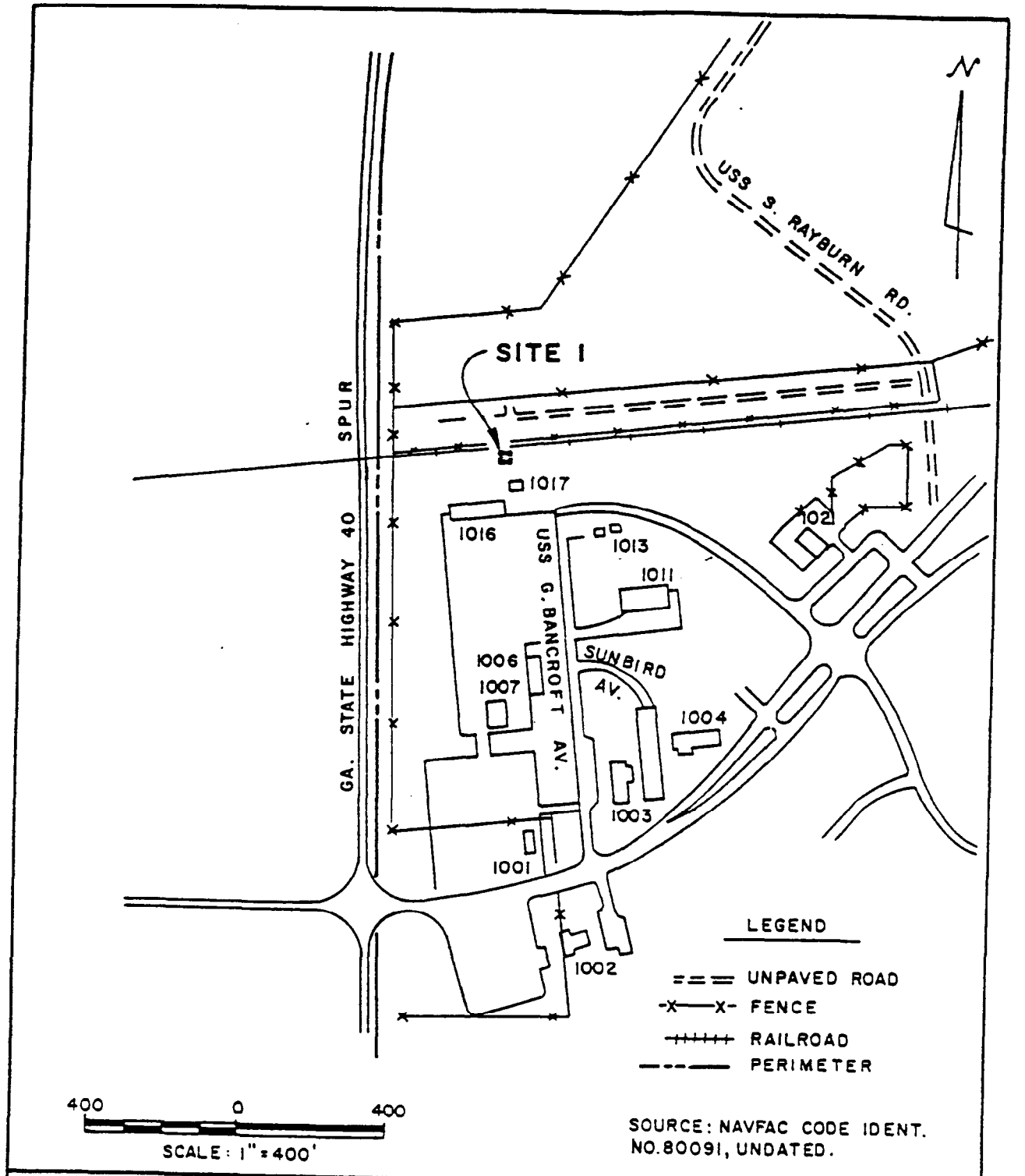


FIGURE 2-2
SITE I - PCB TRANSFORMER STORAGE AREA NO. I

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

One soil sample was taken on September 14, 1982 and laboratory analysis identified 9.2 ppm of PCB (see Appendix D). No Georgia State or Federal standards exist for PCBs in soil. In late September 1982, about 40 cubic feet of soils were excavated over the 120 square foot area. The soil was removed to an average depth of approximately 4 inches. The transformers and contaminated soil were disposed of off-base by a waste disposal contractor in 1982.

Due to the small quantity of PCBs found in the soil and the volume of contaminated soil excavated, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 1.

2.2.2 Site 2, Fire Fighting Pit. The fire fighting training pit (unlined), used from 1980 to 1981, was approximately 30 feet by 30 feet by 2 feet deep. It was located in the waterfront area off Pelican Road near the intersection of Stimson Drive and USS James Monroe Avenue (see Figure 2-3). Contaminated diesel fuel, paints and paint thinners were poured into the bermed pit and burned once every two months by the fire department. Approximately 1500 gallons of waste engine oil and small amounts of diesel fuel, paints and paint thinners were reportedly burned between 1980 and 1981. In 1980, a one time disposal of an unknown quantity of hydrazine was also burned at Site 2. It is unknown whether water or some type of chemical foam or powder was used to extinguish the fires. A soil core sample was taken from the pit in August, 1980 and was tested for EP toxicity. Lab results identified the materials as non-hazardous (see Appendix E). In 1982, approximately 100 cubic yards (3 feet deep in an area of 30 feet by 30 feet) of contaminated soil were excavated from the pit and disposed of by a waste disposal contractor. Because of the EP Toxicity results and the volume of contaminated soil excavated, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 2.

2.2.3 Site 3, PCB Transformer Storage Area No. 2. Site 3 was a contractor paved area used to store an unknown number of transformers and construction materials and equipment from 1979 to 1982. The transformers, an unknown number of which contained polychlorinated biphenyls (PCB), were stored on a 120 square feet area near Building 5006 (see Figure 2-4) with plastic sheets above and below them and within earthen berms. Less than one gallon of transformer coolant (containing PCB) leaked from the transformers onto soil adjacent to the pavement. Three samples were taken from this soil. The results indicated the presence of Aroclor 1260 (PCB) in concentrations of 47.5, 31.2 and 24.0 parts per million. No State or Federal standards exist for PCB in soils.

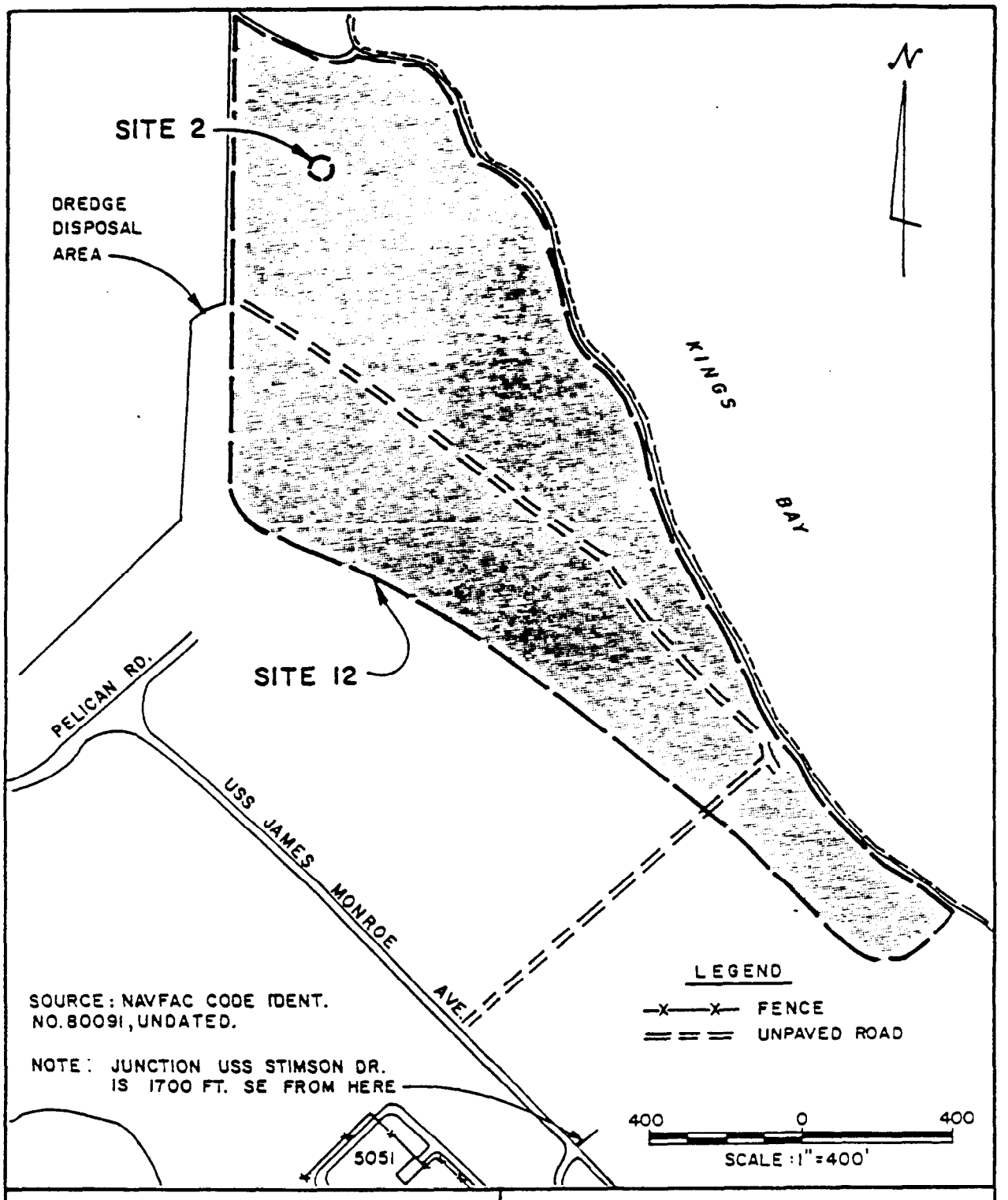


FIGURE 2 - 3
SITE 2 - FIRE FIGHTING PIT.
SITE 12 - ARMY RESERVE DISPOSAL AREA, FUTURE DRY DOCK.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

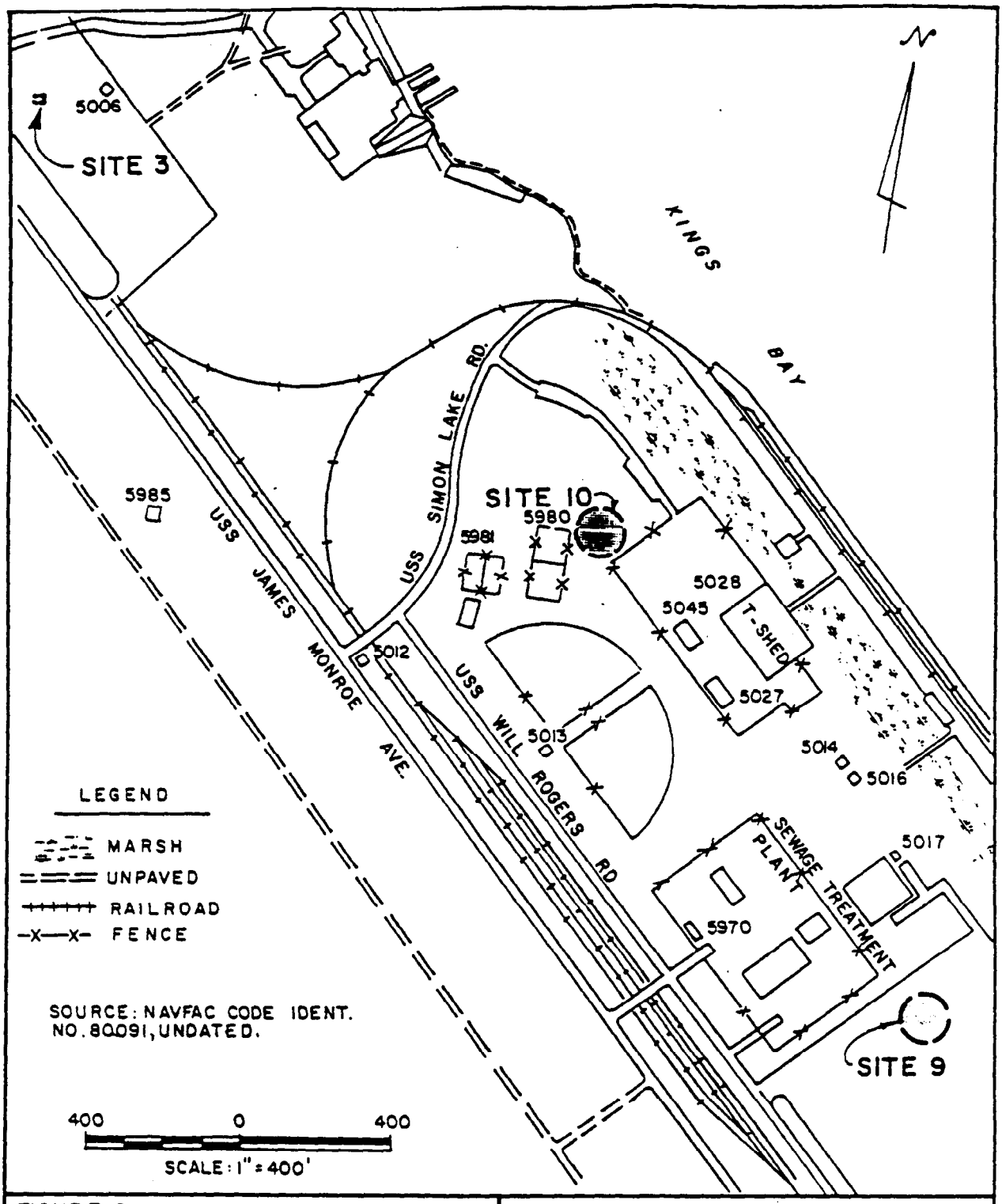


FIGURE 2-4
SITE 3 - PCB TRANSFORMER STORAGE AREA NO. 2.
SITE 9 - BLUE STAR SHIPPING DISPOSAL AREA, PARKING LOT.
SITE 10 - BLUE STAR SHIPPING DISPOSAL AREA, T-SHED.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

Soils in an area of approximately 14 feet by 15 feet and 4 inches deep were excavated in September 1982 and, along with the transformers, removed from the base by a waste disposal contractor. The total volume of soil removed was 70 cubic feet. Results of the soil analysis are shown in Appendix F. No sampling was performed after excavation.

Based on the fact that contaminated soils in the area of the PCB spill were excavated, this site does not pose a potential threat to human health or the environment. Therefore, no further action under the NACIP program is recommended for Site 3.

2.2.4 Site 4, PCB Transformer Storage Area No. 3. Reportedly, in the early 1980s, transformer with oil containing polychlorinated biphenyls (PCB) was placed behind the standby water treatment plant at SUBASE Kings Bay (see Figure 2-5). In December, 1982 approximately one gallon of transformer coolant, containing 63 percent PCB by weight, was spilled from a filler cap onto the adjacent soil. In January 1983, the transformer and 8 cubic feet of excavated soil were transferred to 55 gallon drums. Soil was removed to a depth of approximately 11 inches in an area covering one square yard. On September 15, 1983, the drums containing the soil and the transformer were removed from the base by a waste disposal contractor.

Due to the small size of the spill and the fact that contaminated soil in the area was excavated, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 4.

2.2.5 Site 5, Army Reserve Disposal Area, Towhee Trail. This disposal site was used by the Army Reserve from approximately 1969 to 1974. The site covers a total area of approximately 8.5 acres located on both sides of Towhee Trail (see Figure 2-6). The area on the west side of the road is reportedly about 7 acres in size while that on the east side is about 1.5 acres. The areas were both excavated to a depth of five feet before wastes were placed in them. Wastes disposed of in the site included tree stumps, wooden pallets, metal ammo boxes (some empty and some filled with concrete), aluminum sheeting, concrete blocks and kitchen waste. Also, a large pile of dredge spoils and gravel (from abandoned railroad tracks) were spread over most of the western portion of the site. The spoils and gravel were spread to a depth of about 2 feet. Burning of wastes occurred twice a year on the western side of the road. No burning ocurred on the eastern side of the road. A total of approximately 30 to 40 gallons of diesel fuel and waste engine oil were used to ignite the wastes.

Therefore, over the 5 years that the site was in use a total of 300 to 400 gallons of waste oil and fuel were burned. Quantities of wastes disposed are approximated at 69,000 cubic yards.

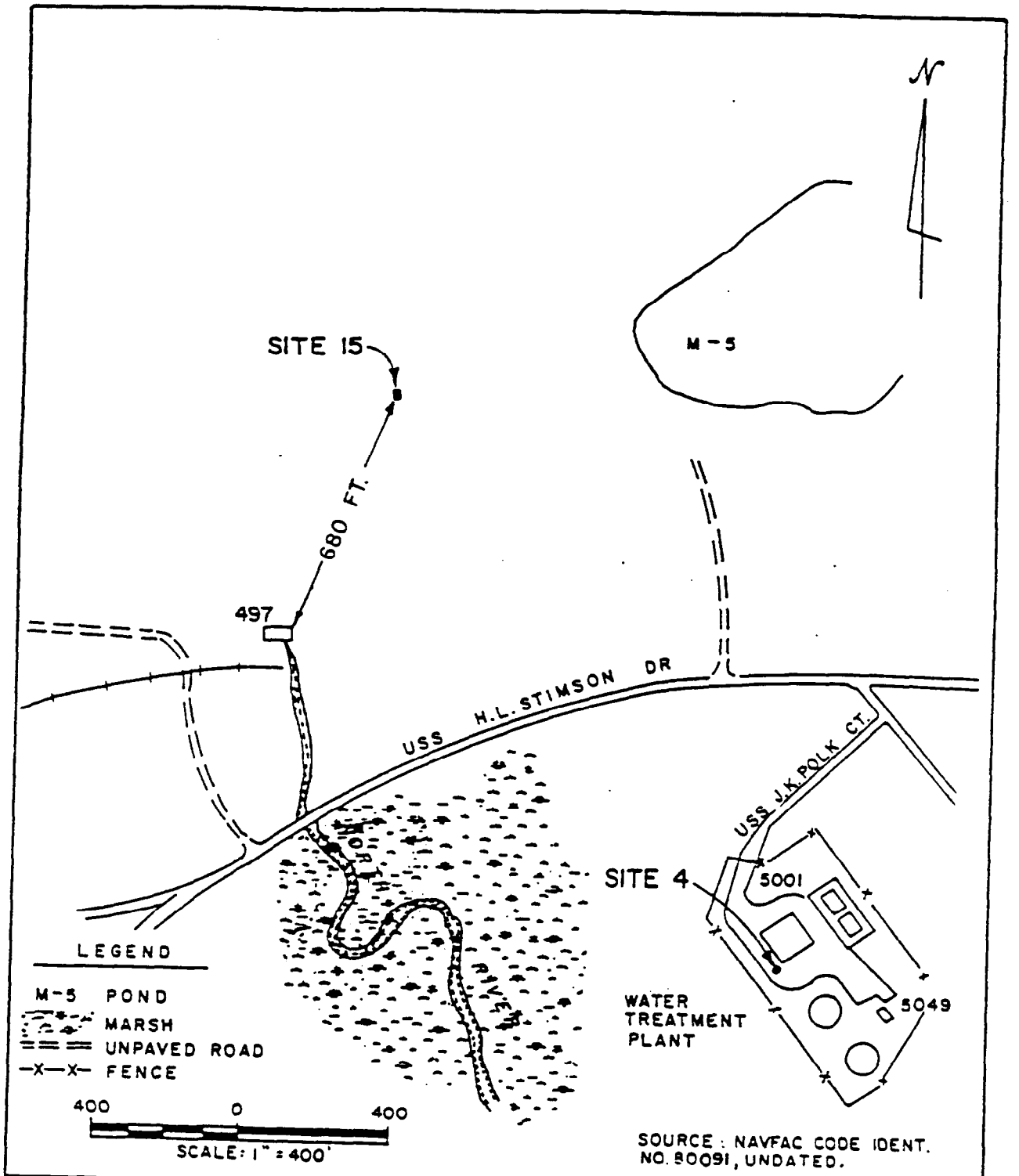


FIGURE 2-5
SITE 4 - PCB TRANSFORMER STORAGE AREA NO. 3
SITE 15 - ARMY RESERVE DISPOSAL AREA NEAR THE WATER TREATMENT PLANT, STIMSON DRIVE.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

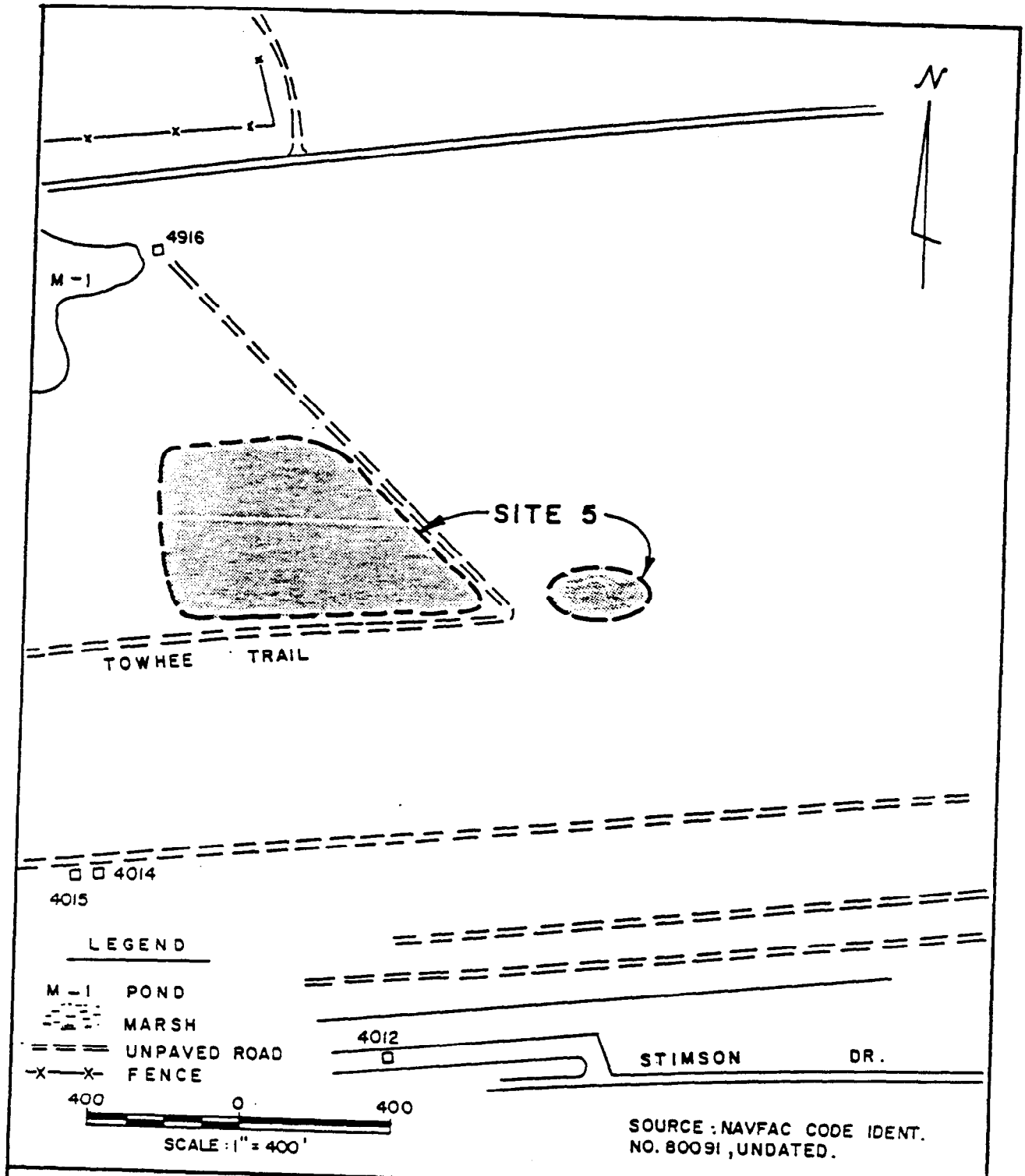


FIGURE 2-6
SITE 5 - ARMY RESERVE DISPOSAL AREA, TOWHEE TRAIL.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

Because hazardous waste were reportedly not disposed of at Site 5, this site does not pose a potential threat to human health or the environment. Therefore, no further action under the NACIP program is recommended for Site 5.

2.2.6 Site 6, Army Reserve Disposal Area No. A. This site, located east of Proteus Boulevard and north of Calhoun Drive, is adjacent to the wetlands bordering Marianna Creek (see Figure 2-7). The site is a 0.25 acre area that the Army Reserve used from at least 1975 until 1979 for trash and garbage disposal during their six week summer training camps. Pits, approximately five feet in diameter and five to six feet deep, were dug for the disposal of office wastes and garbage. After the pits were filled with wastes, they were then covered with one to two feet of soil. Waste quantity is estimated at 1,600 cubic yards.

Because no hazardous wastes were disposed of at Site 6, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 6.

2.2.7 Site 7, Army Reserve Disposal Area No. B. Site 7, was used by the Army Reserve during summer training camp (6 weeks out of the year) for the disposal of kitchen garbage. The disposal occurred between 1971 and 1977. The site is located east of Proteus Boulevard, just south of Teal Trail, and covers an area of approximately 0.5 acre (see Figure 2-7). The pits were dug to a depth of eight feet and were approximately 5 feet in diameter. Based on the dimension of the disposal area, approximately 6,500 cubic yards of garbage were buried in this site.

Because hazardous wastes were reportedly not disposed of at Site 7, this site does not pose a potential threat to human health or the environment. Therefore, no further action under the NACIP program is recommended for Site 7.

2.2.8 Site 8, Army Reserve Disposal Area No. C. Site 8 is located at the southern end of Proteus Boulevard adjacent to the dredge disposal area (see Figure 2-7). The site was used by the Army Reserve for their six week summer training camps between 1973 and 1974. The site area is about 100 feet by 14 feet by 5 to 8 feet deep, and was used for the disposal of general household wastes such as paper, wood and kitchen garbage. During the IAS on-site visit, a depression was noticed in the area and a totally corroded 55-gallon drum was seen off to one side towards USS Proteus Boulevard. There was no evidence of leakage or spillage. Approximately 350 cubic yards of waste are estimated to have been buried at Site 8.

Since hazardous wastes were reportedly not disposed of at Site 8, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 8.

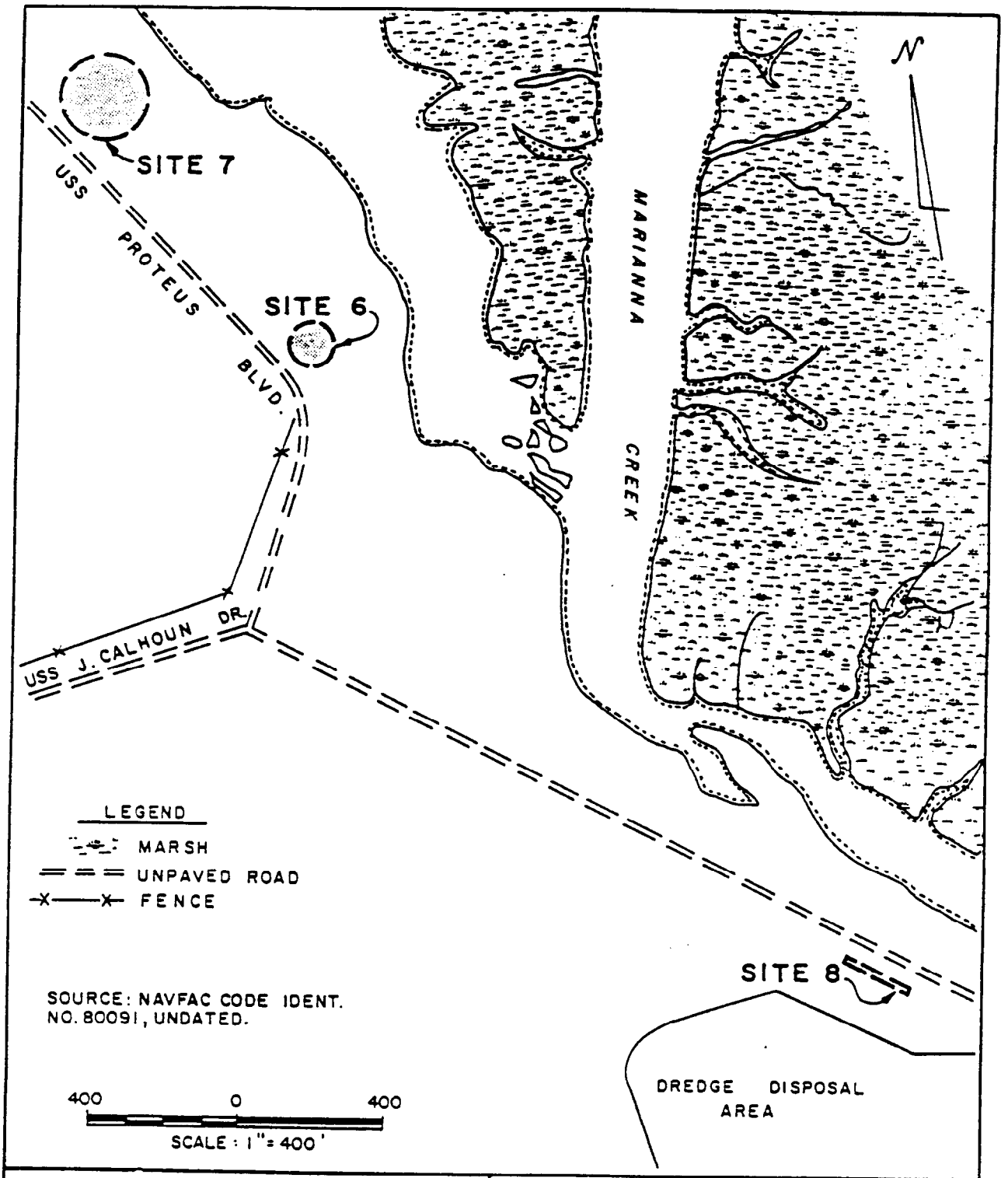


FIGURE 2-7
SITE 6 - ARMY RESERVE DISPOSAL AREA NO. A
SITE 7 - ARMY RESERVE DISPOSAL AREA NO. B
SITE 8 - ARMY RESERVE DISPOSAL AREA NO. C

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

2.2.9 Site 9, Blue Star Shipping Disposal Area, Parking Lot. The Blue Star Shipping Company operated this site from 1959 to 1974. The site was located under the present parking lot next to the water front sewage treatment plant (see Figure 2-4). This burn and burial site was 0.25 acres and 3 to 4 feet deep. It is unknown how often the burning occurred or if any fuel was used to ignite the wastes. Wastes included pallets, paper, dunnage and an unknown quantity of sticks of dynamite. The waste quantity is estimated at 1400 cubic yards. The area was completely excavated during the construction of adjacent buildings and a parking lot in the late 1970s. Since no hazardous wastes were reportedly disposed of at Site 9, this site does not pose a potential threat to human health or the environment. Therefore, no further action under the NACIP program is recommended for Site 9.

2.2.10 Site 10, Blue Star Shipping Disposal Area, T-Shed. Site 10 was used from 1974 to 1979 by the Blue Star Shipping Company as a disposal area similar to Site 9. The site was located east of Building 5080 near the T-shed fence line (see Figure 2-4). Wastes were burned at the site and included pallets, paper, dunnage and an unknown quantity old dynamite. It is unknown how often burning occurred or if any fuel was used to ignite the wastes. The area of the site is approximately 0.25 acres and three to four feet deep. Based on the dimensions of the site approximately 1400 cubic yards of wastes were buried here. This area was completely excavated during construction of the T-Shed parking lot in the early 1980s. Since hazardous wastes were reportedly not diposed of at Site 10, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 10.

2.2.11 Site 11, Old Camden County Landfill. Located in the far western area of the activity (see Figure 2-8), this 35 acres landfill was operated by Camden County from 1974 to October 1981 (Knowlton, 1981). Reportedly, hazardous wastes were not accepted at the landfill. Only domestic wastes were accepted including general household and office wastes, scrap paper, wood, and sludge and grit from the base wastewater treatment plants. The landfill was a trench and fill operation with trenches oriented in an east-west direction across the landfill (approximately 800 feet long by 20 feet wide). Excavation was into the water table which is four to eight feet below the surface at the site. Burning of wastes took place once per week during the first year of the operation only. This practice was discontinued in 1975. At the end of each day the wastes and ashes were compacted and covered with at least six inches of soil. Upon closure, a final soil cover of two feet was placed on the landfill. Estimated waste quantity is 500,000 cubic yards.

Since hazardous wastes were reportedly not disposed of at Site 11, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 11.

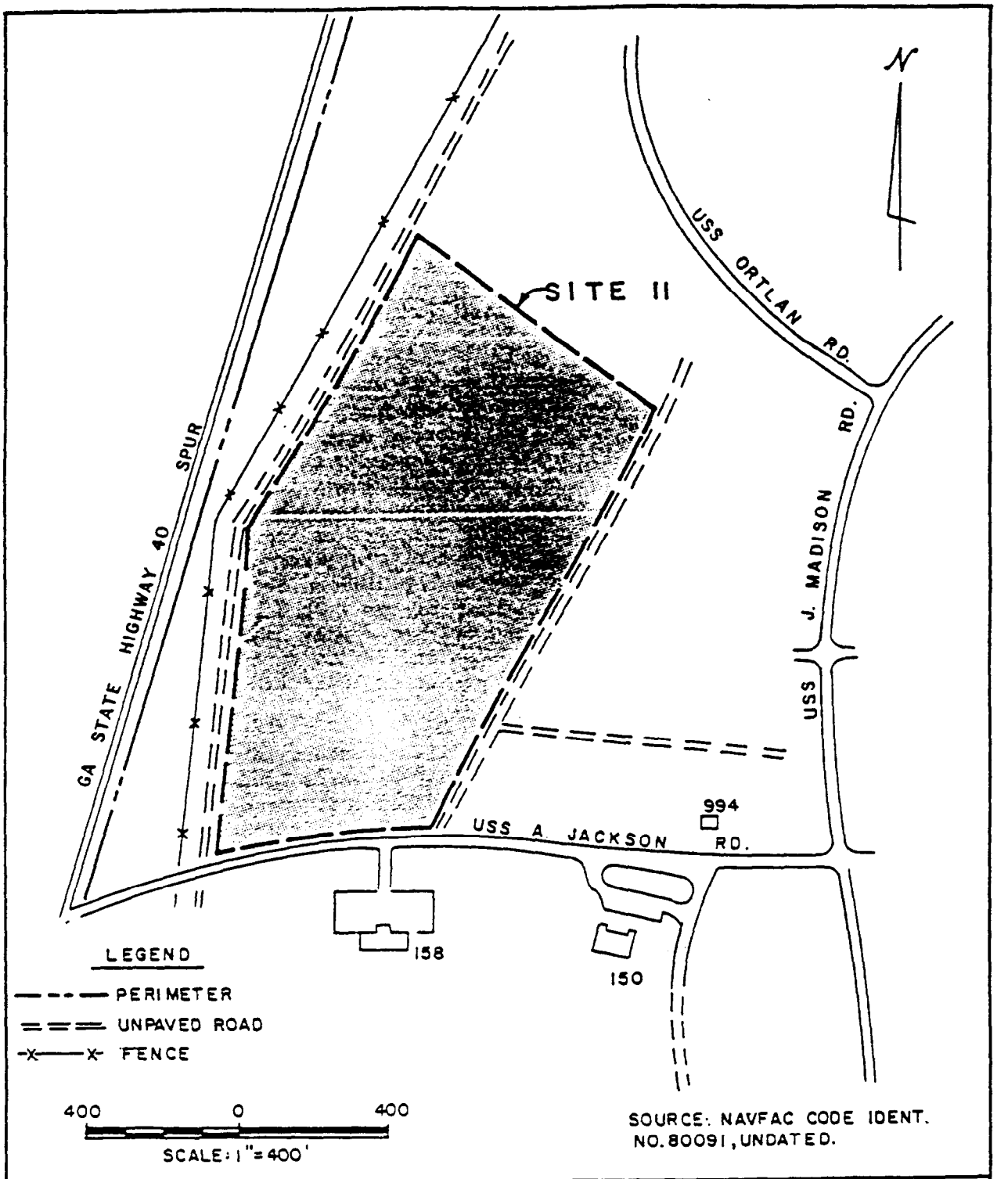


FIGURE 2-8
SITE II - OLD CAMDEN COUNTY LANDFILL.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

2.2.12 Site 12, Army Reserve Disposal Area. Site 12 is located along Kings Bay in the future dry dock area (see Figure 2-3). The site was used by the Army Reserve for amphibious ship-to-shore materials loading and offloading training operations from 1974 to 1978. The size of the disposal area is approximately 41 acres. Wastes included empty wooden and metal ammo boxes, concrete slabs, dummy cargo, and six to eight 55-gallon drums of waste engine oil.

Waste quantity was estimated at 467,000 cubic yards. In 1983, a contractor operating a backhoe at the site uncovered six to eight 55-gallon drums of waste oil. One of the drums was punctured by the backhoe, causing a spill. The stained soils and drums were removed from the base by a waste disposal contractor in 1983. The remaining inert wastes were excavated in late 1983 and buried in the dredge spoil area. Since all wastes were excavated from Site 12, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 12.

2.2.13 Site 13, Old DPDO Yard. The Old DPDO yard was located east of Polaris Lane across USS James Monroe Avenue (see Figure 2-9). The size of the yard was reportedly 450 feet by 75 feet. The fenced and asphalt paved area was used from 1979 to 1983 for storage of waste materials. Materials stored here included:

Type	Percentage of Total Materials
Paints (including polyamide paints)	60-70%
Solvents (including methyl ethyl ketone, methyl isobutyl ketone)	10%
Monomethanol Amine	5%
Antifreeze (ethylene glycol)	5%
2190 Lubricating Oil (used on ships and submarines)	1%
Waste Oil and small amounts of unidentified materials	10%

Reportedly, two old transformers were stored at the site. Some types of waste materials were stored on metal pallets. It was reported that during operation of the site, between one and five 55 gallon drums of the unknown types of materials were spilled onto the asphalt paved area but were cleaned up by Public Works personnel soon after they occurred. Corroded and dented drums and cans of materials were generally repacked, sealed and labelled for off-base disposal. When final cleanup of the site was undertaken in 1984, useable materials were sent to the Naval Air Station, Jacksonville and the remaining hazardous materials were hauled off station by contract waste haulers. Empty drums were sent to a contractor for triple rinse. The site is now covered by more than 5 feet of compacted soil as a part of the on-going construction of SUBASE Kings Bay.

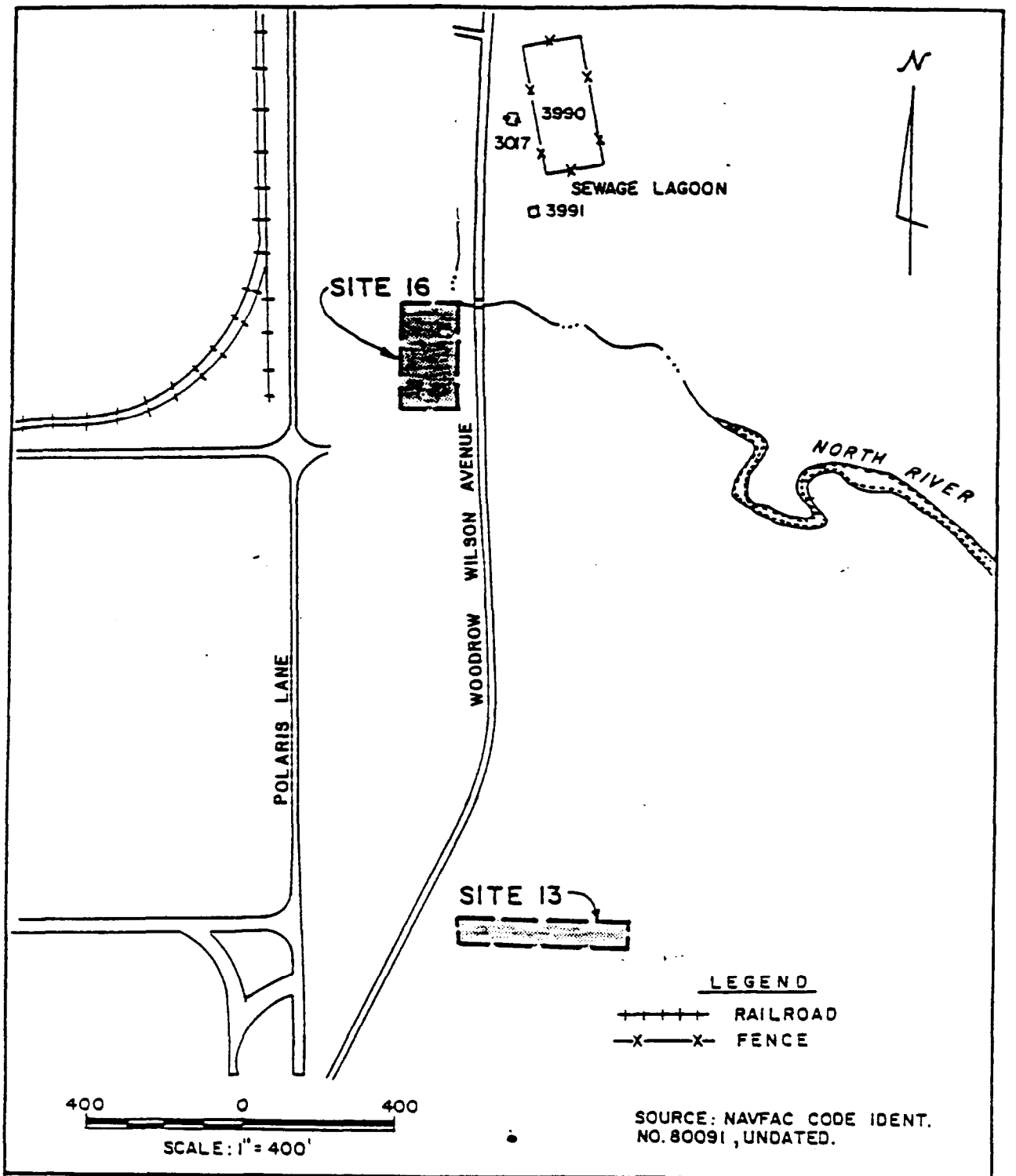


FIGURE 2 - 9
SITE 13 - OLD DPDO YARD.
SITE 16 - ARMY RESERVE DISPOSAL AREA NEAR OLD SEWAGE LAGOON 3990

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

Since cleanup actions were taken each time a spill occurred, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 13.

2.2.14 Site 14, Army Reserve Disposal Area, Kaemehameha Avenue. Site 14 is an area approximately 1500 square feet (60 feet by 25 feet) located 1160 feet west of Kamehameha Avenue (see Figure 2-10). Surface waste disposal was first observed at the site in 1978. The period of site operation is estimated to be between 1958 to 1978. Presently, the area is overgrown with forest vegetation. During IAS on-site visit, the following labelled drums were found lying on the ground: three 55-gallon drums marked "lube oil" (partially full); one 55-gallon drum marked "diesel" (partially full); one severely corroded 55-gallon drum with no visible marking (empty); and one 5-gallon can of white paint (full). Evidence of oil leakage from three of the drums was apparent on the area immediately surrounding the drums. The estimated spill quantity of the above materials is 100 to 200 gallons.

Because cleanup actions have been initiated by SUBASE Kings Bay at this site, no further action under the NACIP program is recommended for Site 13.

2.2.15 Site 15, Army Reserve Disposal Area Near Water Treatment Plant, Stimson Drive. This site is located north of Stimson Drive near the water treatment plant (see Figure 2-5). The surface waste disposal area is about 10 feet by 5 feet and was reportedly used from 1970 to 1971 by the Army Reserve. During the IAS on-site visit, two 55-gallon drums were observed at the site. One was almost completely corroded with no legible markings or labels. No evidence of leakage from the drums was apparent. The other drum was marked "Methanol Tech Grade A" (Phipps Product, Boston, Mass., Stock No. 6810-221-8355, expiration date 9/71) and was partially full. The area is presently wooded. The estimated spill quantity of methanol is 50 to 100 gallons.

Because cleanup actions have been initiated at this site, no further action under the NACIP program is recommended for Site 15.

2.2.16 Site 16, Army Reserve Disposal Area Near Old Sewage Lagoon 3990. This site, located west of Woodrow Wilson Avenue and south of old sewage lagoon 3990 (see Figure 2-9), was used every six months by the Army Reserve from 1958 to 1964. The site covered an area of one acre and was excavated three to five feet deep. Wastes disposed here included food, wood, trash, scrap metal, tree limbs and empty paint and solvent cans (about 1 or 2 gallon cans per month). The waste quantity is estimated at approximately 4000 cubic yards. Reportedly, burning of waste took place at this site. It is unknown how often burning occurred or if any fuel was used to ignite the wastes. The site was covered with soil upon closure.

Since hazardous wastes were reportedly not disposed of at Site 16, this site does not pose a potential threat to human health or to the environment. Therefore, no further action under the NACIP program is recommended for Site 16.

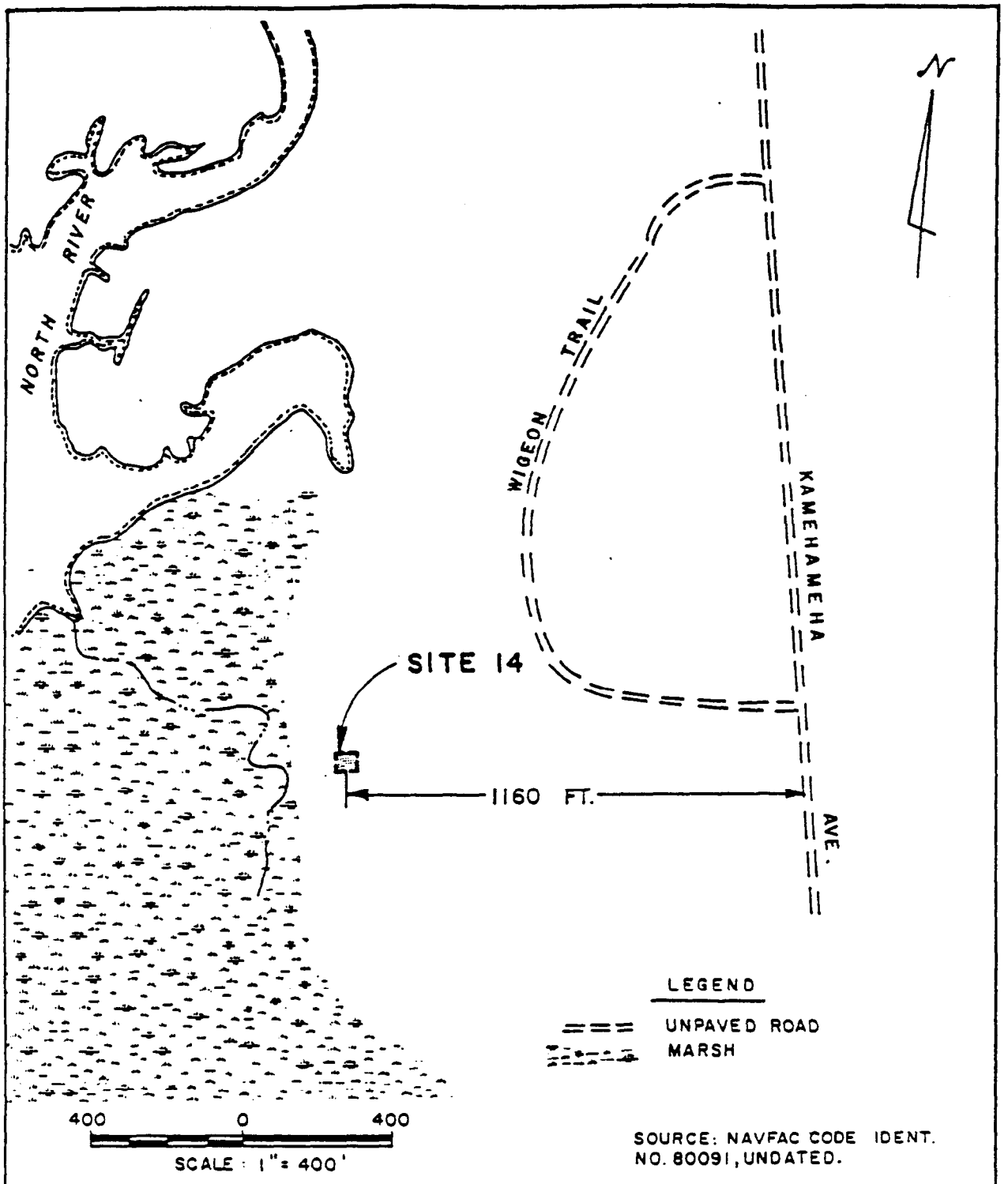


FIGURE 2-10
SITE 14 - ARMY RESERVE DISPOSAL AREA, KAMEHAMEHA AVE.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

CHAPTER 3. RECOMMENDATIONS

3.1 GENERAL RECOMMENDATIONS. It is recommended that the locations of all sixteen sites at SUBASE Kings Bay identified in the Initial Assessment Study be marked on General Development Maps.

CHAPTER 4. BACKGROUND

4.1 INTRODUCTION. The Naval Submarine Base (SUBASE), Kings Bay is located in the southeast corner of Georgia approximately eight miles north of the Georgia-Florida border. It covers a total area of approximately 16,168 acres. The closest community to the activity is the city of St. Marys which borders the southern boundary of the base (see Figure 4-1). SUBASE Kings Bay is located in Camden County. The county has a population of 12,800 living mainly in St. Marys, Kingsland, and Woodbine. The population in Camden County has increased steadily since 1940 with the introduction of paper manufacturing at St. Marys. Kings Bay, which borders the base on the eastern side, empties into Cumberland Sound and eventually the Atlantic Ocean. The bay provides the port for refit facilities on the fleet ballistic missile submarines. Since 1979, SUBASE Kings Bay has supported Submarine Squadron Sixteen. Squadron sixteen was moved from Rota, Spain to Kings Bay in July 1979. Its mission is the maintenance and repair of submarines. Since 1979, SUBASE Kings Bay has employed approximately 3000 people including personnel living on the Reserve Training Facility.

Kings Bay was an inactive Military Ocean Terminal owned and maintained by the U.S. Army for reserve training operations and contingency purposes from 1956 to 1978. Because there was no immediate operational need for this installation, it was placed in an inactive status and remained in that status from 1956 until 1 July 1978. The property was then transferred to the U.S. Navy for development of SUBASE Kings Bay. SUBASE Kings Bay is still being developed into a support facility for Fleet Ballistic Missile Submarines.

4.1.1 Tenant/Host Relationships. The Naval Submarine Base at Kings Bay, Georgia has several tenant activities that contribute in accomplishing its mission. A list of the tenants and their operations is as follows.

4.1.1.1 Mobile Technical Unit Fourteen. This unit is in Building 2014 and its function is to service and repair electronic equipment in submarines, vessels and ships.

4.1.1.2 Navy Publications and Printing Service Jacksonville Detachment. This shop is currently located in trailers 2 and 3. It provides the base with printing and duplicating services.

4.1.1.3 Explosive Ordnance Disposal Group Two Detachment Kings Bay. The Explosive Ordnance Disposal Group Two Detachment Kings Bay is located in Building 2013 and has the responsibility for providing ordnance related support to the SUBASE, USS Simon Lake and Submarine Squadron Sixteen Diving services.

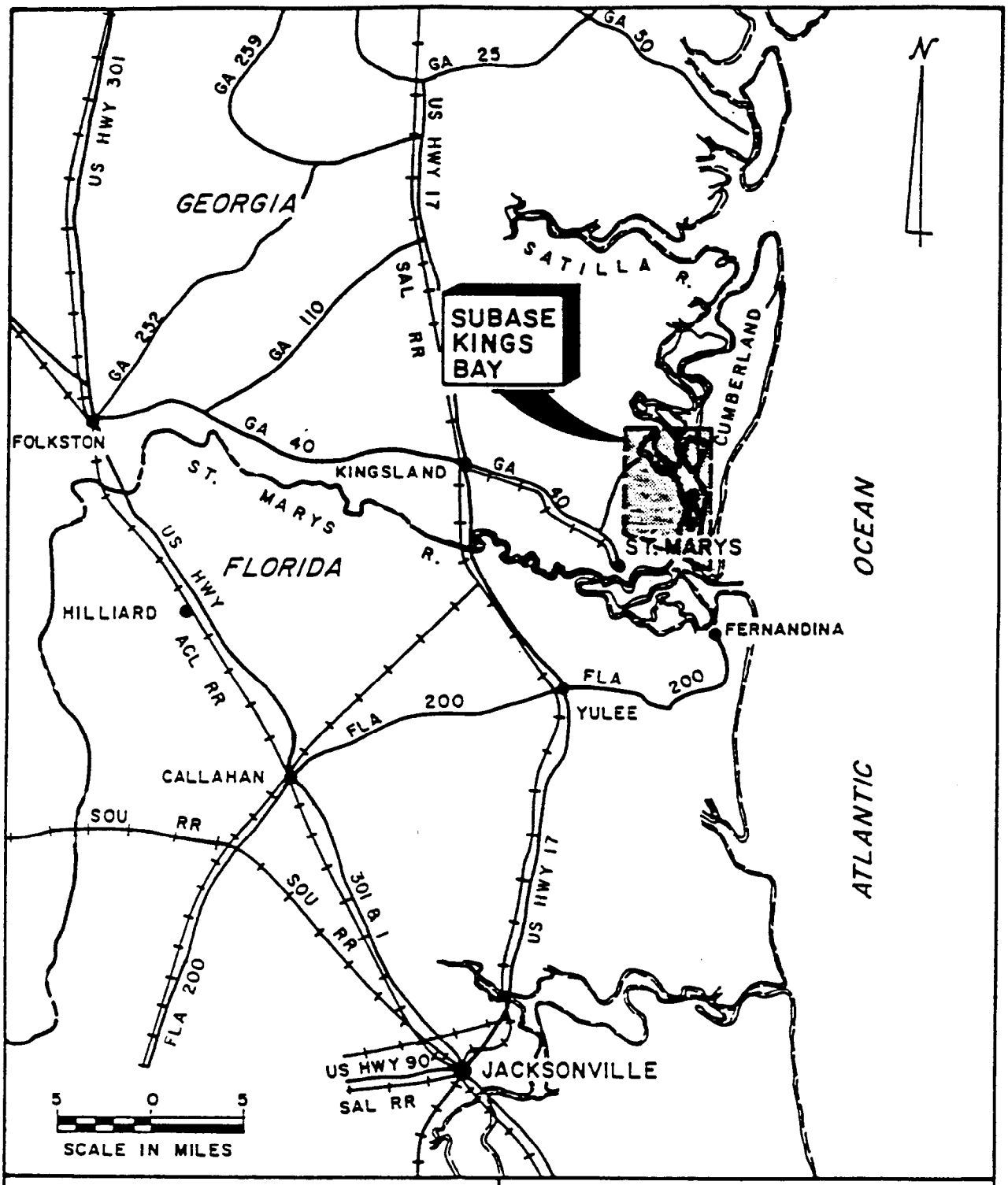


FIGURE 4-1
VICINITY MAP
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

4.1.1.4 Photo Laboratory. The Photo Laboratory, located in Building S-15, provides photographs for newspaper articles.

4.1.1.5 US Army Reserve Three Hundred and Seventieth Engineering Detachment (TI)M. The US Army Reserve 370th Engineering Detachment (TI)M meets on weekends and provides utility services including electrical and plumbing at the base.

4.1.1.6 Residential Officer-In-Charge of Construction. The three groups in this activity are the Resident Officer-In-Charge of Construction, Kings Bay (ROICC,KB), the Resident Officer-In-Charge of Construction, Systems (ROICC,SYS), and the Officer-In-Charge of Construction, Trident. They are responsible for advertising and awarding of construction contracts, supervising on-base construction and managing of service contracts.

4.1.1.7 Defense Investigative Service. The Defense Investigative Service provides counter-intelligence, espionage, security and protective services for the Base.

4.1.1.8 Applied Physics Laboratory, Johns Hopkins University. The Applied Physics Laboratory's major responsibility is the maintenance of electronic communications equipment aboard submarines.

4.1.2 Adjacent Land Use. The existing land use in the region ranges from highly urbanized to rural development. The north, south, and west areas in the vicinity of the base are mostly residential with some commercial development on the west side. Camden County lies midway between Jacksonville to the south, and the smaller urban area of Brunswick to the north. The economy of the region has been directly dependent on manufacturing since the mid-1940s. The Gilman Paper Company is located in the city of St. Marys less than 4 miles southwest of the activity. This company is the largest manufacturing company in Camden County accounting for about 70 percent of the total manufacturing labor force since 1970 (Environmental Science and Engineering, Inc., 1975). On the east side of the base is Kings Bay. The region is predominantly rural with only about 8 percent of the land area developed in the region. The majority of the undeveloped land is either marsh or swamp and does not lend itself to development or agricultural uses.

Excluding public land, only 3.6 percent of Camden County is developed for commercial or residential uses. Over half of this development is in the cities of St. Marys, Woodbine, and Kingsland. Of the undeveloped land in the county, over 70 percent is unsuitable for development because of soil conditions or drainage problems.

4.2 HISTORY.

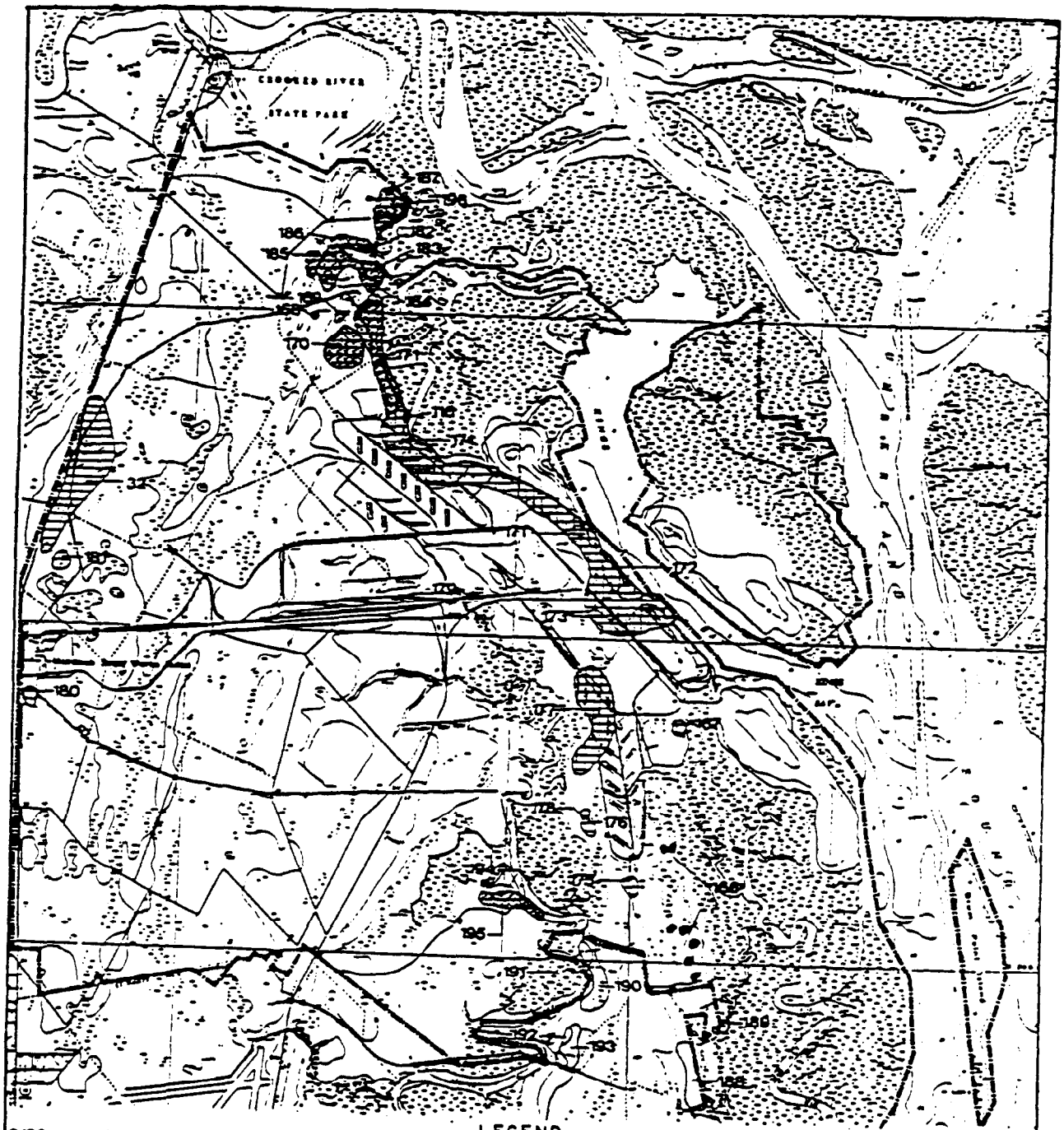
4.2.1 History. In the early 1950s, the U.S. Army began operations at SUBASE Kings Bay, developing the property as a military ocean terminal. Kings Bay Army Terminal, as it was called, was constructed to meet Department of the Army requirements for east coast port facilities

capable of shipping ammunition and other explosives in the event of a national emergency. Acquisition of land for the terminal began in 1954 and construction activity commenced in 1956 with all facilities being completed in 1958. From its inception until June 30, 1965 the terminal was known as the Kings Bay Army Terminal. On April 1, 1965 as a result of a major reorganization, the terminal was placed under the jurisdiction of the newly organized Military Traffic Management and Terminal Service, and on 1 July 1965 became officially known as the U.S. Army Military Ocean Terminal, Kings Bay (MOTKI). MOTKI had no assigned military personnel and was operated by nineteen U.S. Government Civil Service employees, whose mission was to plan programs, perform utility repairs and provide fire prevention and protection functions for the terminal.

MOTKI was a terminal, not a storage depot, designed to store ammunition or explosives for about three months. MOTKI was directly subordinate to the Military Ocean Terminal, Sunny Point, Southport, N.C. Facilities constructed at the Terminal included a 2000 foot wharf, administration buildings, work shops, utility buildings, and 47 miles of railroad track for transporting explosives. In 1978, the Department of the Navy selected MOTKI as the East Coast basing site for its Fleet Ballistic Missile (FBM) submarine support facility. This selection was made after screening 60 potential sites. Construction of a refit facility for one submarine squadron (T-1) began in 1978 in anticipation of 10 Poseidon submarines. In 1979, the Navy moved Squadron 16 from Spain to Kings Bay. On July 1, 1978 the site was established in a developmental status and was named the Naval Submarine Support Base. The activity became the Naval Submarine Base, Kings Bay in 1979. Although secondary to its primary mission, the terminal has in the past performed valuable service to the United State Government and to the local populace. For example, during the Cuban missile crisis a U.S. Army Transportation Battalion (Boat) consisting of approximately 1,100 military personnel and seventy small craft vessels were temporarily stationed at Kings Bay, and during Hurricane Dora in 1964 the terminal was utilized as a shelter area for nearly one hundred local residents.

4.2.2 Historical Sites. Both aboriginal groups and Euro-American settlers chose the northeast section of the Base as a place for settlement because of its relatively abundant natural resources. There are 34 aboriginal and historic sites located on the activity, 20 of which are located on the coast. Twenty seven of these sites are potentially eligible for the National Register of Historic Places (Environmental Science and Engineering, Inc., 1980) (see Figure 4-2). This area and the area adjacent to the North River are categorized as archaeologically sensitive zones requiring special management practices to preserve the natural resources including the wetlands and bays they contain.

4.3 LEGAL ACTIONS. There is no record of past environmental legal actions against SUBASE Kings Bay.



SOURCE: EDAW, INC., 1981

LEGEND

- ARCHEOLOGICAL SITES TO BE PRESERVED
- ARCHEOLOGICAL SITES–MATERIAL OF VALUE TO BE REMOVED
- ARCHEOLOGICAL SITES–INVESTIGATED, CONTAIN LITTLE OR NO MATERIAL OF VALUE

FIGURE 4-2
LOCATION OF ABORIGINAL AND HISTORIC SITES
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

4.4 BIOLOGICAL FEATURES. SUBASE Kings Bay is located on an arm of Cumberland Sound called Kings Bay. It is between the St. Marys River and Crooked River and connected to the sea by a 12-mile access channel which passes through the St. Marys Inlet. SUBASE Kings Bay covers a total area of approximately 16,168 acres. Terrestrial ecosystems comprise 9,621 acres of land area, while salt marsh ecosystems and open water estuarine systems comprise 6,116 acres and 1,010 acres respectively (Environmental Science and Engineering, Inc., 1975). Land areas at SUBASE Kings Bay consist of major upland plant communities of pine flatwoods and pine plantations, salt marshes in the lowland areas, and southern mixed hardwoods occurring in small patches predominantly in the eastern half of the base.

4.4.1 Ecosystem. The Kings Bay area can be divided into three general geographic areas based upon a combination of the elevation, substrates, and physiognomy (general appearance) of the dominant vegetation:

1. The shore area on the east is composed of salt marsh and associated estuaries interspersed with "spoil islands."

2. At the interface of the upland and coast is a transition zone of salt-tolerant species such as live oak (*Quercus virginianum*), red cedar (*Juniperus silicicola*), and magnolia (*Magnolia grandiflora*). However, some of these areas have been cleared and replanted as pine plantation.

3. Inland is a heterogenous assemblage of communities including pine flatwoods, pine plantations, southern mixed hardwoods, early successional stage communities, wooded swamps, freshwater marshes, and developed lands.

Associated with these communities are abundant and diversified species of animals. Aquatic and terrestrial systems of the area support a variety of fauna related to the diversity of habitats (Environmental Science and Engineering, Inc., 1975).

4.4.1.1 Terrestrial Flora And Fauna. Terrestrial floral components at SUBASE Kings Bay consist of pine flatwoods, pine plantations, southern mixed hardwood, early successional stages, wooded swamp, freshwater marsh, and developed lands. A description of these components are as follows (Environmental Science and Engineering, Inc., 1980):

Pine Flatwoods. Pine flatwoods constitute the largest terrestrial community in the Kings Bay vicinity. These habitats are characterized by four pine species which dominate the canopy. These are, in order of abundance, slash pine (*Pinus elliottii*), longleaf pine (*Pinus palustris*), loblolly pine (*Pinus taeda*), and pond pine (*Pinus serotina*). In the pine flatwood community, these species of pine constitute over 92 percent of the total tree biomass of the 19 species recorded. Pine flatwoods fauna are extremely diverse and are represented by over 58 species. The pine flatwoods on-site have an incomplete canopy. As a result, numerous species of shrubs and herbaceous plants are found in scattered areas. Pines are generally harvested in 18 to 20 years for pulpwood and in 30 to 40 years for saw timber.

Pine Plantation. Pine plantation is the second largest terrestrial plant community at Kings Bay. This man-made community is planted with slash pines (Pinus elliottii). The shrub layer is dominated by galberry (Ilex glabra), wax myrtle (Myrica cerifera), and saw palmetto (Serenoa repens). The dominant plant comprising a sparse herb stratum is bracken fern (Pteridium aquilinum). Pine plantations in the vicinity have fairly closed canopies and sparse groundcover vegetation; thus, these systems support a more limited quantity of wildlife than is typical of an open canopy stand.

Southern Mixed Hardwoods. The southern mixed hardwoods community in the vicinity of Kings Bay occurs on a variety of sites, from the moist soils adjoining mixed hardwood swamps and freshwater creeks to the well-drained upland soils inland from the tidal salt marsh. The understory exhibits a mosaic pattern and is dominated by wax-myrtle (Myrica cerifera) and sapling laurel oak (Quercus hemisphaerica). The shrub cover consists mainly of wax-myrtle, saw palmetto (Serenoa repens), and vining plants such as catbrier (Smilax spp.) and grape (Vitis rotundifolia). Mammals frequently encountered are grey squirrel(Sciurus carolinesis carolinesis), cotton mouse (Peromyscus gossypinus gossypinus), raccoon (Procyon lotor lotor), ninebanded armadillo (Dasypus, novencinctus) white-tailed deer (Odocoileus virginianus), and wild hog (Sus Scrofa).
Early Successional Stages. Early successional stages were formerly major plant communities such as pine plantations or pine flatwoods until clearing of the land left the areas open to pioneering species. Old fields and other developed lands in the vicinity of the activity characteristically support thick growths of broomsedge, dog fennel, blackberry, panic grasses, sedges, and grasses. Early successional communities include old fields, firelanes, power transmission corridors, and overgrown bunkers or magazines.

Wooded Swamps. Forested wetlands at Kings Bay consist of two types: (1) cypress-gum domes and strands, and (2) mixed hardwood swamps. Groups of cypress trees are termed cypress domes due to their well-defined dome profile. The canopies of these swamp communities are usually dominated by water tupelo (Nyssa sylvatica) and pond cypress (Taxodium ascendens) or bald cypress (T. distichum).

Mixed hardwood swamps occur along the floodplains of active or free-flowing streams and rivers and exhibit a higher diversity of tree species such as red maple (Acer rubrum), sweet bay (Magnolia virginiana), loblolly bay (Gordonia lasianthus), and sweet gum (Liquidambar styraciflua).

Salt Marshes. Saltwater wetlands at Kings Bay are represented by salt marshes regularly inundated by tides. These marshes are dominated by nearly pure stands of smooth cordgrass (Spartina alterniflora), with some intermixing of saltgrass (Distichlis spicata) occurring along the shoreward margin.

On SUBASE Kings Bay, 28 species of mammals, 169 species of birds, 34 species of reptiles and 21 species of amphibians have been reported. These species constitute the major consumers in the terrestrial ecosystem

(Environmental Science and Engineering Inc., 1975). Few species of reptiles occur regularly in the salt marsh. Characteristic reptiles of the salt marsh include the ornate diamondback terrapin (Maloclenys terrapin terrapin), garter snake (Thamnophis sirtalis, ribbon snake (Thamnophis sauritus sackeni), and salt marsh snake (Natrix fasciata clarki). Occasional inhabitants are the American alligator (Alligator mississippiensis) eastern indigo snake (Drymarchon corais couperi), and a few species of frogs (Rana sp.). Some breeding birds which commonly occur are long-billed marsh wren, seaside sparrow, clapper rail and common yellow-throat (Environmental Science and Engineering Inc., 1980).

4.4.1.2 Aquatic Flora And Fauna. The open water estuarine system of SUBASE Kings Bay occupies a total area of 1,010 acres, some 940 acres of which are in the Kings Bay and Marianna Creek basins. Additionally, there are about 1,516 acres of associated marsh lands.

Cumberland Island lies directly east of the activity and encloses Cumberland Sound. Fresh water empties into Cumberland Sound from the St. Marys and Crooked Rivers. The St. Marys River cuts off the island from the south and provides an entrance into Cumberland Sound from the Atlantic Ocean. Tides fluctuate with a mean annual range of 5.8 feet at the southern end of Cumberland Island. The water depth in Cumberland Sound varies between 10 and 20 feet below mean low water level (EDAW, Inc., 1981).

Estuaries serve as nursery, feeding, and spawning areas for the majority of fish species inhabiting the coastal waters. There are approximately 50,000 acres of estuary within the region with salt marshes comprising 60 percent of this area. Decaying marsh grass is ultimately transported into the open estuarine waters by the tides where it becomes a foundation for the marine food chain. Blue crabs are harvested in Cumberland Sound and adjacent water bodies. Cumberland Sound was once an oyster fishing area but has been closed due to pollution of the oyster habitat. A number of fish species inhabit these waters and contribute to the active commercial fishing industry in the region (EDAW, Inc., 1981). The quality of the water in the Cumberland Sound estuary is influenced by both natural conditions and man-made pollution. There are four large point sources of pollution in the immediate vicinity of the sound, including three kraft paper mills, one on the North River and two on the Amelia River, and one municipal sewage treatment plant discharge on the Amelia River. Each of these sources discharge wastewater of high organic content and, hence, high oxygen demand (Environmental Science and Engineering, Inc., 1975).

4.4.2 Endangered, Threatened, and Rare Species. The environment of the SUBASE Kings Bay supports a number of threatened and endangered species identified from both the Federal and State listings. These listings include U.S. Fish and Wildlife Service, 1978-1979, List of Endangered and threatened Wildlife and Plants (Environment Reporter, Federal Register, Vol. 1, 101:1519-1522), and Georgia's Protected Wildlife and Plants, 1976-1977. SUBASE Kings Bay plays an important role as a wildlife refuge. Seventeen endangered and threatened species have been listed as

possibly occurring in the near vicinity of the base. An additional six endangered species have been listed as possibly occurring in the general area by the U.S. Fish and Wildlife Service and the Georgia Department of Natural Resources (see Appendix B). Five of these endangered species were observed during the MOTKI field surveys including the colonial pocket gopher, southern bald eagle, eastern brown pelican, American alligator and Arctic Peregrene Falcon (Environmental Science and Engineering, Inc. 1980).

Two fish species listed as endangered by the Georgia Department of Natural Resources inhabit Cumberland Sound: the Atlantic sturgeon and the short-nose sturgeon. Also, several specimens of the Florida manatee have been observed in the region. The St. Marys River entrance has been designated as part of the critical habitat for this endangered species (EDAW, Inc., 1981)

Appendix B and Appendix C show all endangered, threatened, and unusual flora and fauna occurring or possibly occurring in the vicinity of SUBASE Kings Bay. Unusual species in the State of Georgia have been designated to include "any resident species which exhibits special or unique features and therefore deserves special consideration in its continued survival in the state" (Georgia Department of Natural Resources, Game and Fish Division, 1976).

4.5 PHYSICAL FEATURES

4.5.1 Climatology. The SUBASE Kings Bay, Georgia experiences sub-tropical climate, with hot wet summers and cool, dry winters. The mean annual temperature is approximately 68°F. Temperatures rarely rise above 100°F because of the moderating effect of the ocean. Most of the precipitation occurs in the form of rain from summertime showers or thundershowers. Snowfall is not very common but has been recorded during three of the past five winters. The mean annual precipitation at Kings Bay is estimated to be 54-inches (Environmental Science and Engineering Inc., 1975). Relative humidity varies widely throughout the year from an annual average of 87 percent in the morning to 55 percent during the afternoon. The relative humidity is generally highest during hot summer months (June through September), and lowest during the spring (March through May). Dense fog occurs quite frequently at Kings Bay.

Prevailing annual winds at the activity are westerly, with strong northerly components in winter and southerly components in summer. Highest prevailing wind speeds (9-10 mph) are experienced in late winter and early spring, with lightest winds occurring during the summer. The seasonal and annual wind pattern is influenced by the land/water temperature along the coast. Thunderstorms do occur, but more frequently in summer with an average of 64 days per year. Tropical cyclones and hurricanes have usually occurred in the months of August and September. Tornadoes are very common, but generally occur during the months of March through May (Environmental Science and Engineering, Inc., 1975).

4.5.2 Topography. The area around the SUBASE Kings Bay is generally flat and marshy and traversed by slow, meandering streams. The highest area is about 60 feet above mean sea level (msl), located 10 miles southwest of the Naval Submarine Base (See Figure 4-3). The average elevation at SUBASE Kings Bay is 30 feet above msl (Environmental Science and Engineering, Inc., 1980).

The elevations on the Naval Submarine Base range from zero msl along the Bay and in streams to slightly above 30 feet msl in the extreme western sections along the State Road 40 spur. Generally, elevations decrease from west to east along the activity with average of about 15 feet msl. The area is virtually flat; however, steep slopes can be observed along deeper drainways. These drainways are located north of the activity.

4.5.3 Geology. The Kings Bay region is located in the Georgia coastal plain section of the continental shelf that was once beneath the sea. It emerged from the sea because of land uplift and a general decline of the sea. The present features at the activity were etched during the ice age. The growth of the ice caps caused enough accumulation of water to lower the level of the sea. Once the water melted the sea level rose again. The alternating retreating and advancing of the sea over the area accounted for the existing landforms mainly through carving the ancient shore lines (Environmental Science and Engineering, Inc., 1975). The shoreline complexes which were deposited have not been accurately dated, but it is somewhere around Pleistocene and Holocene in age. Seven different shorelines have been discovered around the Kings Bay as shown in Figure 4-4. They are the Wicomico, Penholoway, Talbot, Pamlico, Princess Anne, Silver Bluff, and Holocane. The oldest is the highest on the landscape. Conversely the youngest is the lowest on the landscape. The description of the shoreline complexes are restricted to Pamlico, Princess Anne, and Silver Bluff which occur in the vicinity of the SUBASE Kings Bay.

The Pamlico shoreline complex generally ranges from 15 to 35 feet above sea level consisting chiefly of clayey and sandy materials.

The Princess Anne shoreline complex is 10 to 15 feet above sea level. SUBASE Kings Bay falls into this classification of complexes (See Figure 4-4). It is on low upland ridges just west of the salt marsh. The complex is not well defined and developed as the others, which indicates that the sea was at this level for a relatively short time.

The silver bluff shoreline complex is 6 to 10 feet above sea level consisting of intercoastal flats, salt marshes, and the off-shore barrier island. Cumberland Island is represented by the silver bluff shoreline (See Figure 4-4). Parts of the barrier islands have been formed in recent times. Most recent deposits, however, are on the flood plain of the major streams.

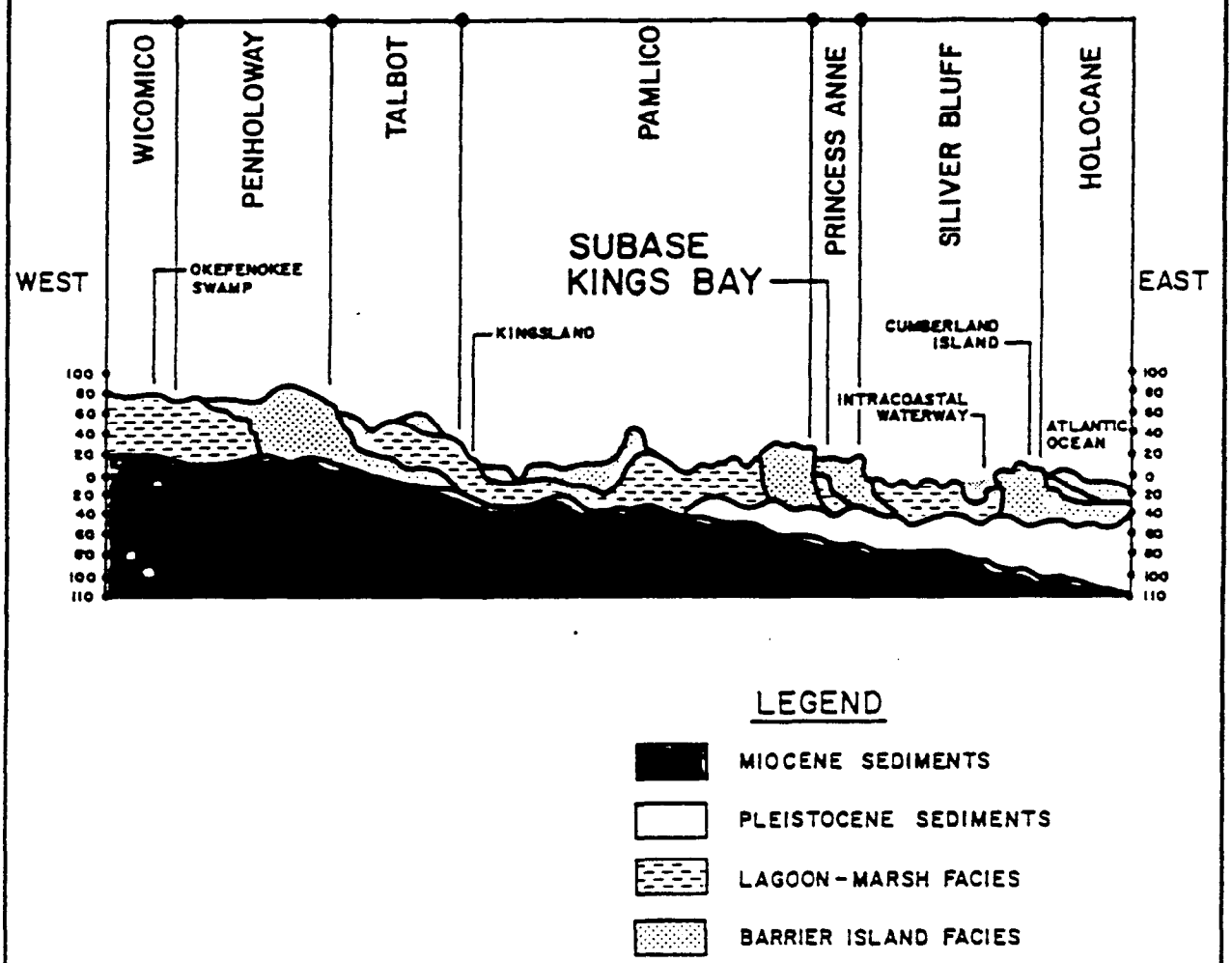
0-5		15-20		> 30	
5-10		20-25			
10-15		25-30			

ELEVATION ABOVE MSL

SOURCE: ENVIRONMENT SCIENCE AND ENGINEERING INC. 1975

FIGURE 4-3
TOPOGRAPHY OF THE
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA



SOURCE: SOUTHERN DIVISION
NAVFACENGCOM, 1981

FIGURE 4-4
GEOLOGIC FORMATIONS IN AND AROUND THE NAVAL SUBMARINE BASE KINGS BAY, GEORGIA

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

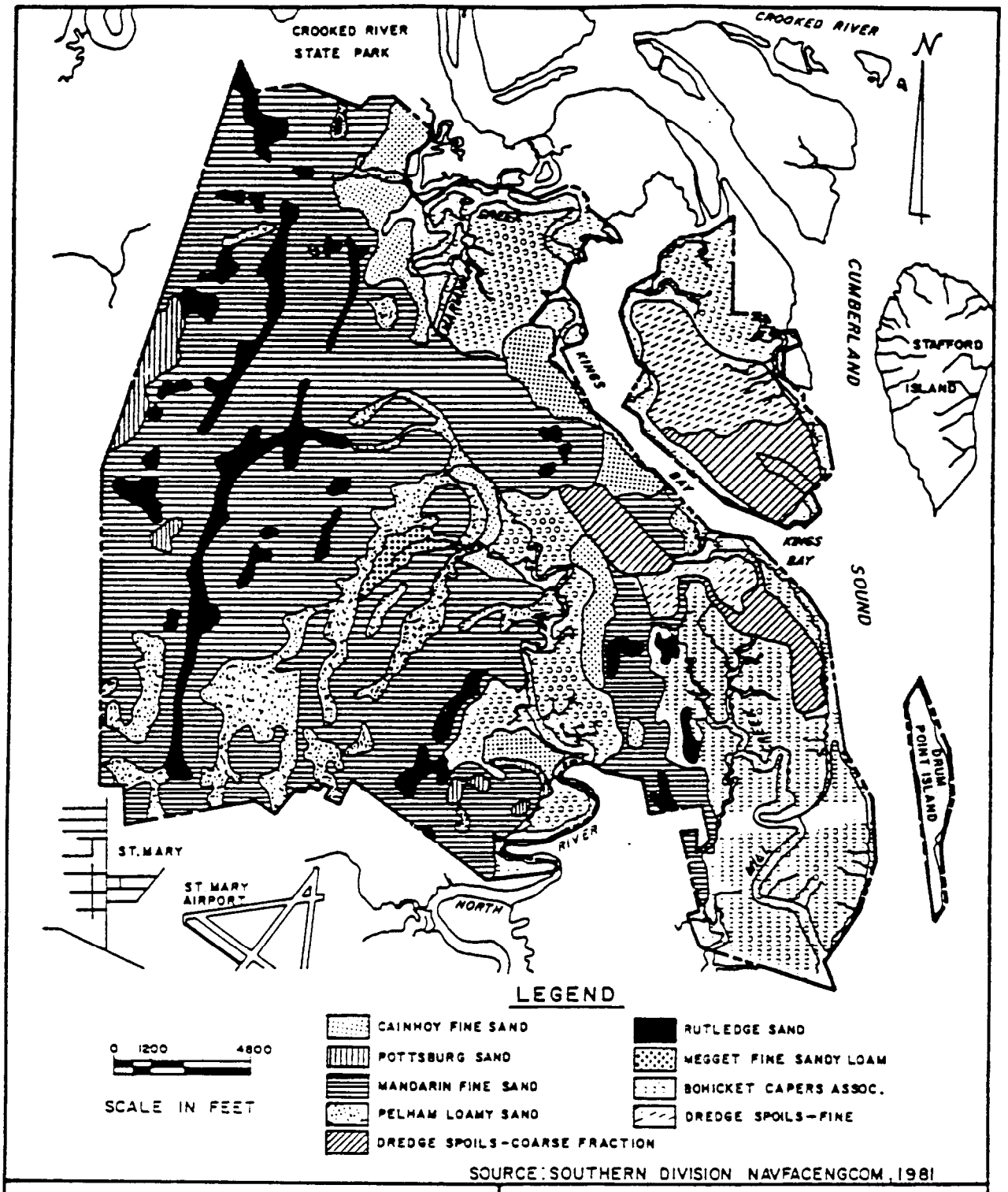
The surficial deposits vary in depth from 40 to 100 feet composed of layers of sedimentary rock dominated by sandstones, shales, and limestone, with some layers of sand and clay. Bedrock is found at 4,000 feet below the surface, consisting of ancient crystalline rocks. This bedrock material has been seismically stable, and there are no known faults within Kings Bay, Georgia.

4.5.4 Soils. The soils at SUBASE Kings Bay are derived from marine deposits. Generally they consist of sands and fine sands on the uplands, and silty clays and clays in the tidal marsh areas. Soils at SUBASE Kings Bay can be classified into seven different categories (Soil Conservation Service, 1980). Figure 4-5 shows soil distribution at the activity, and Table 4-1 depicts the classification of soils and their drainage characteristics. Each of these soil types is listed and described on the following pages.

1. Cainhoy Fine Sand
2. Pottsburg Sand
3. Mandarin Fine Sand
4. Pelham Loamy Sand
5. Rutledge Sand
6. Meggett Fine Sandy Laom
7. Bohicket - Caper & Association

Cainhoy Find Sand: The Cainhoy soils are somewhat excessively drained, nearly level and gently sloping. Typically, the surface layer is dark gray fine sand about 5 inches thick. The underlying layers to a depth of 120 inches are fine sand. The upper 18 inches of the underlying material is brownish yellow. Below this is a very pale brown layer to a depth of 50 inches. Next are light gray and white layers to a depth of 101 inches. Below these is a black and dark reddish brown layer to a depth of 120 inches. These soils occur in narrow strips along the banks of Mill Creek, North River, and Kings Bay (See Figure 4-4).

Pottsburgh Sand: The Pottsburg soils are somewhat poorly drained and are nearly level. Typically, these soils are sand throughout. The surface layer is gray and about 4 inches thick. The subsurface layer extends to a depth of 63 inches. The color varies from light gray with brownish yellow and brown mottles to white with brownish yellow and dark grayish brown mottles. This layer is underlain by weakly cemented, dark brown organic hardpan.



SOURCE: SOUTHERN DIVISION NAVFACENGCOM, 1981

FIGURE 4-5
SOILS MAP OF THE
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

TABLE 4-1

CLASSIFICATION OF SOILS AND
DRAINAGE CHARACTERITICS AT THE
NAVAL SUBMARINE BASE, KINGS BAY, GEORGIA

Type	Rating	Drainage Characteristics
Cainhoy Fine Sand	Class I	Very Good Drainage: Highly Permeable Water Table more than 6 feet Below Surface All Year
Pottsburg Sand Mandarin Fine Sand	Class II	Somewhat Poor Drainage: Moderate Permeability; Water Table within 3.5 feet of Surface for Part of the Year
Pelham Loamy Sand	Class III	Poor Drainage: Moderate Permeability; Water Table within 1.5 feet of Surface for Part of the Year
Rutledge Sand Meggett Fine Sandy Loam Bohicket-Capers Association	Class IV	Poor Drainage: Slow to Moderate Permeability; Water Table at Surface for Part of the Year

Source: EDAW Inc., January 1981.

Mandarin Fine Sand: The Mandarin soil type is represented by somewhat poorly drained, sandy soils with a slope of less than one percent. The Mandarin is the most extensive soil type on the activity covering 75 percent of the land. The surface layer consists of 3-inch thick very dark gray sand, underlain by light gray sand extending to a depth of 19 inches. It is underlain by a weakly cemented organic hardpan that extends to a depth of 34 inches. This hardpan is black in the upper part, very dark brown in the middle part, and dark brown in the lower part. Beneath the hardpan, to a depth of 62 inches are light gray, white, and grayish brown layers. These layers are underlain by a second weakly cemented organic hardpan that is black and extends to a depth of 80 inches or more.

Pelham Loamy Sand: Pelham soils are found on flats, depressions and drainageways with less than one percent slope. The 7-inch thick surface layer is represented by a very dark gray loamy sand, followed by an 18-inch thick grayish brown loamy sand. The subsoil is characterized by gray sandy clay loam to sandy clay with mottles extending to a depth of 75 inches.

Rutledge Sand: The Rutlege soils are very poorly drained and are found in depressions and drainageways. Typically, these soils are fine, sand throughout. The surface layer is predominantly black and is about 15 inches thick. The underlying material to a depth of 70 inches or more is light gray mottle with brownish gray in the upper part, light brownish gray in the middle part, and grayish brown mottled with very dark grayish brown in the lower part.

Meggett Fine Sandy Loam: This type of soil is represented by poorly drained soils found commonly on low flats, low terraces and flood plains with a slope of less than one percent. A 5-inch thick surface layer is characterized by dark gray, fine sandy loam underlain by a 3-inch thick gray, fine sandy loam mottled with yellowish brown. The subsoil is sandy clay in composition and extends to a depth of 65 inches or more with varying color.

Bohicket-Capers Association: This unit generally consists of very poorly drained soils, clayey in nature and found in tidal marshes. These soils border the Atlantic Ocean, extend inland along creeks and streams, and are subject to flooding.

Typically, the surface layer of bohicket soils consists of 8-inch thick dark gray silty clay loam underlain by dark greenish gray silty clay and clay to a depth of 65 inches. Fibrous grass roots may be found throughout the area.

Capers soils are represented by an 8-inch thick very dark gray silty clay surface layer, and are underlain by very dark gray and dark gray clay up to a depth of 42 inches. Below this, greenish gray clay extends to a depth of 60 inches. Fine grass roots can be found throughout the area.

4.5.5 Hydrology

4.5.5.1 Surface Hydrology. SUBASE Kings Bay is dominated by the presence of large and small rivers draining into the Atlantic Ocean. The surface waters include the St. Marys River, the Satilla River, and the Crooked River. Several swamps, marshes and small streams can also be found in and around the activity (Environmental Science and Engineering, Inc., 1975). Figure 4-6 depicts the SUBASE Kings Bay drainage network. The drainage network covers approximately 11,000 acres within the boundaries of the activity located west of Kings Bay. Approximately 30 percent of this area is salt marsh, and the remainder is upland. The major drainage outlet on the activity is the North River draining 49 percent of the area to the south. To the north, the Crooked River drains five percent, and Marianna Creek drains 17 percent of the activity. The remaining 29 percent of the activity generally drains eastward into Cumberland Sound and Kings Bay.

The Satilla River located north of the activity extends westward from Cumberland sound for approximately 100 miles and drains 3,400 square miles, with an average flow of 2,700 cubic feet per second (cfs) at the mouth.

The St. Mary's River demarcates the boundary between Florida and Georgia for approximately 130 miles as it flows from the Okefenokee Swamp to its mouth at the southern end of Cumberland Sound. The river drains an area of 1,500 square miles with an estimated annual mean discharge of approximately 1,500 cfs at its mouth.

The estimated drainage areas for the Crooked River and the North River are 68 and 16 square miles. The North River, a tributary of the St. Mary's River, drains approximately one-half of SUBASE Kings Bay.

Most of the surface runoff at SUBASE Kings Bay is stored in the upland swamps and marshes and is diverted off base through long shallow ditches and meandering, low velocity natural intermittent streams. These ditches and streams discharge surface runoff into Cumberland Sound from the St. Marys and Crooked Rivers. Surface runoff at the activity is slow because of flat slopes associated with high water table and dense ground cover vegetation.

4.5.5.2 Flood Hazard. The areas in the region which would be inundated by a flood once every 100 years on the average are shown in Figure 4-6. The elevation of the 100 year floodplain in the region is slightly more than 10 feet above msl. Mainly because of the flatness of the region, about one-half of the activity would be inundated by the 100-year flood (Environmental Science and Engineering, Inc., 1975). Generally, the 100-year flood would inundate the low marsh areas on the site bordering Mill Creek, Marianna Creek and the North River.

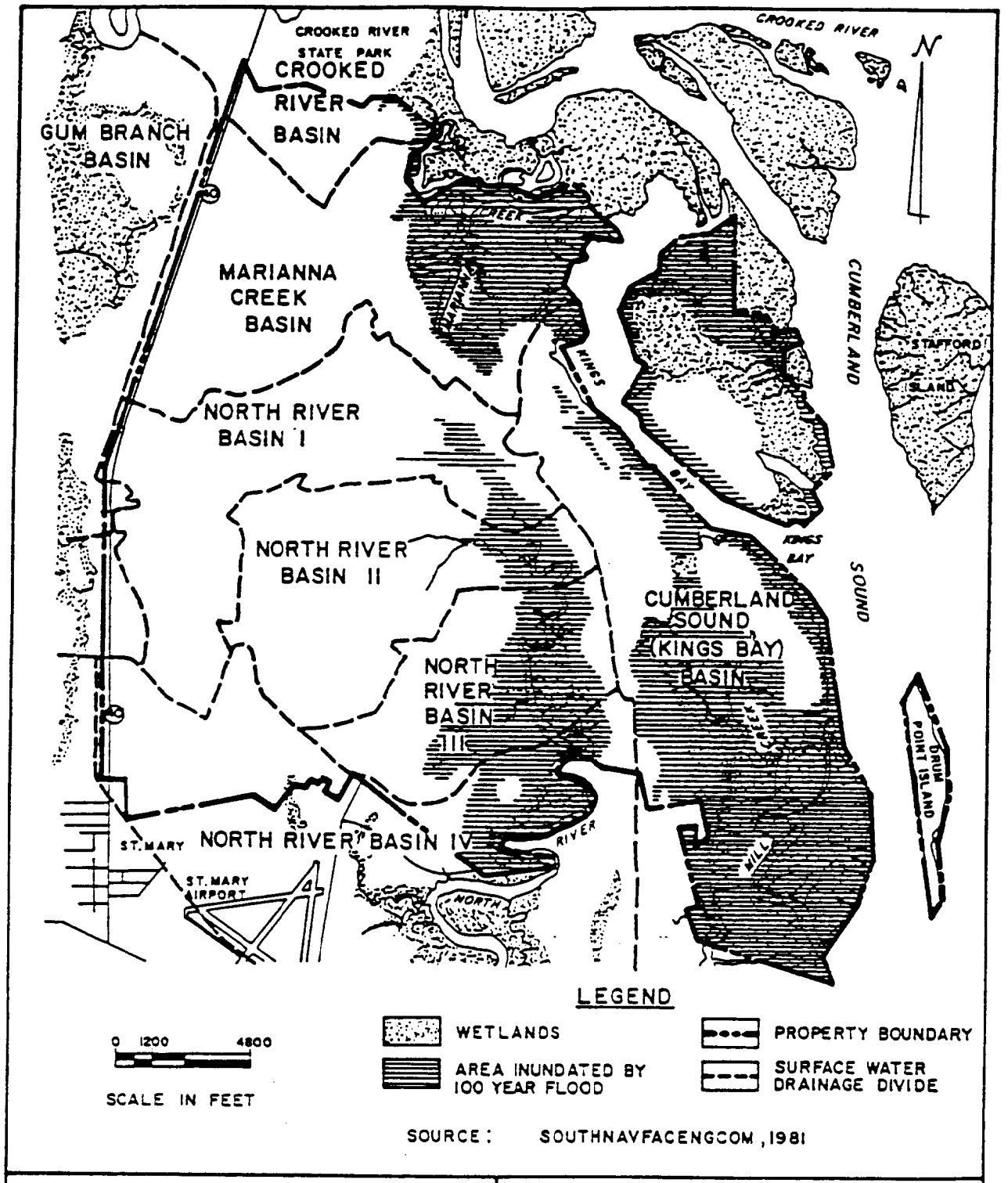


FIGURE 4-6
SURFACE WATER DRAINAGE BASINS AND FLOOD HAZARD AREAS
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

4.5.5.3 Ground Water Hydrology. Ground water at SUBASE Kings Bay occurs in three different aquifers: the water table, the secondary artesian, and the primary artesian aquifer (see Figure 4-7). The water table aquifer is primarily used for irrigation by adjacent communities. The secondary artesian aquifer is not used widely because of extreme variability in water yield. The primary artesian aquifer is used for public water supply by SUBASE and surrounding towns and urban areas.

The water table aquifer at the activity is mainly composed of sands and limestone, with aquifer thickness ranging from 40 to 90 feet. On the western portion of the activity, the aquifer is composed of loose to dense fine sands throughout its thickness. However, on the eastern portions of the activity near Kings Bay, the sands are only about 40 to 60 feet thick, and overlie limestone 60 feet in thickness (Environmental Science and Engineering, Inc., 1975). There are 22 known water table aquifer wells at the activity, ranging in depth from 47 to 81 feet. These wells have been unused since 1978 when the property was transferred to the U.S. Navy.

The secondary artesian aquifer which is located approximately 40 to 90 feet below the ground surface, is generally composed of isolated limestone lenses between the water table aquifer and the principal artesian aquifer. The limestone lenses are highly variable both in thickness and extent. The aquifer thickness ranges from approximately 380 feet to 530 feet. The yields are extremely variable, and hence the aquifer cannot be considered as a principal source of water. The yield is generally better than the overlying water table aquifer, but not as good as the underlying principal artesian aquifer (Environmental Science and Engineering, Inc., 1975). There are no major production wells on the SUBASE Kings Bay tapping the secondary artesian aquifer.

The principal artesian aquifer consists of limestone located approximately 470 to 570 feet below the ground surface. Drinking water for the activity and adjacent communities, is pumped from this aquifer, which is the deepest and most productive in the vicinity of the base (Environmental Science and Engineering, Inc., 1981). The principal artesian aquifer is divided into two water bearing zones with different types of limestone, separated by a dense, confining 100 to 150 feet thick layer.

The major production wells at SUBASE Kings Bay tap the principal artesian aquifer. Wells tapping this aquifer are under pressure, and water levels within a tightly cased well will rise to an altitude of between 20 and 30 feet above sea level. Most wells tapping this aquifer yield in excess of 1,000 gallons per minute. Well depths vary from 600 to 894 feet, with four of the five production wells greater than 800 feet in depth (Environmental Science and Engineering, Inc. 1980). Location of these wells are presented in Figure 2-1.

4.6 WATER QUALITY. The State of Georgia has established water quality standards which are contained in the "Rules for Georgia Water Quality Control" (Georgia Department of Natural Resources, 1980).

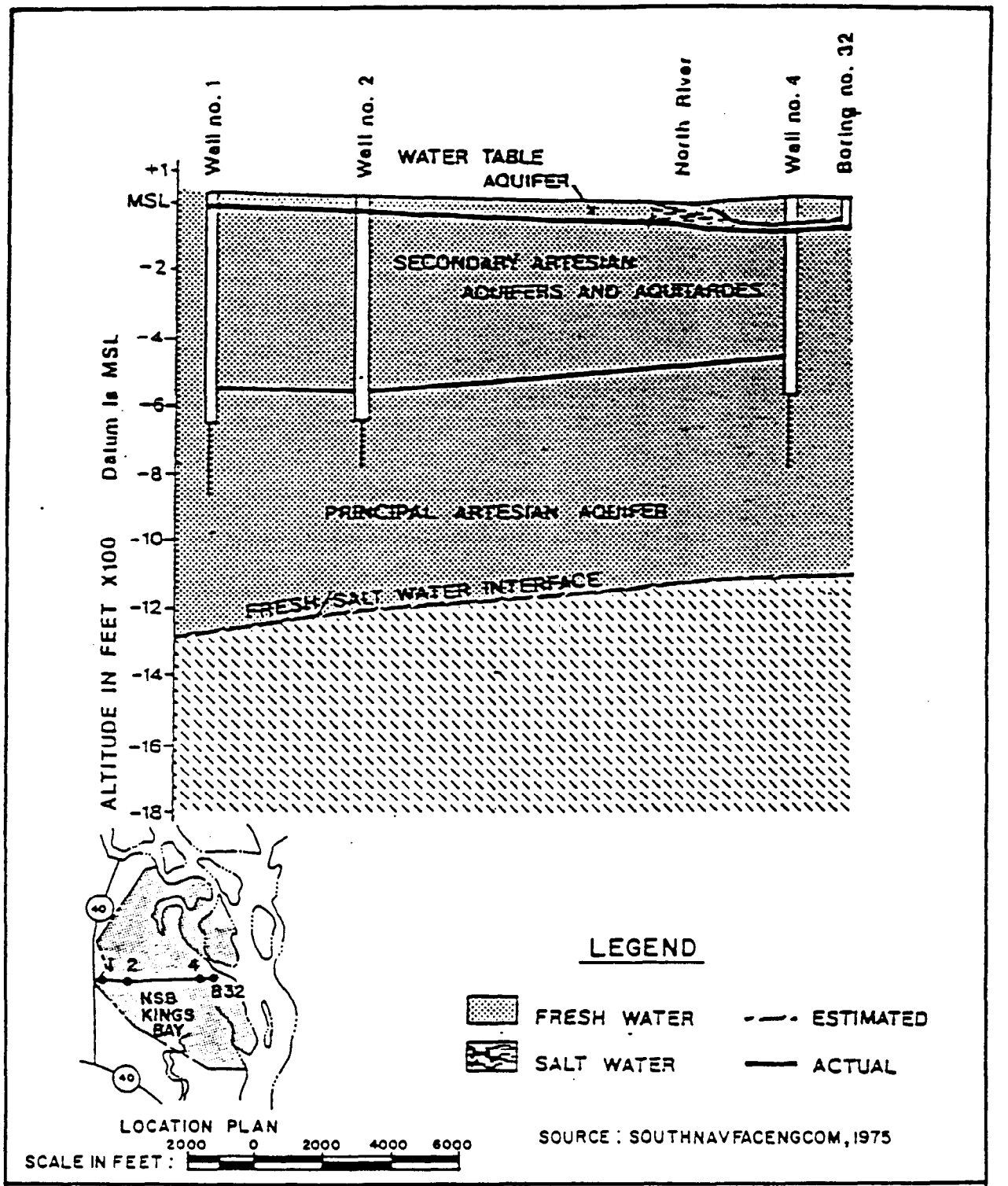


FIGURE 4-7
GEOLOGICAL SECTION SHOWING VARIOUS AQUIFERS
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

4.6.1 Surface Water Quality. The surface water in streams and creeks in the vicinity of the base are used mainly for noncontact recreation including boating, fishing and navigation. Surface water in the vicinity is also used for waste disposal. Waste disposal includes runoff from pine plantations, small agricultural areas, poorly operating septic tanks, leachate from sanitary landfills, and runoff from impervious areas such as highways and parking lots. The St. Marys and Satilla Rivers are clssified by the State of Georgia for warm water fishing. The North River is classified for industrial use. Current Georgia water quality standards for the classifications as contained in the "Rules for Georgia Water Quality Control" are summarized in Table 4-2. Florida water quality standards also apply to the St. Marys River, which is designated a Class III water in Chapter 17-3 of the Florida Administrative Code (1979). This classification is designated as suitable for recreation and the propagation and management of fish and wildlife.

Pertinent Florida water quality standards are listed in Table 4-3.

The natural quality of the St. Marys and Satilla Rivers watersheds ocassionally violates Georgia Water Quality Standards, most consistently for pH, while dissolved oxygen levels are below the accepted standard of 4.0 milligrams per liter. Conductivity, suspended solids concentration and turbidity are low, while the color is extremely high. Ammonia and nitrate concentrations vary with the weather. The iron concentration is high and is generally associated with suspended matter. Other metal concentrations are low. Fecal coliform bacteria concentrations are well below the Georgia and Florida state water quality standards, except in winter (Environmental Science and Engineering, Inc., 1975). Elevated levels of lead and mercury were noticed. Also seen were elevated levels of oil and grease, mainly due to urban run off (Environmental Science and Engineering, Inc. 1980).

Water quality in the North River, Marianna Creek, and Mill Creek watersheds were characterized as generally highly colored, clear, with dissolved oxygen concentrations ranging from 9.2 to 13.2 mg/l. Conductivities were higher than in the vicinity fresh waters, probably due to salt spray and tidal influence. Some of the Marianna Creek stations were located within the estuarine complex as shown by the conductances ranging from 247 to 22,200 umho/cm. Heavy metal concentrations were low with the exception of mercury. Mercury-based fungicide use was cited as a possible cause for the elevated mercury levels of 3.0 to 9.4 ug/l (Environmental Science and Engineering, 1980).

4.6.2 Ground Water Quality. At the Naval Submarine Base, Kings Bay, ground water quality has been monitored periodically. The studies conducted by (Environmental Science and Engineering, Inc., 1975) indicate that the water from the water table aquifer in the Kings Bay area is typically low in minerals and pH. Occasionally, high concentrations of chlorides near salt water bodies and high concentrations of iron at some places were observed. Further studies (Environmental Science and

TABLE 4-2

WATER QUALITY STANDARDS FOR GEORGIA WATERS

Parameter	Standard		
	Warm Water Fishing	Industrial	Recreational
General	Freedom from sludge deposits, floatables, oil, turbidity, color, odor, toxicity, radioactivity, and physical alterations associated with human activities which may result in objectionable, unsightly conditions or fail to protect indigenous human, animal, and aquatic life usages.		
Dissolved Oxygen			
Daily Average	>5.0 mg/l		>5.0 mg/l
Daily Minimum	≥4.0 mg/l	≥3.0 mg/l	≥4.0 mg/l
pH Range	6.0-8.5	6.0-8.5	6.0-8.5
Temperature Maximum	≤90°F (32°C)	≤90°F (32°C)	≤90°F(32°C)
Temperature Increase			
Fresh waters	<5°F (2.8°C)	<5°F (2.8°C)	<5°F (2.8°C)
Estuarine waters	≤1.5°F (0.8°C)	≤1.5°F (0.8°C)	≤1.5°F (0.8°C)
Fecal Coliform Bacteria			
Fresh waters	1000 organisms/100 ml mean* 4000 organisms/100 ml max*	—	200 organisms/100 ml mean*
Estuarine waters	National Shellfish Sanitation Program		100 organisms/100 ml mean*
Toxic Wastes and Other Deleterious Materials	None in concentration that would harm man, fish, and game, or other beneficial aquatic life	None in concentrations that would prevent fish survival or interfere with legitimate and beneficial uses.	None in concentrations that would harm man, fish, and game or other beneficial aquatic life

* Geometric mean of no less than 4 samples at a given site over a 30-day period at intervals not less than 24 hours.
† National Shellfish Sanitation Program Manual of Operations (U.S. Public Health Service, 1965). Specified bacteriological criteria for shellfish and designation of contaminated areas.

Source: Rules of the Georgia Department of Natural Resources, Environmental Protection Division; Chapter 391-3-6, Water Quality Control; Environment Reporter, 1978.

(ml is milliliter; mg/l is milligrams per liter)

TABLE 4-3

SELECTED WATER QUALITY STANDARDS FOR
FLORIDA CLASS III WATERS -- PREDOMINANTLY MARINE

Parameter	Standard	
Biochemical Oxygen Demand	Not to depress the dissolved oxygen below the limit.	
Dissolved Oxygen	>5.0 mg/l daily average >4.0 mg/l minimum	
Chloride	No more than a 10% increase over background; natural fluctuation maintained.	
Nutrients	None which will create an ecological imbalance.	
Toxic Substances	None present.	
Bacteriological Quality	Fecal Coliform	Total Coliform
Monthly Average	≤200/100 ml	≤1000/100 ml
Maximum	≤800/100 ml	≤2400/100 ml
Aluminum	≤1.5 mg/l	
Arsenic	≤0.05 mg/l	
Cadmium	≤0.05 ug/l	
Chromium	≤1.0 mg/l	
Copper	≤0.015 mg/l	
Iron	≤0.3 mg/l	
Mercury	≤0.1 ug/l	
Nickel	≤0.1 mg/l	
Lead	≤0.03 mg/l	
Silver	≤0.05 ug/l	
Zinc	≤0.03 mg/l	
pH	pH 6.0-8.5; less than 1.0 unit change, 0.2 unit for open coastal water.	
Oil and Grease	≤5.0 mg/l; no visible slicks or sheen	
Turbidity	≤50 Jackson Candle units above background	
Shannon-Weaver Diversity Index	Not decreased to ≤75% of background for benthic invertebrates	

Source: Florida Department of Environmental Regulation. Rules 17-3, 17-4, and 17-5, Florida Administrative Code, March 1, 1979.

Engineering, Inc., 1980) concluded that the water from the water table aquifer is acidic in composition (pH range 4.0 to 6.6) with high levels of organic carbon. Occasionally, chlorides were high near salt water bodies. Mercury exceeded the Federal Primary Drinking Water Limits (EPA, 1976).

Water in the secondary artesian aquifer has fewer minerals than the underlying primary artesian aquifer, but more than the upper water table aquifer (Environmental Science and Engineering, Inc., 1975).

Public water supplies for SUBASE and adjacent communities are drawn from the principal artesian aquifer, and the water is of such quality that only chlorination and aeration are required. Aeration removes high concentrations of iron and hydrogen. The treated waters typically are not softened even though hardness levels exceed 300 mg/l of calcium carbonate. Dissolved solids concentrations sometimes exceed the U.S. Public Health Service limit of 500 mg/l. The water in the principal artesian aquifer is categorized as very hard and alkaline with moderate amounts of dissolved solids (Environmental Science and Engineering, Inc., 1975).

Contamination of brackish water with the fresh groundwater has also been noticed in Coastal areas around Kings Bay.

4.7 WATER SUPPLY. The water supply system on the base consists of two water treatment plants. One facility, the Waterfront Water Treatment Facility (WWTF), serves the Waterfront Development Area, while the other facility, the Base Water Treatment Facility (BWTF), serves all other areas. Each system has associated distribution lines. A service line connecting the two water plants was constructed to meet the base fire flow requirements. The two plants act separately except during a fire. Water for these plants is supplied by five wells yielding in excess of 1000 gallons per minute each. Well depths vary from 600 to 894 feet with four of the five production wells greater than 800 feet in depth.

The entire region of SUBASE Kings Bay is underlaid by an abundant source of water in the Principal Artesian Aquifer. The aquifer water is of good quality and provides sufficient yield for present population levels. The only limitation of future supplies is the posibility of contamination by saltwater intrusion. Within the region, water is distributed by county and municipal agencies. Private wells supply water for most of the individual homes and businesses in rural areas.

In Camden County, water treatment facilities for St. Marys, Woodbine, and Kingsland are adequate for present demands. However, the water distribution systems of both St. Marys and Woodbine require extensions and replacement of inadequate sized lines. Kingsland's distribution system is adequate.

4.8 MIGRATION POTENTIAL. SUBASE Kings Bay is located on an arm of Cumberland Sound called Kings Bay. It is between the St. Marys River and Crooked River and connected to the sea by a 12-mile access channel which

passes through the St. Marys Inlet. Major routes of contaminant migration are through surface runoff to the intermittent creeks and rivers by storm drainage ditches, or by infiltration from the surface into the ground water. Surface runoff at SUBASE Kings Bay is slow because of the flat slopes and the amount and intensity of the rainfall. The mean annual precipitation at SUBASE Kings Bay is estimated to be 54 inches. The water table aquifer is isolated from the underlying artesian aquifers by confining layers of relatively impermeable clays and limestones. The presence of permeable sands in the area is conducive to rainfall percolation directly into the water table aquifer which is a potential source of ground water contamination. The water eventually migrates through the water table aquifer and discharges into streams, rivers, and springs including the North River, Crooked River and Marianna Creek. These streams and rivers eventually flow to Kings Bay and Cumberland Sound. The fresh water bodies described above are used principally for noncontact recreation including boating, fishing and navigation (see Section 4.6.1).

CHAPTER 5. WASTE GENERATION

5.1 INDUSTRIAL OPERATIONS. Most of the shops and operations described in this section have existed subsequent to the Navy's aquisition of the Naval Submarine Base property in 1978. The Base is the site of a former U.S. Army Terminal. Originally designated as the Kings Bay Army Terminal, it was constructed to meet Department of the Army requirements for east coast port facilities, capable of shipping ammunition and other explosives in the event of a national emergency. Upon completion in 1958, there was no immediate operational need for this installation, and it was subsequently placed in an inactive status. On April 1, 1965, as result of a major reorganization, the terminal was placed under the jurisdiction of the newly organized Military Traffic Management and Terminal Service, and on July 1, 1965 became officially known as the Military Ocean Terminal, Kings Bay (MOTKI). MOTKI was designed to store ammunition or explosives for short periods of time, generally less than 3 months. The terminal was directly subordinate to the Military Ocean Terminal, Sunny Point, N.C.

MOTKI had no assigned military personnel and was operated by nineteen U.S. Government Civil Service employees, whose mission was to plan programs, perform repairs on utilities, and provide fire prevention and protection functions for the terminal. The most prominent feature of the terminal was its wharf. This steel and concrete wharf was two thousand feet long, eighty-seven feet wide and contained three parallel railroad tracks. As a result of these features, trains and tractor trailors could enter the wharf from one end and depart from the other without reversing direction. MOTKI had its own complete railroad system, consisting of forty-seven miles of railroad tracks within the terminal which connected with the St. Marys Railroad just outside the terminal. Operating facilities on the wharf included the railroad tracks, various administrative and operational buildings including the headquarters, bachelor officers' quarters, fire station, motor pool and cafeteria, smokehouses, a public address system, floodlights for round-the-clock operations, and a water system for firefighting.

In July 1, 1978, ownership of the property that MOTKI had occupied was transferred to the Navy for development of the Naval Submarine Base. The following sections discuss the various shops that are operated by the Navy at SUBASE Kings Bay.

5.1.1 Public Works Shops. A number of shops at SUBASE Kings Bay have been operated by a private contractor for the Public Works Department. The Base Operating Services Contractor (B.O.S.C.), is supervised by the Public Works Department and operates the Vehicle Maintenance, Carpentry, Paint and Plumbing, Heating, Ventilation and Air Conditioning, Steam and Compressed Air, Roads and Grounds, and Electrical Shops to their specifications.

5.1.1.1 Vehicle Maintenance Shop. The vehicle maintenance shop has been located in Building 2007 since 1981. Between 1979 and 1981 this shop was located in Building 1016, which is now the interim hazardous waste storage facility. The shop's responsibilities include the maintenance and repair of all government vehicles and equipment (including locomotives, ships, and lawn maintenance equipment).

Waste oil has been contained in a 500 gallon underground tank located next to the asphalt driveway until it is hauled off base by a private contractor. Reportedly, small quantities of paint solvents and transmission, brake, and other automotive fluids are also added to the waste oil tank. Absorbent material is used to contain minor spills and is placed in the dumpster for removal from the base. An automobile and equipment painting operation has also been active at the motor vehicle maintenance shop. Waste materials (paints and thinners) from this operation are stored in drums and removed periodically off-base. Waste batteries have also been generated. Quantities and disposal methods associated with these wastes are presented in Table 5-1.

5.1.1.2 Carpentry, Paint and Plumbing Shop. This shop has been located in Building 2006 since its inception in 1980. All three operations have been performed in one work area. Reportedly, the carpentry and plumbing operations do not generate any hazardous waste. Only minor plumbing work has been done and all paint wastes from carpentry operations have been handled by paint shop personnel.

The main responsibility of the paint shop has been the general painting of all buildings at SUBASE Kings Bay. These operations generate approximately six 55-gallon drums of waste paints and solvents such as lacquer, thinners and mineral spirits each year which have been hauled off-station by a contract waste hauler. Paint (mostly latex) and thinner have been purchased in small containers (less than 5 gallons) and the empty containers have been disposed of in the dumpsters. Solvents have been received in 55-gallon drums which have been sold for recycle when empty.

5.1.1.3 Heating, Ventilation and Air Conditioning. The heating, ventilation and air conditioning shop has been responsible for the maintenance and repair of the air movement systems for all buildings at SUBASE Kings Bay. Boilers, condensers, and heat exchangers are handled by the steam and compressed air shop. Reportedly, the heating, ventilation and air conditioning shop uses no chemicals that are considered hazardous or that require special disposal.

TABLE 5-1

ESTIMATED VEHICLE MAINTENANCE SHOP
WASTE GENERATION AND DISPOSAL, SUBASE KINGS BAY

Years of Generation	Waste Types	Estimated Total Quantity	Location of Disposal	Comments
1981-1985	Waste Oil	3,000-5,000 gallons	Hauled off base by waste hauling contractor	
1981-1985	Batteries	500	Turned in for recycle to supply Building 2006	Batteries are turned in containing acid
1981-1985	Paint waste, thinner and solvent	1,300	Hauled off base by waste hauling contractor	Waste from vehicle and equipment painting

5.1.1.4 Steam and Compressed Air Shop. This shop is responsible for the maintenance and repair of all boilers, condensers, heat exchangers, and related equipment. Scale removal using muriatic acid and tri-sodium phosphate is the only shop operation generating quantities of chemical waste. Quantities disposed and disposal methods used are presented in Table 5-2. The muriatic acid is diluted to approximately one half strength before use. In the past until early 1985, the spent muriatic acid was further diluted and disposed at unknown locations on the ground. The quantity of acid disposed of on these occasions is unknown. Since early 1985, the acid has been neutralized with tri-sodium phosphate and discharged into the sewage system.

Approximately 100 bags of waste asbestos insulation were generated when the cooling towers at the housing development were replaced in February 1985. The doubled plastic bags of asbestos were disposed of off-station by a contract waste hauler.

5.1.1.5 Electrical Shop. The electrical shop, a part of the Public Works Department, has been located in Building 2010 since early 1981. The shop has been responsible for the maintenance and repair of the electrical distribution system, building electrical wiring, and all electric motors. Reportedly, the electrical shop uses no solvents or chemicals requiring disposal. The storage and disposal of PCB-filled transformers is handled by the Public Works Department as discussed in Section 6.1.5.

TABLE 5-2

ESTIMATED STEAM AND COMPRESSED AIR SHOP
WASTE GENERATION AND DISPOSAL, SUBASE KINGS BAY

Years of Generation	Waste Types	Estimated Total Quantity	Location of Disposal
1980-1981	Muriatic acid	4,000 gal	Neutralized and poured down drain to activity WWTP
1981 early 1985	Muriatic acid	2,700 gal	Diluted and poured onto ground at various unknown locations
1980 early 1985	Tri-sodium phosphate	1,400 gal	Neutralized and poured down drain to activity WWTP
1982 early 1985	Tri-sodium phosphate	900 gal	Diluted and poured onto ground at various unknown locations

5.1.1.6 Roads and Grounds Maintenance. The roads and grounds maintenance shop has been located in Building 2010 since November 1984. The shop has been responsible for the maintenance of all roads and grounds at SUBASE Kings Bay. All vehicles and equipment used by roads and grounds shop personnel have been serviced by the Public Works Vehicle Maintenance Shop. The only operation using hazardous materials has been the application of herbicides.

5.1.2 USS Simon Lake. The USS Simon Lake, a submarine tender, has been responsible for the maintenance and repair of submarines since July 1979. The USS Simon Lake has on-board capabilities to perform all industrial operations required as part of the maintenance and repair of submarines. Additional responsibilities include the transferring of submarine generated wastes to the T-Shed (Building 5028) for ultimate disposal and the reloading of provisions. Reportedly, lead acid batteries, which have been received from submarines and vehicles, periodically break causing minor spills (of less than 10 gallons). Oily wastes generated by the submarine tender go to either the oil/water separator at the Auxillary Repair Dock Medium (ARDM) or to the waterfront wastewater treatment plant which also includes an oil/water separator. Table 5-3 is a list of typical wastes generated in a three month period from the USS Simon Lake. These wastes have been stored at the T-shed unitl transferred to Building 1016 (interim hazardous waste storage facility).

5.1.3 Dry Dock (ARDM) Operations. The main function of the ARDM (Auxillary Repair Dock Medium) has been to provide a work area for the refitting of submarines since 1979. Refitting of submarines has included the removal of marine growth and paint, repainting, and replacement of worn parts. Large amounts of wastewater have been generated by hydroblasting operations during the marine growth removal. This water, (containing paint chips) has been discharged directly to the wastewater treatment plant. Oily wastewater from the submarines has been pumped to the oil/water separator at the ARDM and then to the wastewater treatment plant. Approximately 21,000 gallons of waste oil have been pumped from the oil/water separator storage tank each year since 1981. This waste oil is sold to a waste oil recycling contractor. Paint chips from paint removal, solvents, and waste lubricating oil and grease are placed in drums and sent to the interim hazardous waste storage facility (Building 1016) prior to removal by a waste disposal contractor. A list of typical chemical wastes generated at the ARDM during a three month period is presented in Table 5-4.

5.1.4 Auto Hobby Shop. The auto hobby shop, located in Building 1021, has provided facilities to military personnel for private vehicle maintenance since 1981. The shop began at Diamondback area between 1979 and 1980 during which time military personnel were permitted to use the facilities at the vehicle maintenance shop in Building 1016. As part of the construction of Building 1021 in 1981, a 500 gallon underground waste

TABLE 5-3

CHEMICAL WASTES GENERATED FROM THE USS SIMON LAKE
DURING A TYPICAL THREE MONTH PERIOD, SUBASE KINGS BAY

WASTE TYPE	QUANTITY GENERATED[1]
Waste lubricating oil	1200 gallons
Neutralized battery acid	(1) 55-gallon drum
Monoethanol amine and monoethanol amine residues	650 gallons
Potassium hydroxide	(5) 55-gallon drums
Soda ash contaminated with acetic acid	(1) 55-gallon drum
Empty monoethanol amine containers	(50) 5 gallon containers
Mercuric nitrate	(3) 55-gallon drums
Hydrogen peroxide	52 ounces
Paint and thinners	(11) 55-gallon drums
Sulfuric acid	30 gallons
Lithium hydroxide	12 lbs
Caustic soda	(4) 55-gallon drums
Ammonium hydroxide	6 gallons
Triethanol amine	2 gallons
Catalyst carbon monoxide	10 gallons
Acetic acid	(1) 55-gallon drum
Lithium bromide	(4) 55-gallon drums
Ion exchange compound	450 lbs
Hydrochloric acid	7 gallons
Hydrazine	310 gallons
Empty grease cans	(22) 5 gallon cans
Oxygen breathing apparatus cannisters	75
Bleach	5 gallons
Perchloroethylene	(1) 55-gallon drum

[1]Wastes generated are stored at the T-Shed until they can be transferred to Building 1016 (interim hazardous waste storage).

TABLE 5-4

CHEMICAL WASTES GENERATED AT THE ARDM DURING
A TYPICAL THREE MONTH PERIOD, SUBASE KINGS BAY

WASTE TYPE	QUANTITY GENERATED
Mixed waste paints	(20) 55-gallon drums
Waste grease	(5) 55-gallon drums
Empty grease containers	(42) 5-gallon containers
Hydrochloric acid	(1) 55-gallon drum
Sulfuric acid	(1) 55-gallon drum
Boiler compound	(2) 5-gallon containers
Monoethanol amine	15-gallons
Oily sludge	(1) 55-gallon drum

Oil storage tank was also installed. Waste engine oil and other automotive fluids as well as approximately five gallons per week of solvents are added to the tank. On several occasions the tank has overflowed onto the ground. When this occurs the fluid is contained with an absorbent material and placed in a 55-gallon drum for removal by the waste oil contractor. The shop also collects waste batteries and sells them to a private salvage operation. Quantities of waste generated and methods used for their disposal are shown in Table 5-5.

5.1.5 Port Services. Port services has been located on the wharf in Building 5026 since July 1979 and is operated by the Operations Department. The main function of the Port Services is to provide incoming ships with tug boat and pilot services; berthing space with electric, water and sewer services; and reloading services for provisions. Port services has never been responsible for the off-loading of any wastes from ships. Off-loading of ship generated wastes has been performed by the Public Works Department.

Land vehicles operated by port services have been maintained by the Public Works vehicle maintenance shop. Port services maintains three tug boats, one landing craft, and two floating cranes. Waste oil, other engine fluids and solvents (trichloroethane) generated by the maintenance of these crafts have been stored in 55-gallon drums. About 3300 gallons per year of these materials have been generated. They have then been hauled off-base by a waste disposal contractor. Unknown quantities of bilge water from the water craft have been pumped to the oil/water separator and on to the dockside wastewater treatment plant. No method of bilge water measurement currently exists.

5.1.6 Fire Fighting. The fire station at SUBASE Kings Bay has been located in Building 2004 since 1979. Burning for fire fighter training was conducted at SUBASE Kings Bay once every two months between 1980 and 1981. The burning consisted of igniting three to six 55 gallon drums of fluid including waste oil, diesel fuel, and small quantities of paints and paint thinners in an open pit (see Site 2, Section 8.3). Training was discontinued in 1981. No fire fighter training has taken place at SUBASE Kings Bay since 1981.

TABLE 5-5

ESTIMATED AUTO HOBBY SHOP
WASTE GENERATION AND DISPOSAL, SUBASE KINGS BAY

Years of Generation	Waste Types	Estimated Total Quantity	Location of Disposal	Comments
1981-1985	Waste oil	6000-8000 gallons	Hauled off base by waste hauling contractor	
1981-1985	Batteries	200	Sold to private contractor for recycle	Batteries are turned in containing acid
1981-1985	Waste solvents	1040 gallons	Hauled off base by waste hauling contractor, along with with waste engine oil.	

5.1.7 Pest Control Shop. The pest control shop has been at its current location in Building 2010 since 1983. Prior to 1983, the Navy housed the operation in a small building located approximately 200 feet west of Pond M-6. The Army did not operate a full time pest control shop; however, mosquito-control pesticides were applied during summer months when the base was occupied by the Army Reserve. The material was mixed at the job area and applied using thermal foggers. Reportedly, pesticides were never stored on base and spillage of pesticides did not occur.

The pest control shop has been responsible for the control of a variety of rodents, insects, and plants. The pesticides used to accomplish this task included: chlordane, carbaryl, diazinon, dursban, malathion, and naled. Most chemicals have been diluted before application. The majority of the mixing of pesticides have been performed in a dedicated mixing room and minimal spillage has occured. Rinse water from container and equipment rinsing has been contained and used in the next mixture. Empty pesticide containers have been crushed and disposed of off-station by a waste disposal contractor.

Prior to 1981, naptha was mixed with insecticides to help them adhere to tree branches and leaves. In 1984, most unused naptha was turned over to the Defense Property Disposal Office (DPDO), however, three 55-gallon drums were kept in storage at the shop. A list of pesticides reportedly used by the pest control shop during 1980 is shown in Table 5-6. It is believed that these quantities are representative of a typical yearly usage.

Since November 1984, Diaquat has been used at an annual rate of approximately 60 gallons per year. Diaquat, which has been diluted with water and applied through the use of backpack tanks or a larger trailer tank, has been used to kill weeds along fence lines. Mixing has been performed outdoors near the shop and only the amount to be used has been mixed. The Diaquat has been obtained in one gallon containers and empty containers have been washed, rinsed and disposed in the dumpster. Rinse water has been used in subsequent mixtures.

5.1.8 Medical Clinic. The medical clinic, located in Building 1028, has been operating at SUBASE Kings Bay since about 1980. The clinic provides medical service to active duty members and their dependents.

Wastes generated by the medical clinic include infectious wastes and culture plates. Approximately five 20 gallons plastic bags of infectious wastes have been collected each day. The bags have been deposited in a dumpster and disposed of off-station by a private contractor. Between 1980 and early 1984, the infectious wastes were disposed of off-station with the general solid waste of the activity. X-ray development solutions containing silver have been collected in plastic containers and retained by the Supply Department prior to being sent to DPDO at NAS Jacksonville. Approximately 40 grams of silver sludge and 120 grams of silver flakes were accumulated from X-ray operations during August 1984. These quantities vary from month to month depending on the work load at the Medical Clinic.

5.1.9 Dental Clinic. The dental clinic, located adjacent to the hospital in Building 1028, has been providing dental services for personnel on the base since 1982. Wastes from the department include amalgam (containing mercury), silver from x-ray developing, and beryllium dust from grinding tooth casts.

Amalgam has been stored in HGX solution (mercury solution used in filling cavaties). The solution has been collected in plastic containers and kept in a storage closet in the clinic. Approximately one gallon of the solution has been accumulated yearly. Disposal of the waste has not been required.

X-ray developing solution containing silver has been stored in the medical X-ray department prior to transfer to the NAS Jacksonville DPDO.

TABLE 5-6

PESTICIDE USAGE FOR 1980
SUBASE KINGS BAY, GEORGIA

TYPE	QUANTITY	APPLIED CONCENTRATION (Per Cent)
chlordane	24,340 gallons	1.0
	16 pounds	10.0
dursban (chlorpyrifus)	100 gallons	0.5
	100 gallons	0.12
baygon (propoxur)	5 gallons	1.0
malathion	314 gallons	95
	5 gallons	2.5
mineral oils	3,475 gallons	100
naled (dibrom)	36 gallons	85
altosid (methoprene)	7 pounds	7.9
pyrethrum	1 gallons	0.40
diuron	800 pounds	80
anticoagulant	10 pounds	0.025

Beryllium dust has been placed in plastic bags and deposited in a hazardous waste dumpster behind the dental clinic. Approximately once every six months, wastes in the dumpster are collected and disposed of off-station by a waste disposal contractor.

5.2 TENANT ACTIVITIES. SUBASE Kings Bay provides space and services for a number of tenant activities. Brief descriptions of the various tenant activities are presented below.

5.2.1 Mobile Technical Unit 14. The Mobile Technical Unit 14 has been a tenant at SUBASE Kings Bay since about 1982 and has been housed in Building 2014. The function of the unit has been to service and repair electronic equipment used in submarines, vessels and ships. Alcohol and rosin-based flux have been used to clean circuit boards and related components. Approximately 1 quart of alcohol and 4 ounces of rosin based flux per month have been used since 1982. The chemicals have been stored in the building. No waste has been produced since the chemicals have been completely used in the cleaning process. Empty chemical cans have been deposited in a dumpster.

5.2.2 Navy Publishing and Printing Service Jacksonville Detachment. The print shop, presently located in Trailer S-2 and Trailer S-3, has been a tenant activity at SUBASE Kings Bay since 1983. The shop operates two presses and several copy machines. Printing machines have been cleaned once a week using two chemicals: electrostatic solution and blanket wash solution. Most of these solutions evaporate during use and do not generate any liquid waste. During machine cleaning, blanket wash solution, a petroleum base solvent used in cleaning the heads of the press, has been drained from the machine to a one gallon jug. After the solution in the jug settles, the liquid portion has been decanted and reused leaving a residue (dirt and dust from press) at the bottom of the jug. It has been estimated that less than a quarter of a gallon of residue has been produced and not enough has accumulated during the past three years to require disposal.

5.2.3 Explosive Ordnance Disposal Group, Two Detachment. The Explosive Ordnance Disposal Group, Two Detachment (EOD Group Two Detachment) has been located in Building 2013 since 1979. Reportedly, the Army had no EOD or ordnance type detachment at Kings Bay during its period of operation.

The EOD Detachment's principal activity has been to provide ordnance related support to SUBASE Kings Bay, USS Simon Lake, and Submarine Squadron Sixteen. The Detachment also provides diving services to SUBASE Kings Bay.

There have been no waste generating ordnance activites such as manufacturing, loading, or demilitarization at SUBASE Kings Bay. Retrograde ordnance (defective ammo and explosives) have been disposed of by the EOD Group Two Detachment either at Naval Air Station (NAS) Cecil Field, Florida for flares, hand grenades, and small explosives or at the demolition range (Buildings 4979 and 4980) in the case of small arms.

The demolition range consists of an unlined area of 300 feet by 75 eet and is enclosed on three sides by a u-shaped berm which is about 30 feet high. The detonated materials are vaporized, leaving no residue except for occasional pieces of metal debris. This debris has been collected in special metal bins and hauled off-base for disposal by a private contractor.

5.2.4 Photo Laboratory. Since 1983, SUBASE Kings Bay has operated an on-base photo laboratory in Building S-15. One of the main functions of the laboratory has been the preparation of photographs for newspaper articles and most of the processing involves black and white film. The laboratory has also been capable of color slide processing. Estimated quantities of these chemicals and the methods used for their disposal are shown in Table 5-7.

5.2.5 U.S. Army Reserve 370th Detachment. The U.S. Army Reserve 370th Detachment has been at Kings Bay since 1973 and is located in 5 trailers in the Diamondback Area. The Detachment's principal mission at the base has been to provide utility services including electrical and plumbing services. Reportedly, hazardous wastes have not been generated from the utility services. Waste from past camping activities have included tree stumps, wooden pallets, metal ammo boxes, kitchen garbage, and office waste. Approximately 77,000 cubic yards of wastes were disposed between 1973 and 1979 at Site Nos. 5, 6, 7, 8, 12, 14, and 15. The Detachment has not been involved in any ordnance-related operations, nor have they been involved in any transformer work or storage.

TABLE 5-7

ESTIMATED PHOTO LABORATORY
WASTE GENERATION AND DISPOSAL, SUBASE KINGS BAY

Years of Generation	Waste Types	Estimated Total Quantity	Location of Disposal
1983-1985	Black and white developer	72 gallons	Drain to base wastewater treatment plant
1983-1985	Black and white activator	108 gallons	Drain to base wastewater treatment plant
1983-1985	Black and white stop bath (acetic acid)	9 gallons	Drain to base wastewater treatment plant
1983-1985	Mixture of color developer, conditioner, bleach, fixer and stabilizer	162 gallons	Drain to base wastewater treatment plant
1983-1985	Fixer	90 gallons	Turned over to DPDO for silver recovery
1983-1985	Scrap film	6 cu.ft.	Turned over to DPDO for silver recovery

CHAPTER 6. MATERIAL HANDLING: STORAGE AND TRANSPORTATION

6.1 INDUSTRIAL. This section describes the storage and transportation of industrial materials at Naval Submarine Base (SUBASE) Kings Bay.

6.1.1 Materials Storage Defense Property Disposal Office (DPDO). The Old DPDO yard was located east of Polaris Lane across USS James Monroe Avenue (see Figure 2-9). The size of the yard was reportedly 450 feet by 75 feet. The fenced and asphalt paved area was used from 1979 to 1983 for storage of waste materials. Materials stored here included 55 one gallon and five gallon paint cans, ten to fifteen 55-gallon drums of waste oil mixed with solvents (including methyl ethyl ketone, and methyl isobutyl ketone). Two transformers were also reportedly stored at this site. It was reported that during operation of the site, between one and five 55 gallon durms of unknown types of materials were spilled onto the asphalt paved area. The materials were cleaned up by Public Works personnel soon after they occurred (see section 8.14 site 13, old DPDO yard).

The DPDO at SUBASE Kings Bay has been at its present location in Building 6016 since January 1984. The office is not a disposal operation but rather a storage and transfer facility. DPDO performs the paper work for hazardous wastes, but does not accept physical custody at its present location.

The size of the present DPDO yard is approximately one acre. Since January 1984 various items have been stored in the paved fenced yard located behind the DPDO office (see Table 6-1). Much of the material has been stockpiled on metal shelves. During the IAS on-site visit, approximately 300 five gallon cans of paint with expired shelf life were being stored. Other shelves contained various metal items such as office equipment. In the southeast corner of the yard, approximately 300 empty lube oil drums were stored. A metal shed, to protect perishable items from the weather has also been in the southeastern corner of the yard. Next to the shed were about 100 empty drums that had contained non-hazardous materials. This area has been used for receiving and storing empty used drums since 1984. No signs of leakage were evident during the IAS on-site visit. Lead acid batteries from submarines were drained at the wharf, they were then stored at DPDO for about two weeks prior to being sent off-base for reclaimation. Ship batteries have been sent to Naval Air Station (NAS) Jacksonville for disposal. Mercury from tender operations has been collected (about 50 pounds per year) and sent to Building 1016, known as the interim hazardous waste storage facility for off-station contractor disposal.

6.1.2 Supply Storage. Supply storage at SUBASE Kings Bay has been located in Buildings 2006, 2007, 2010, 2020 and 2022 in the Industrial Support Area. The Supply Department has provided storage and supply capabilities to the industrial shop area and the waterfront area since 1979. The majority of materials have been delivered to the five buildings mentioned above by truck. Since 1984, Building 2022 has been

TABLE 6-1

TYPICAL MATERIALS STORED AT
SUBASE KINGS BAY DPDO YARD

ITEM	APPROXIMATE QUANTITY
Cans of Paint (5 gallons)	300
Office Equipment	-
Empty Lube Oil Drums	300
Empty Drums (previously containing non-hazardous materials)	100
Scrap Metal	-
Metal Equipment	-

used for storage of lube oil drums, one gallon cans of solvent, spray paint, construction materials, service mart supplies, tools and medical supplies. From 1980 to 1984, Building 2006 was also used to store these types of materials. From 1979 to 1980, Building 2007 was used as a general supply warehouse. The Base Operating Services Contract (BOSC) has stored various supplies in Building 2006 since 1984, including food, uniforms, plumbing and carpentry supplies. The supplies stored in Building 2006 were also used by the submarine tender. The submarine tender stored supplies for its steam engine such as gaskets, nuts, bolts, and tools for repairs. From 1980 to 1984, Building 2010 was used for these supplies and until 1980 a metal building (no longer standing) was utilized. Public Works Transportation stores supplies such as lube oils, lube greases, auto paint and thinners in Building 2007. A flammable storage area measuring 8 feet by 55 feet has been located in Building 2010 for the storage of paints and paint solvents for use by the industrial shops since 1979. The quantities of materials stored varies depending on the rate at which they are used. On the average Building 2010 stores approximately 200 gallons of paint per month.

6.1.3 Chemical and Hazardous Materials Storage. From 1978 to 1982, the major storage area for chemical and hazardous materials used in the pier area has been the Transit Storage Warehouse (T-shed), Building 5028. Materials have been received here by ship and truck and include all materials necessary for operation and maintenance of the submarines. A listing of typical materials can be found in Table 6-2. Chemical and hazardous materials have also been stored at three of the supply storage warehouses, Buildings 2007, 2010 and 2022 since 1979. Since 1982, hazardous wastes awaiting off-base contract disposal have been stored in Building 1016. This building, known as the interim hazardous waste storage facility, has accepted hazardous waste from throughout

TABLE 6-2

MATERIALS STORED AT THE
T-SHED SUBASE KINGS BAY

TYPE	QUANTITY	AVERAGE STORAGE TIME
Paint	48 gallons	Continually as required
Disinfectant	2 gallons	Continually as required
Linsed Oil	1 gallon	Continually as required
Hydrochloric Acid		N/A
Moriatic Acid	30 gallons	3 months
Herbicides	100 pounds	2 weeks
Lube Oil	20 barrels	4 months
Subtropical Bleach	50 pounds	N/A
Lead-Acid Battery	8	N/A
DS2	1 pint	N/A
Chlorine Gas	20 cyclinders	2 weeks
Chemical Sulphoric Acid	15 quarts	3 weeks
Compressed Gases - Oxygen - Air	5 Tanks 2 tanks	5 tanks on hand at all times
Flit MLO	80 drums	12 months
Cleaning Compounds	5 gallons	3 months
Thinner	180 gallons	Continually as required
Freon	19 pounds	N/A

Source: Applied Engineering and Science, 1984.

N/A = Not Available

SUBASE Kings Bay, repackaged it as necessary and stored it prior to pick-up and off-base disposal by a waste hauling contractor. Waste received at Building 1016 has been separated into seven categories for storage. These categories include general waste materials, organics, unknown wastes, reactive wastes, oxidizers, corrosives and acids. About 100 five gallon containers of waste per month have been stored in Building 1016. The two most common types of wastes have been waste paint and mono-ethanolamine (a chemical used in submarine air purifying systems).

Occasionally, there have been small leaks (less than 1/2 gallon) at Building 1016. These leaks are cleaned up immediately with absorbant. Leaking containers and contaminated absorbant are over packed and handled like other waste in the building.

Since 1979, two additional areas have been used to package and stage hazardous wastes from ships at SUBASE Kings Bay. An outside waste staging facility at the T-shed, accepted hazardous wastes from the USS Simon Lake and other ships docked at SUBASE Kings Bay. Reportedly, waste was transported from the staging area to Building 1016 once a week. Table 6-3 identifies the usual types and quantities of wastes stored at this facility as noted during the IAS on-site survey. All of the wastes are staged on an asphalt pad. Additionally, small quantities of hydrogen peroxide, ammonium hydroxide, sodium chromate and acetic acid were awaiting disposal at the time of the IAS on-site survey. An asphalt paved outside waste oil storage area has been located adjacent to Building 5045 since 1979. Typical types and quantities of wastes stored included hydraulic fluid (twenty 55-gallon drums) and lube oil (fifteen 55-gallon drums). There were no reports or evidence of leakage or spillage at the storage area. Building 5027, in the waterfront area has been used by the Submarine Squadron 16 as a flammable materials/acid storage building since 1978. Table 6-4 lists materials that have been stored in Building 5027 since 1980. Compressed gases, such as oxygen (5 tanks), acetylene (3 cyclinders), and argon (2 cylinders), have been stored on covered metal shelves in an area adjacent to Building 5027.

6.1.4 Petroleum, Oil, Lubricant Storage. Petroleum, oil and lubricant (POL) products have been used for the various industrial shops and waterfront facilities at SUBASE Kings Bay since 1979. Materials stored have included Fuel Oil No. 2 (diesel fuel), Mogas, and leaded and unleaded gasoline. Three 48,000 gallon Fuel Oil No. 2 underground tanks have been used by the Mobile Utility Support Equipment, (MUSE) boiler in the wharf area since 1979. A summary of the petroleum storage facilities at SUBASE Kings Bay is shown on Table 6-5. Ships are fueled at pierside with trucks using hose connections. These tank trucks have ranged in capacity from 500 to 5000 gallons. No spills have been reported from pierside fueling operations, nor have any leaks from tanks been reported.

TABLE 6-3

MATERIALS AWAITING DISPOSAL AT
T-SHED STAGING FACILITY DURING IAS ON-SITE VISIT -
SUBASE KINGS BAY

ITEM	APPROXIMATE QUANTITY	COMMENT
Caustic Sodas	Unknown	Used with breathing apparatus
CO_2 Absorbant	2 pallets of cans (5-10 gallons each)	
Lube Oil	400 gallons	Picked up monthly by private contractor
Perchloroethylene	Ten 55-gallon drums	
Potassium Hydroxide	Three 55-gallon drums	
Paints and Thinners	Six 55-gallon drums	
Carbon Monoxide	Unknown	

TABLE 6-4

TYPICAL MATERIALS STORED AT
BUILDING 5027 SINCE 1980
SUBASE KINGS BAY

ITEM	APPROXIMATE QUANTITY
Paints	12 gallons
Oil	6 gallons
Mono-ethanolyene	165 gallons
Ion exchange compounds	1 cubic yard
Amonium hydroxide	14 gallons
Lithum hydroxide	12 pounds
Sodium phosphate	275 gallons
Nitric acid	1 quart
Potassium hydroxide	45 gallons

TABLE 6-5

SUBASE KINGS BAY PETROLEUM STORAGE FACILITIES

TANK NUMBER[1]	TYPE[2]	PRODUCT	SIZE (GALLONS)
99	UG	Fuel Oil #2	2,060
90	UG	Fuel Oil #2	2,060
95	UG	Fuel Oil #2	2,060
86	UG	Fuel Oil #2	2,500
199	UG	Fuel Oil #2	940
1040	UG	Fuel Oil #2	8,000
1003	UG	Fuel Oil #2	5,500
2022	UG	Fuel Oil #2	4,000
1991(a)	UG	Mogas	4,000
1991(b)	UG	Mogas	4,000
1991(c)	UG	Mogas	4,000
1991(d)	UG	Mogas	9,000
1991(e)	UG	Mogas	4,000
1986	UG	Fuel Oil #2	550
1029	UG	Fuel Oil #2	10,000
1931	UG	Fuel Oil #2	15,000
1939	UG	Fuel Oil #2	15,000
1933	UG	Fuel Oil #2	700
2990	UG	Fuel Oil #2	550
2987(a)	UG	Mogas	12,000
2987(b)	UG	Diesel	4,000
2987(c)	UG	Diesel	5,000
2987(d)	UG	Mogas	5,000
2010	UG	Fuel Oil #2	2,800
2007	UG	Fuel Oil #2	3,000
5038	UG	Fuel Oil #2	500
5026	AG	Fuel Oil #2	200

NOTES:

1. In some cases tanks are numbered according to an adjacent building.

2. U.G. - Underground
   A.G. - Above ground

TABLE 6-5 (Continued)

SUBASE KINGS BAY PETROLEUM STORAGE FACILITIES

TANK NUMBER[1]	TYPE[2]	PRODUCT	SIZE (GALLONS)
2983	UG	Fuel Oil #2	2,000
1028	UG	Fuel Oil #2	10,000
1979	UG	Fuel Oil #2	6,000
2904	UG	Fuel Oil #2	2,000
2915	UG	Fuel Oil #2	2,000
5027	UG	Fuel Oil #2	250
5972(a)	Earth Mounted	Fuel Oil #2	48,000
5972(b)	Earth Mounted	Fuel Oil #2	48,000
5972(c)	Earth Mounted	Fuel Oil #2	48,000

Underground total 148,470 gallons
Above ground total 200 gallons
Emergency total 144,000 gallons

NOTES:
1. In some cases tanks are numbered according to an adjacent building.
2. U.G. - Underground
   A.G. - Aboveground

Source: Naval Facilities Engineering Command, 1983.

6.1.5 PCB Storage. Less than 40 transformers were acquired by the Navy from the Army's Kings Bay Military Ocean Terminal. These transformers were stored at four locations at SUBASE Kings Bay from 1979 until 1984 awaiting disposal.

Four of these areas were Public Works storage yards (see Section 6.1.8). These storage yards were located behind the interim hazardous waste storage facility, Building 1016, (see Section 8.2, Site 1); a paved area near Building 5006 (see Section 8.4, Site 3); a storage yard behind the water treatment plant (see Section 8-5, Site 4); and behind Building 2016 in the Industrial Support Area. When the regulations defining PCB transformers were changed in 1982 (from less than 500 parts per million PCB to less than 50 parts per million PCB) two of the transformers stored behind Building 2016 were changed from "non-PCB" status to "PCB" status and were moved (in 1982) to Building 1016 for temporary storage while awaiting disposal. There were no reports or evidence of leakage or spills at the storage area. Transformers stored at Sites 1 and 3 were removed and the sites were excavated in 1982 (see Sections 8.2 and 8.4). A spill at transformer oil occurred in December 1982 at the storage area behind the water treatment plant (see Section 8.5, site 4). Approximately one gallon of transformer coolant containing polychlorinated biphenyls (PCB) was spilled from a filler cap onto adjacent soil. The Naval Air Station in Jacksonville tested a sample for PCB and determined coolant was 63 percent PCB. The transformer and 8 cubic feet of contaminated soil were placed in 55-gallon drums and hauled off-base for proper disposal on September 15, 1983 (Simons, 1983).

6.1.6 Pesticide Storage. Pesticides were stored in Building S-130 and Building S-214 from 1978 to 1983. Building S-130 was an area 25 feet by 40 feet and stored household pesticides. Building S-214 was an area about 20 feet by 12 feet and stored pesticides for mosquitoes. Since 1983 pesticide operations have been handled out of Building 2010. A listing of pesticides stored and used at SUBASE Kings Bay during 1980 is shown in Table 6-6. From 1980 until 1984, an outdoor area near Building 4019 was used as a storage facility for about twenty-five 55-gallon drums of Chevron Chemical Company's Flit® MLO (Mineral Oil Light). Flit MLO is a biodegradable pesticide that was used to kill mosquito larva. Flit MLO was the only pesticide stored at this location. However, in 1984 all of the pesticide had been used and the empty drums were sent to DPDO for disposal.

6.1.7 Nuclear, Biological, Chemical (NBC) Decontamination Agents Storage. Since 1980, DS-2 and supertropical bleach (STB) have been stored by the EOD Detachment as part of their required decontamination materials. About 24 one quart containers of DS-2 have been stored in a flammable storage locker behind Building 2013. About 50 pounds of STB have been stored in a locked trailer. These quantities are typical of past amounts stored by the EOD. Disposal of these materials has never been required.

TABLE 6-6

PESTICIDE USAGE FOR 1980
SUBASE KINGS BAY, GEORGIA

TYPE	QUANTITY	APPLIED CONCENTRATION (Per Cent)
chlordane	24,340 gallons	1.0
	16 pounds	10.0
dursban (chlorpyrifus)	100 gallons	0.5
	100 gallons	0.12
baygon (propoxur)	5 gallons	1.0
malathion	314 gallons	95
	5 gallons	2.5
mineral oils	3,475 gallons	100
naled (dibrom)	36 gallons	85
altosid (methoprene)	7 pounds	7.9
pyrethrum	1 gallons	0.40
diuron	800 pounds	80
anticoagulant	10 pounds	0.025

6.1.8 Public Works Storage Yards. There were four known Public Works storage yard locations. One of the largest of these storage yards was known as Area No. 1. This storage yard was 120 square feet, located at Site 1 approximately 80 feet north of the old vehicle maintenance building (Building 1016) in the far western area of the activity. This yard was used as a temporarily fenced impoundment from 1979 to 1982 (see Section 8.2 Site 1). Ten PCB transformers were stored at this location awaiting disposal. It was reported that minor quantities (less than one gallon) of PCB oil leaked from the transformers. All ten transformers and the contaminated soils were removed from the site in 1982 through a private waste hauling contract.

There was a second storage yard behind the water treatment plant. This storage yard was a 20 feet by 30 feet unpaved area with pallets. This area was used as a storage yard from 1983 to 1984.

A third storage yard was located behind Building 2016 in the Industrial Support Area. This storage yard was a 6 feet by 10 feet paved area with pallets. From 1983 until 1984 this yard was used as a temporary storage area.

The fourth storage yard was a fenced, paved area located near Building 5006 (see Section 8.4, Site 3). This storage yard was 120 square feet was used as a temporary impoundment area from 1979 until 1982. Site 3 was used by a contractor to store an unknown number of transformers and construction materials and equipment. Less than one gallon of transformer coolant (containing PCBs) leaked from the transformers onto soil adjacent to the pavement. Soils in an area of approximately 14 feet by 15 feet and 4 inches deep were excavated and, along with the transformers, removed from the base by waste disposal contractor.

6.1.9 Pier Operations: Loading and Unloading from Ships. From 1959 to 1979 the Blue Star Shipping Company was involved in the handling of dynamite and unknown types of explosives at the Army's Military Ocean Terminal Pier. Ordnance materials were trucked to a holding area on the wharf (presently the T-shed) prior to loading on ships. Two disposal sites (Sites 9 and 10; see Section 8.10 and 8.11) reportedly originated from the Blue Star Shipping operations. These two sites near the wharf were used to burn unknown quantities of pallets, paper, dunnage and old dynamite.

An inside concrete paved flammable materials storage facility has been in Building 5027 since 1979. Typical types and quantities of materials stored included monoethyanolamine (thirty 55-gallon drums), paint (thirty 5 gallon cans), methyl sobuty ketone (forty-five 5 gallon cans), toluene (fifteen 5 gallon cans), and trichloromonofluoromethane (thirty 40 gallon drums). There were no reports or evidence of leakage or spillage at the facility.

Presently, the Port Services (under the Operations Department) loads and unloads provisions and waste materials from ships entering port. The wastes have been given to Public Works for off-station contractor disposal.

6.1.10 Materials and Waste Transportation. Since 1979, when the Navy began operations at SUBASE Kings Bay, all in-coming materials entered the Base through the T-Shed. The majority of supplies were brought by truck from Charleston, South Carolina. Every 45 days ships would enter port and off-load fuel and supplies. All materials were stored at the T-Shed or on the submarine tender.

The majority of waste generated at the SUBASE Kings Bay has been domestic solid waste. The wastes have been placed in dumpsters and hauled off-base by a waste disposal contractor. Salvageable materials, such as scrap metal, have been collected and sold by DPDO. Since 1982, hazardous wastes have been transported to Building 1016 for interim storage until picked up by a contract waste hauler. Waste oil was sent to Charleston for recycling from 1979 to 1981. Since 1981, it has been handled by private contract (see Section 7.4). During 1981, other waste materials such as paints and solvents were sent to the Naval Air Station, Jacksonville, because of their large storage facility.

6.1.11 Auxillary Repair Dock Medium (ARDM) Storage Area. This facility, located near the ARDM pier adjacent to Monroe Avenue (see Figure 2-5), has been a paint storage area since 1979. The facility has an area of approximately 1000 square feet. The ARDM is a floating dry dock used for submarine maintenance and repair. Wastes from the USS Oak Ridge were stored here in a 10-foot square building, (Building 221), which was removed sometime after 1982. The facility has been in use since 1979. Waste generated included waste paint, oil, grease, small amounts of paint thinner and cleanup rags. Every 6 months approximately ten, 55-gallon drums of these waste materials were repackaged and transferred to the Public Works Department hazardous waste storage facility (Building 1016) or stored on-site prior to private contractor disposal. It was reported that approximately 100 gallons of waste including vinyl, antifouling and epoxy were spilled on the ground during past use of the area. This spill was cleaned up by repackaging the waste near the end of 1984.

6.2 ORDNANCE. Ordnance storage facilities are currently under construction at SUBASE Kings Bay. From 1959 to 1979, dynamite and unknown types of explosive were stored in what is now the T-Shed, by the Blue Star Shipping Company (see Section 6.1.9). Reportedly no ordnance supplies have been stored in the bunkers since 1959. These bunkers are large earthen mounds surrounding the railroad tracks. Most have been removed, and plans are to use the remaining bunkers as fill for future structures.

CHAPTER 7. WASTE PROCESSING

7.1 GENERAL. This chapter discusses the various methods of waste processing used at SUBASE Kings Bay, Georgia. Waste processing operations at SUBASE Kings Bay include: sewage treatment, solid waste disposal, hazardous waste disposal, oil and solvent recycling, and ordnance disposal.

7.2 WASTEWATER CONVEYANCE AND TREATMENT PLANT. The sewage and wastewater treatment system at SUBASE Kings Bay consists of two independent facilities. The Waterfront Sewage Treatment Plant (WSTP) services the Waterfront Development Area and the Base Sewage Treatment Plant (BSTP) services all other base development areas.

The WSTP, located south of the T-Shed, was constructed in 1978. The 0.4 million gallon per day (mgd) facility includes the following unit processes: aerated pretreatment (equalization), influent pumping, activated sludge, secondary clarification, chlorine contact, aerobic digestion, and sludge dewatering via drying beds. The treatment plant is designed to treat bilge wastewater and sanitary sewage pumped from naval ships in port through lift stations located at the wharf and ARDM area. Daily flows vary considerably with fluctuations in ship loads; however, for the period July 1982 to June 1983, daily flow averaged 0.26 mgd (SOUTHNAVFACENGCOM, 1983).

Effluent from the facility is discharged into Kings Bay under authorization of the National Pollutant Discharge Elimination System (NPDES) permit Number GA 0027707. When the Camden County landfill at SUBASE Kings Bay (Site 11) was operational (1974 to October 1981), sludge and grit from the treatment plants were disposed here. Since late 1981, dried sludge from the sludge drying beds has been periodically removed by a private contractor and disposed of off-station. The estimated quantity of sludge removed is 15 cubic yards per month based on the removal of three beds every two months.

The BSTP is a 0.3 mgd land application treatment system constructed in 1979. The plant, located north of the "Industry Support" area, is an aerated lagoon treatment plant with screening and grit removal. After chlorination, the wastewater effluent has been land applied to forest areas using a spray irrigation system. Sludge has been removed from the lagoons manually on an as needed basis. From 1979 to late 1981, sludge was disposed on-site at Site 11. Since late 1981, the sludge and grit have been disposed off-station. The aerated lagoons have been designed for 15 years of operation without sludge removal.

7.3 SOLID WASTE DISPOSAL. Solid wastes generated at the base during the Blue Star Shipping Company's operation consisted of pallets, paper, dunnage and individual sticks of dynamite. These wastes were burned and buried at Sites 9 and 10 from 1959 to 1979 (see Sections 2.3.9 and 2.3.10). The Army Reserve generated general trash such as office wastes,

wooden pallets, concrete blocks, metal ammo boxes and kitchen wastes. These disposal areas are Sites 5, 6, 7, 8, and 12. Sites 14, 15 and 16 were also used by the Reserves for disposal of drums, empty paint and solvent cans and the wastes mentioned above. SUBASE Kings Bay disposal of solid wastes occured at Site 11, Camden County Landfill (see Section 2.2.11) from 1974 to 1981. Since Site 11 closed, solid wastes from the base have been disposed of off-station by a waste disposal contractor. Since 1981, inert construction material, trees, stumps, roots and brush have been disposed within one of the dredge spoil areas and burned daily to reduce volume. There are approximately 25 acres of dredge spoil areas at the activity. No hazardous waste material have been reported to be disposed in these areas. An average of 28 tons of solid wastes has been generated at the base during the Navy's tenure (1969-1985).

7.4. OIL AND SOLVENT RECYCLING. During the Army's occupation of the base, oil and solvents were not recycled. From 1979 until 1981, waste oil was recycled through Navy facilities in Charleston, South Carolina. This practice occurred until 1981, at which time the recycling was handled through a private waste recycler. Approximately 5,000 gallons of waste oil has been collected per month for recycling. Waste solvents generated at SUBASE Kings Bay have always been recycled through DPDO at the Naval Air Station, Jacksonville.

7.5 ORDNANCE. No ordnance processing operations have occurred at SUBASE Kings Bay in the past.

CHAPTER 8. DISPOSAL SITES AND POTENTIALLY CONTAMINATED AREAS

8.1 GENERAL. This chapter describes each of the disposal sites or potentially contaminated areas identified at the Naval Submarine Base (SUBASE), Kings Bay, Georgia at the time of the IAS. The locations of the sites are found on Figure 8-1 with more detailed maps following site descriptions. Table 8-1 summarizes the information collected for these sites.

8.1.1 Site Identification. The sites described were identified through several sources including SUBASE records, correspondence, and maps; interviews with activity personnel; examination of aerial photographs; and field examination. For all sites, efforts were made to confirm data through multiple sources.

8.2 SITE 1, PCB TRANSFORMER STORAGE AREA NO. 1. This site, used from 1979 to 1982, was located approximately 80 feet north of the old vehicle maintenance building (Building 1016) in the far western area of the activity (see Figure 8-2). The area was a temporarily fenced impoundment, 120 square feet in size, where ten PCB transformers were stored awaiting disposal. The transformers, as part of the aerial electrical distribution system, were acquired from the Army when the Military Ocean Terminal became Navy property. It was reported that minor quantities (less than one gallon) of PCB oil leaked from the transformers. While the transformers were stored here, they isolated from the environment (since 1981) with plastic sheets placed above and below them and surrounded by earthen berms. A soil sample was taken on September 14, 1982 and analyzed in accordance with Part VI, Volume 44, Number 106, pages 315-38 of the Federal Register. The result of the sample analysis (see Appendix D) found 9.2 ppm PCB (Type 1260) in the soil (Holley Electric Corp., 1982). No Georgia State or Federal standards exist for PCB in soil. Cleanup and removal of approximately 40 cubic feet of soil occurred in September 1982. Soils were excavated over the 120 square foot area to an average depth of approximately 4 inches. All ten transformers and the contaminated soils were removed from the site in 1982 through a private waste hauling contract. During the IAS on-site visit, there were no transformers stored at the site.

8.3 SITE 2, FIRE FIGHTING PIT. The fire fighter training pit (unlined), used from 1980 to 1981, was aproximately 30 feet by 30 feet by 2 feet deep. It was located in the waterfront area off Pelican Road near the intersection of Stimson Drive and Monroe Avenue (see Figure 8-3). Waste oil (from vehicle maintenance), contaminated diesel fuel, paints and paint thinners were poured into the bermed pit and burned once every two

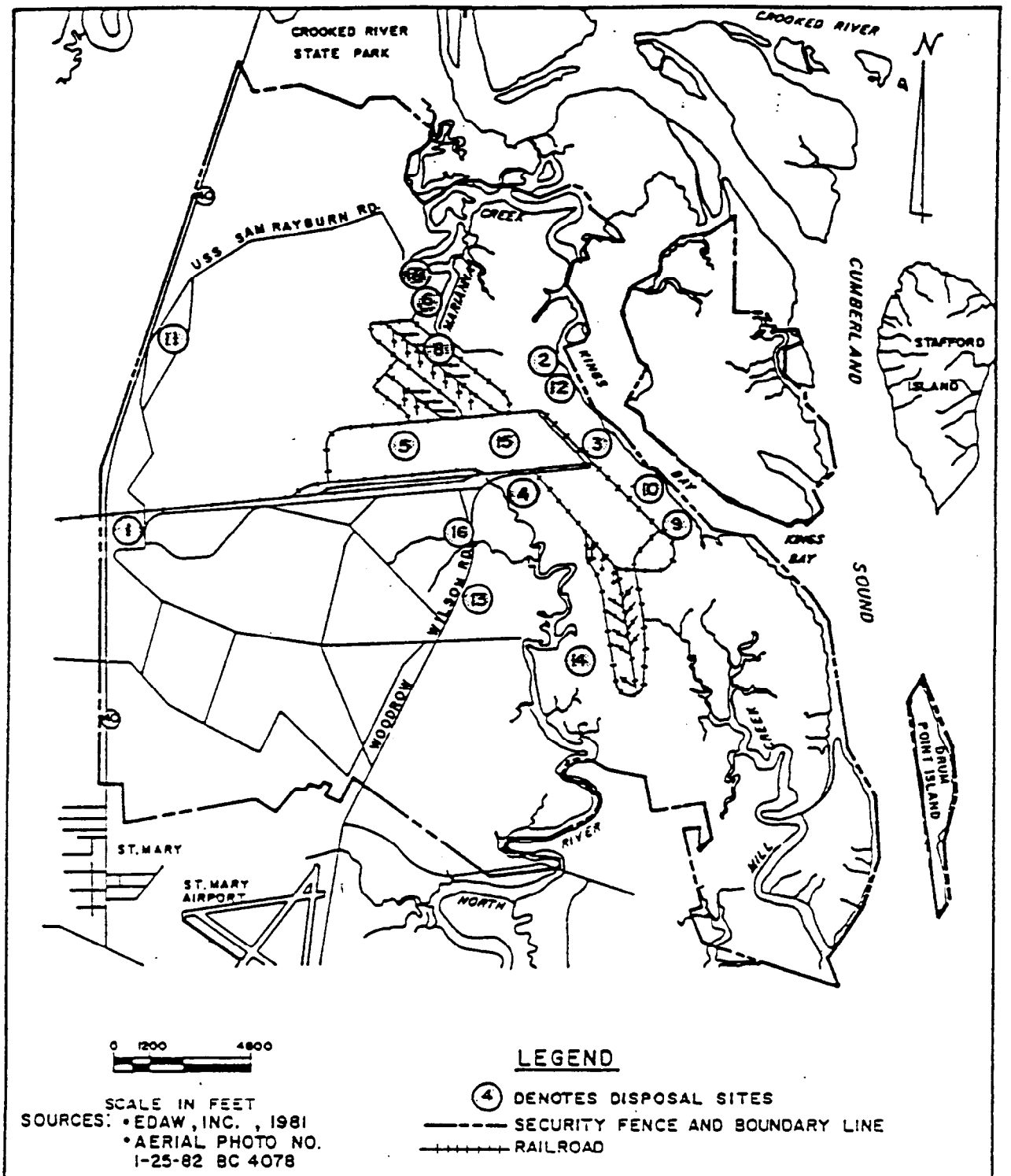


FIGURE 8-1
LOCATION OF DISPOSAL SITES AND POTENTIAL CONTAMINATION AREAS
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

TABLE 8-1

AREAS OF CONTAMINATION-NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

AREA OF CONCERN	PERIOD OF OPERATION	TYPES OF WASTES DISPOSED OR SPILLED	MAP COORDINATES ESTIMATED TOTAL QUANTITY	COMMENTS
Site 1, PCB Transformer Storage Area No. 1	1979 to 1982	Polychlorinated Biphenyls	N290,000-E686,000 less than one gallon	Site cleaned up in September 1982
Site 2, Fire Fighting Pit	1980 to 1981	Waste oil, diesel fuel paint thinner, hydrazine	N294,000-E700,000 100 cubic yards	Site excavated and material sent to the currently operated Camden County Landfill in 1982
Site 3, PCB Transformer Storage Area No. 2	1979 to 1982	Polychlorinated Biphenyls	N292,000-E696,000 less than one gallon	Site cleaned up in 1982
Site 4, PCB Transformer Storage Area No. 3	Early 1980s to 1983	Polychlorinated Biphenyls	N290,000-E700,000 one gallon	Soil and transformer hauled off-base by a waste disposal contractor

TABLE 8-1 (Continued)

AREAS OF CONTAMINATION-NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

AREA OF CONCERN	PERIOD OF OPERATION	TYPES OF WASTES DISPOSED OR SPILLED	MAP COORDINATES ESTIMATED TOTAL QUANTITY	COMMENTS
Site 5, Army Reserve Disposal Area, Towhee Trail	1969 to 1974	Tree stumps, wooden pallets, metal ammo boxes, aluminum sheeting, concrete block, kitchen garbage	N292,000-E696,000 69,000 cubic yards	Wastes were disposed into pits; some were burned
Site 6, Army Reserve Disposal Area No. 1	At least 1975 to 1979	Dry wastes, office wastes, garbage	N292,000-E696,000 1600 cubic yards	Wastes were disposed into pits and covered with topsoil
Site 7, Army Reserve Disposal Area No. 2	1971 to 1977	Kitchen garbage	N298,000-E696,000 6500 cubic yards	Used during summer training camps
Site 8, Army Reserve Disposal Area No. 3	1973 to 1974	Paper, wood, kitchen garbage	N296,000-E698,000 350 cubic yards	Depression and 1 totally corroded 55-gallon drum were noticed in the area at the time of the IAS on-site visit
Site 9, Blue Star Shipping Disposal Area, Parking Lot	1959 to 1974	Pallets, paper, dunnage, old dynamite	N290,000-E706,000 1400 cubic yards	This area has been completely excavated during construction activities

TABLE 8-1 (Continued)

AREAS OF CONTAMINATION-NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

AREA OF CONCERN	PERIOD OF OPERATION	TYPES OF WASTES DISPOSED OR SPILLED	MAP COORDINATES ESTIMATED TOTAL QUANTITY	COMMENTS
Site 10, Blue Star Shipping Disposal Area, T-Shed	1974 to 1979	Pallets, paper, dunnage, old dynamite	N290,000-E704,000 1400 cubic yards	This site has been completely excavated
Site 11, Old Camden County Landfill	1974 to 1981	General household and office wastes, scrap paper, wood, treatment plant sludge and grit	N295,000-E687,000 500,000 cubic yards	
Site 12, Army Reserve Disposal, Area Future Dry Dock	1974 to 1978	Wooden and metal ammo boxes, concrete slabs dummy cargo, waste oil drums	N295,000-E701,000 467,000 cubic yards	The area was excavated in 1983
Site 13, Old DPDO Yard	1979 to 1983	Paints, solvents, antifreeze, waste oil, PCB transformers	N-286,000-E698,000 unknown quantities	The site was closed in 1983 and cleaned up
Site 14, Army Reserve Disposal Area, Kamehameha Avenue	1958 to 1978	Lube oil, diesel fuel, paint	N284,000-E702,000 100 to 200 gallons	Several drums were found during the IAS on-site visit

TABLE 8-1 (Continued)

AREAS OF CONTAMINATION-NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

AREA OF CONCERN	PERIOD OF OPERATION	TYPES OF WASTES DISPOSED OR SPILLED	MAP COORDINATES ESTIMATED TOTAL QUANTITY	COMMENTS
Site 15, Army Reserve Disposal Area near Water Treatment Plant, Stimson Drive	1970 to 1971	Methanol	N292,000-E700,000 50 to 100 gallons	Drums were observed during the IAS on-site visit
Site 16, Army Reserve Disposal Area near Old Sewage Lagoon 3990	1958 to 1964	Food, trash, scrap metal, tree limbs, empty paint and solvent cans	N288,000-E698,000 4000 cubic yards	Site was covered with soil upon closure

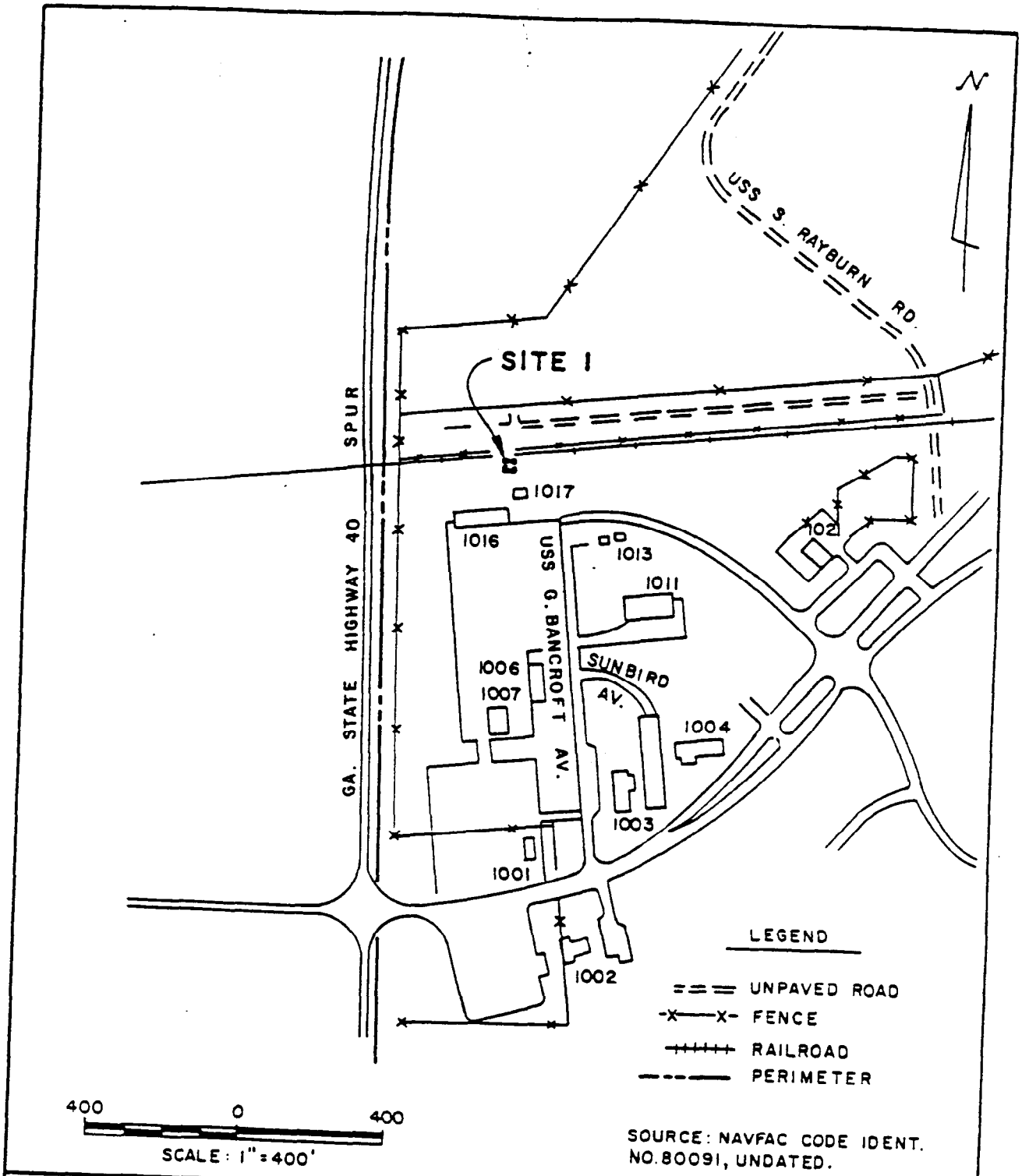


FIGURE 8-2
SITE I - PCB TRANSFORMER STORAGE AREA NO. I

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

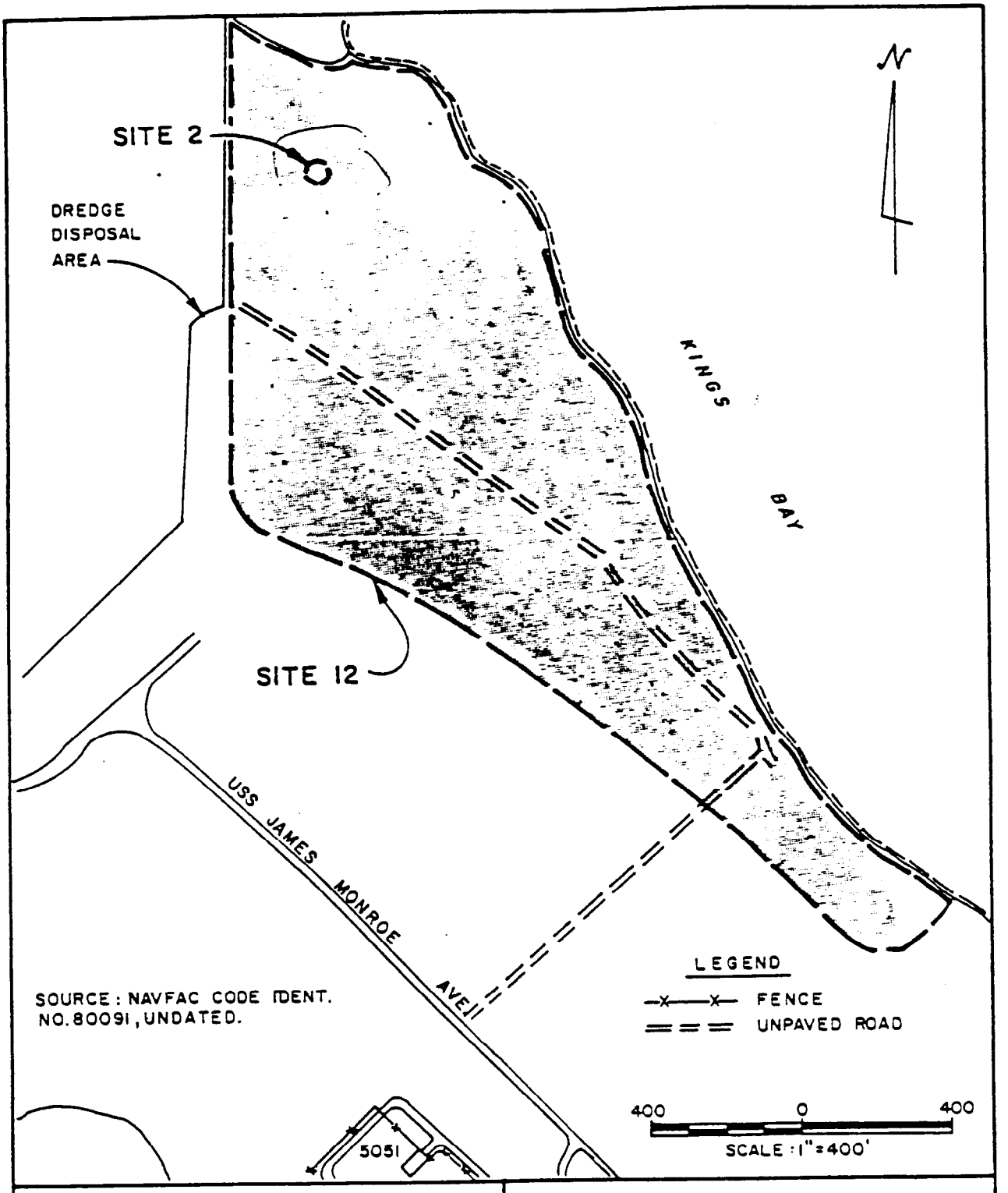


FIGURE 8 - 3
SITE 2 - FIRE FIGHTING PIT.
SITE 12 - ARMY RESERVE DISPOSAL AREA, FUTURE DRY DOCK.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

months by the fire department. Approximately 1500 gallons of waste oil and small amounts of diesel fuel, paints and paint thinners were reportedly burned between 1980 and 1981. At one time in 1980, an unknown quantity of hydrazine was also burned at Site 2. A soil core sample was taken from the pit in August 1980 and tested for EP toxicity. Lab results identified the materials to not exceed the maximum concentrations of contaminants for characteristic of EP toxicity. Therefore, the materials were not considered to be a hazardous waste (400 CFR, Part 261.24, Section 3001 of the Resource Convervation Act of 1976) (Technical Services, Inc., 1981). In 1982, approximately 100 cubic yards of contaminated soil were excavated from the pit and disposed of off base by a waste disposal contractor.

8.4 SITE 3, PCB TRANSFORMER STORAGE AREA NO. 2. Site 3 was a paved area used by a contractor to store an unknown number of transformers and construction materials and equipment from 1979 to 1982. The transformers, an unknown number of which contained polychlorinated biphenyls (PCB), were stored on a 120 square feet area near Building 5006 (see Figure 8-4) with plastic sheets above and below them and within earthen berms. Less than one gallon of transformer coolant (containing PCBs) leaked from the transformers onto soil adjacent to the pavement. Three samples were taken from this soil. The results indicated the presence of Aroclor 1260 (PCB) in concentrations of 47.5, 31.2 and 24.0 parts per million. No State or Federal standards exist for levels of PCB in soils. Soils in an area of approximately 14 feet by 15 feet and 4 inches deep were excavated and, along with the transformers, removed from the base by waste disposal contractor. The total volume of soil removed was 70 cubic feet. Results of the soil analysis are shown in Appendix F. No sampling was performed after excavation.

8.5 SITE 4, PCB TRANSFORMER STORAGE AREA NO. 3. Reportedly, in the early 1980s, a transformer with oil containing polychlorinated biphenyls was placed behind the standby water treatment plant at SUBASE Kings Bay (see Figure 8-5). In December, 1982 approximately one gallon of transformer coolant, determined to contain 63 percent PCB by weight by a laboratory at the Naval Air Station, Jacksonville, was spilled from a filler cap onto the adjacent soil. In January 1983, the transformer and 8 cubic feet of excavated soil were transferred to 55 gallon drums. Soil was excavated to a depth of approximately 11 inches in an area covering one square yard. On September 15, 1983, the drums containing the soil and the transformer were removed from the base by a waste disposal contractor.

8.6 SITE 5, ARMY RESERVE DISPOSAL AREA, TOWHEE TRAIL. This disposal site was used by the Army Reserve from approximately 1969 to 1974. The site covers an area of approximately 8.5 acres located on both sides of Towhee Trail where the road makes a sharp turn to the northwest (see

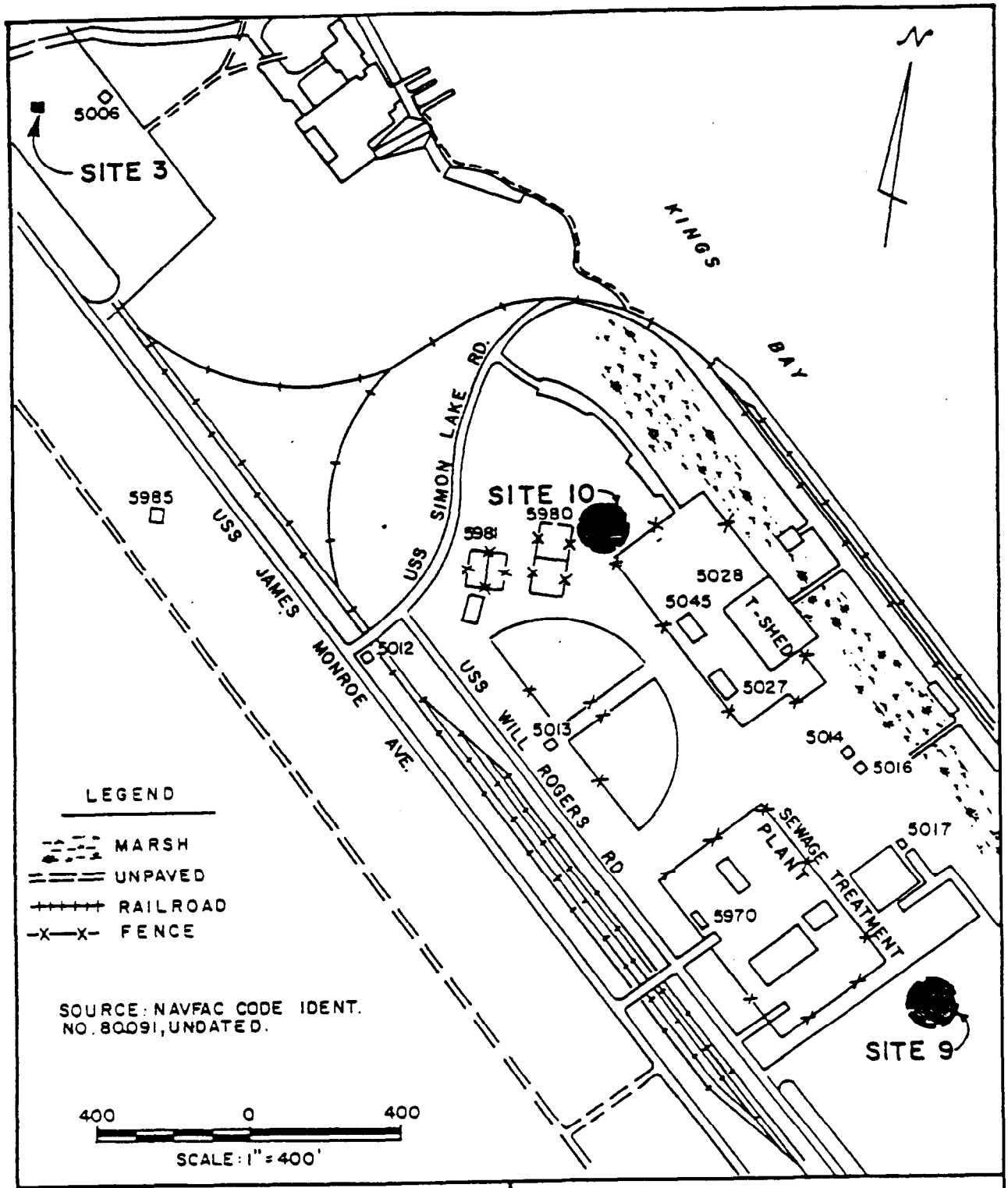


FIGURE 8-4
SITE 3 - PCB TRANSFORMER STORAGE AREA NO. 2.
SITE 9 - BLUE STAR SHIPPING DISPOSAL AREA, PARKING LOT.
SITE 10 - BLUE STAR SHIPPING DISPOSAL AREA, T-SHED.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

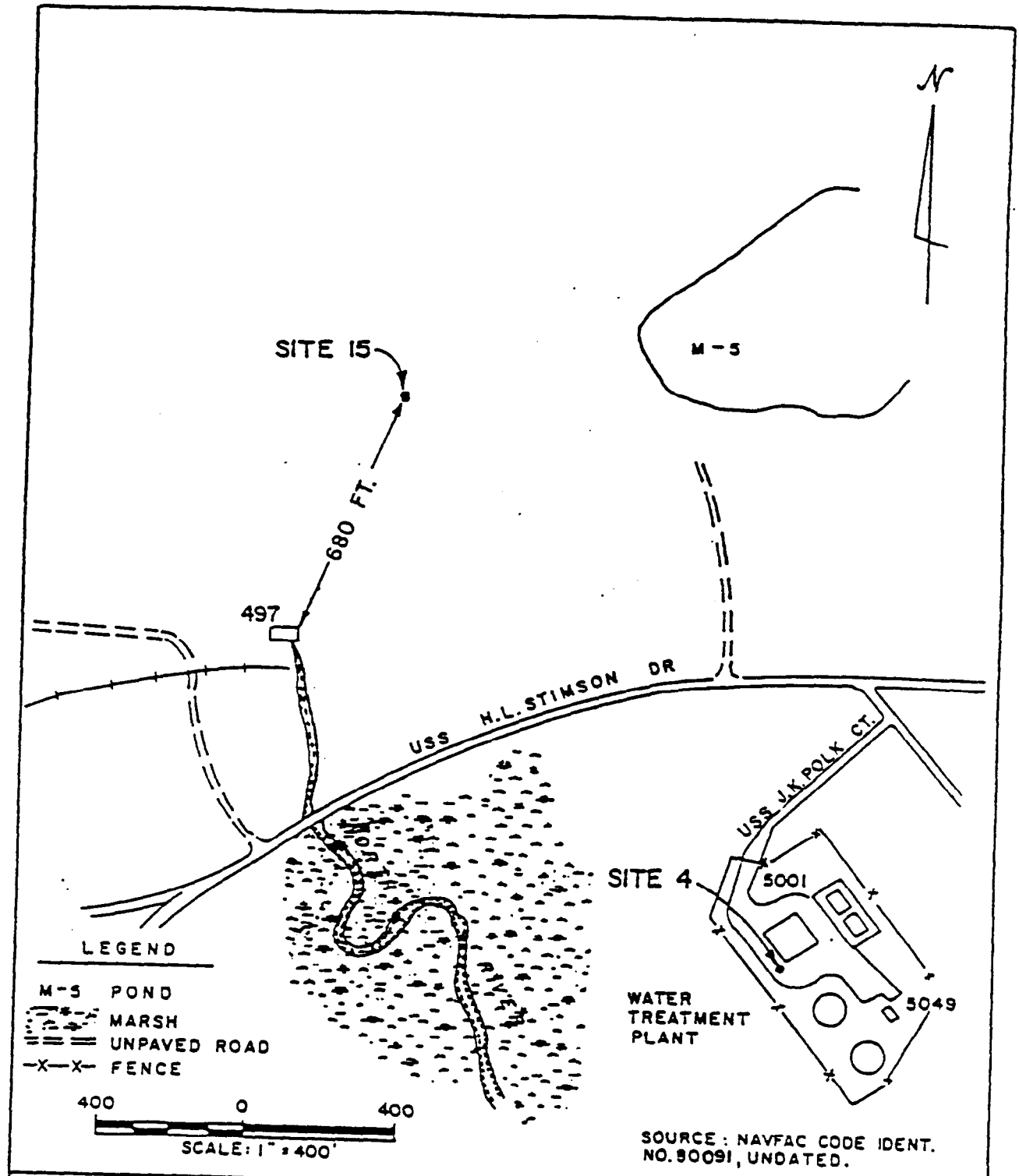


FIGURE 8-5
SITE 4 - PCB TRANSFORMER STORAGE AREA NO. 3
SITE 15 - ARMY RESERVE DISPOSAL AREA NEAR THE WATER TREATMENT PLANT, STIMSON DRIVE.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

Figure 8-6). The area on the west side of the road was reportedly about 7 acres in size while that on the east side was about 1.5 acres. The areas were both excavated to a depth of five feet before wastes were disposed in them. Wastes disposed in the site included tree stumps, wooden pallets, metal ammo boxes (some empty and some filled with concrete) aluminum sheeting, concrete blocks and some kitchen waste. There was also a large pile of dredge spoil (from stream cleanings due to erosion and sedimentation) and gravel from abandoned railroad tracks stored over most of the western area to a depth of about two feet. Burning took place twice a year at the end of reserve training on the western side of the road. A total of approximately 30 to 40 gallons of diesel fuel and waste oil were used to ignite the wastes. Therefore, over the 5 years that the site was in use a total of 300 to 400 gallons of waste oil and fuel were burned. Quantities of wastes disposed are approximated at 69,000 cubic yards based on the reported dimensions of the site.

8.7 SITE 6, ARMY RESERVE DISPOSAL AREA NO. A. This site, located east of Proteus Boulevard just north of Calhoun Drive, is adjacent to the wetlands bordering Marianna Creek (see Figure 8-6). The site is a 0.25 acre area that the Army Reserve used prior to 1975 until 1979 for trash and garbage disposal during their six week summer training camps. Pits, approximately five feet in diameter and five to six feet deep, were dug for the disposal of office wastes and garbage and were then covered with one to two feet of soil. Waste quantity is estimated at 1,600 cubic yards. Coniferous trees were abundant at the site.

8.8 SITE 7, ARMY RESERVE DISPOSAL AREA NO. B. Site 7 was used by the Army Reserve during summer training camp (6 weeks out of the year) for the disposal of kitchen garbage. The disposal occurred between 1971 and 1977. The site is located east of Proteus Boulevard just south of Teal Trail, and covers an area of approximately 0.5 acre (see Figure 8-6).

The pits were dug to a depth of eight feet and were approximately five feet in diameter. Based on the dimension of the disposal area, approximately 6,500 cubic yards of garbage were buried in this site.

8.9 SITE 8, ARMY RESERVE DISPOSAL AREA NO. C. Site 8 is located at the southern end of Proteus Boulevard adjacent to the dredge disposal area (see Figure 8-7). The site was used by the Army Reserve for their six week summer training camps between 1973 and 1974. The site area is about 100 feet by 14 feet by five to eight feet deep, and was used for the disposal of general household wastes such as paper, wood and kitchen garbage. During the IAS on-site visit, a depression was noticed in the area and a totally corroded and unlabeled 55-gallon drum was seen off to one side toward USS Proteus Boulevard. The drum appeared to be empty with no sign of spillage. Approximately 350 cubic yards of waste are estimated to have been buried at Site 8.

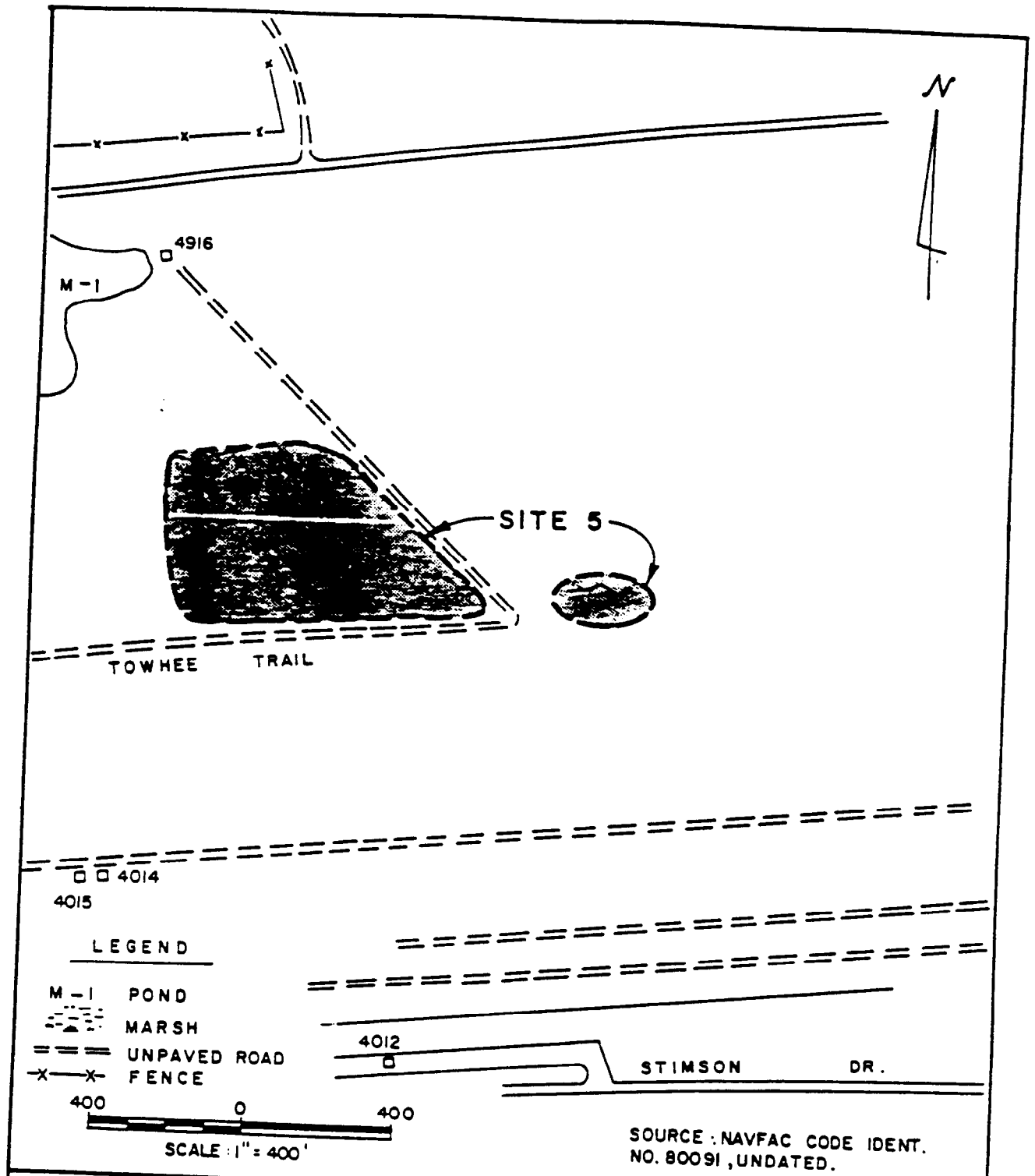


FIGURE 8-6
SITE 5 - ARMY RESERVE DISPOSAL AREA, TOWHEE TRAIL.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

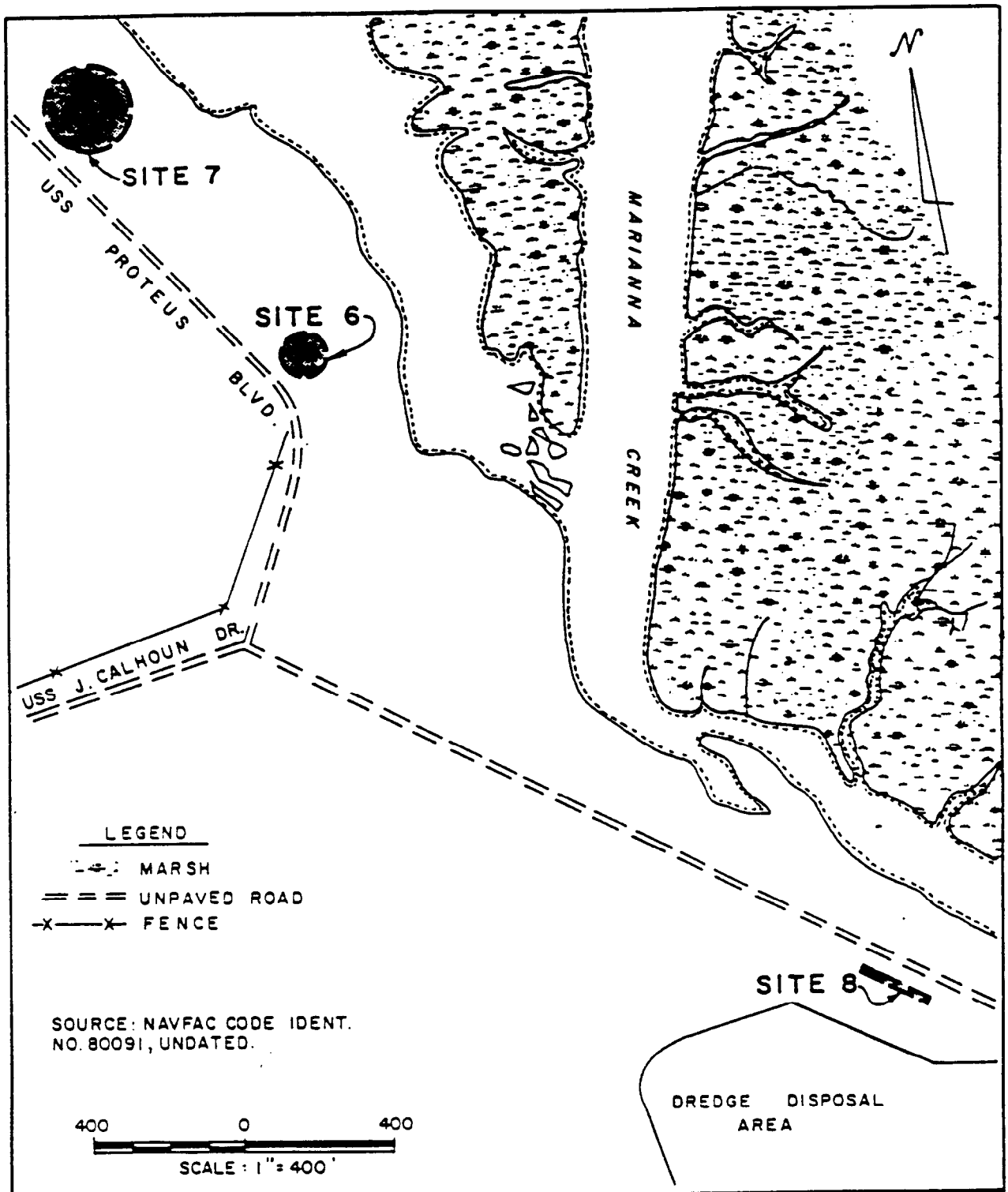


FIGURE 8-7
SITE 6 - ARMY RESERVE DISPOSAL AREA NO. A
SITE 7 - ARMY RESERVE DISPOSAL AREA NO. B
SITE 8 - ARMY RESERVE DISPOSAL AREA NO. C

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

8.10 SITE 9, BLUE STAR SHIPPING DISPOSAL AREA, PARKING LOT. The Blue Star Shipping Company operated this site from 1959 to 1974. The site was located under the present parking lot next to the water front sewage treatment plant (see Figure 8-3). The burn and burial site was 0.25 acre and three to four feet deep. It is unknown how often wastes were burned or if any fuel was used to ignite the wastes. Wastes included pallets, paper, dunnage, and an unknown quantity of sticks of dynamite. The waste quantity is estimated at 1400 cubic yards. The area was completely excavated during the construction of adjacent buildings and a parking lot in the late 1970s.

8.11 SITE 10, BLUE STAR SHIPPING DISPOSAL AREA, T-SHED. Site 10 was used from 1974 to 1979 by the Blue Star Shipping Company as a disposal area similar to Site 9. The site was located east of Building 5080 near the T-shed fence line (see Figure 8-3). Wastes were burned at the site and included pallets, paper, dunnage and old dynamite. It is unknown how often waste were burned or if any fuel was used to ignite the wastes. The area of the site is approximately 0.25 acre and three to four feet deep. Based on the dimensions of the site approximately 1400 cubic yards of waste were buried here. This area was completely excavated during construction of the T-shed parking lot. It is believed that the T-shed parking lot was constructed in the early 1980s. During the IAS on-site visit, this site could not be distinguished from the surrounding area.

8.12 SITE 11, OLD CAMDEN COUNTY LANDFILL. Located in the far western area of the activity (see Figure 8-8), this 35 acres landfill was operated by Camden County from 1974 to October 1981 (Knowlton, 1981). Reportedly, hazardous wastes were not accepted at the landfill. Domestic wastes were accepted from the following sources:

Source	Percentage of Total Waste
Camden County	60%
SUBASE Kings Bay	20-30%
Blue Star Shipping Co.	5-10%
Gilman Paper Co.	5-10%

Wastes, including general household and office wastes, scrap paper, wood and sludge and grit from the base sewage treatment plants, were brought to the site by truck. On the average, about 12 truck loads per day of wastes were disposed of at the site. It was reported that for a three month period in 1974 or 1975, the Gilman Paper Co. sent about seven truck loads of scrap paper (seven or eight bales per truck) to the landfill. The landfill was a trench and fill operation with trenches oriented in an east-west direction across the landfill (approximately 800 feet long by 20 feet wide by 12 feet deep). Excavation was into the water table which is four to eight feet below the surface in this area. Burning of wastes took place once per week during 1974, but did not occur after 1974. Each day the wastes, including ashes in 1974, were compacted and covered with at least six inches of soil. Upon closure, a final soil cover of two feet was placed on the landfill. Estimated waste quantity is 500,000 cubic yards.

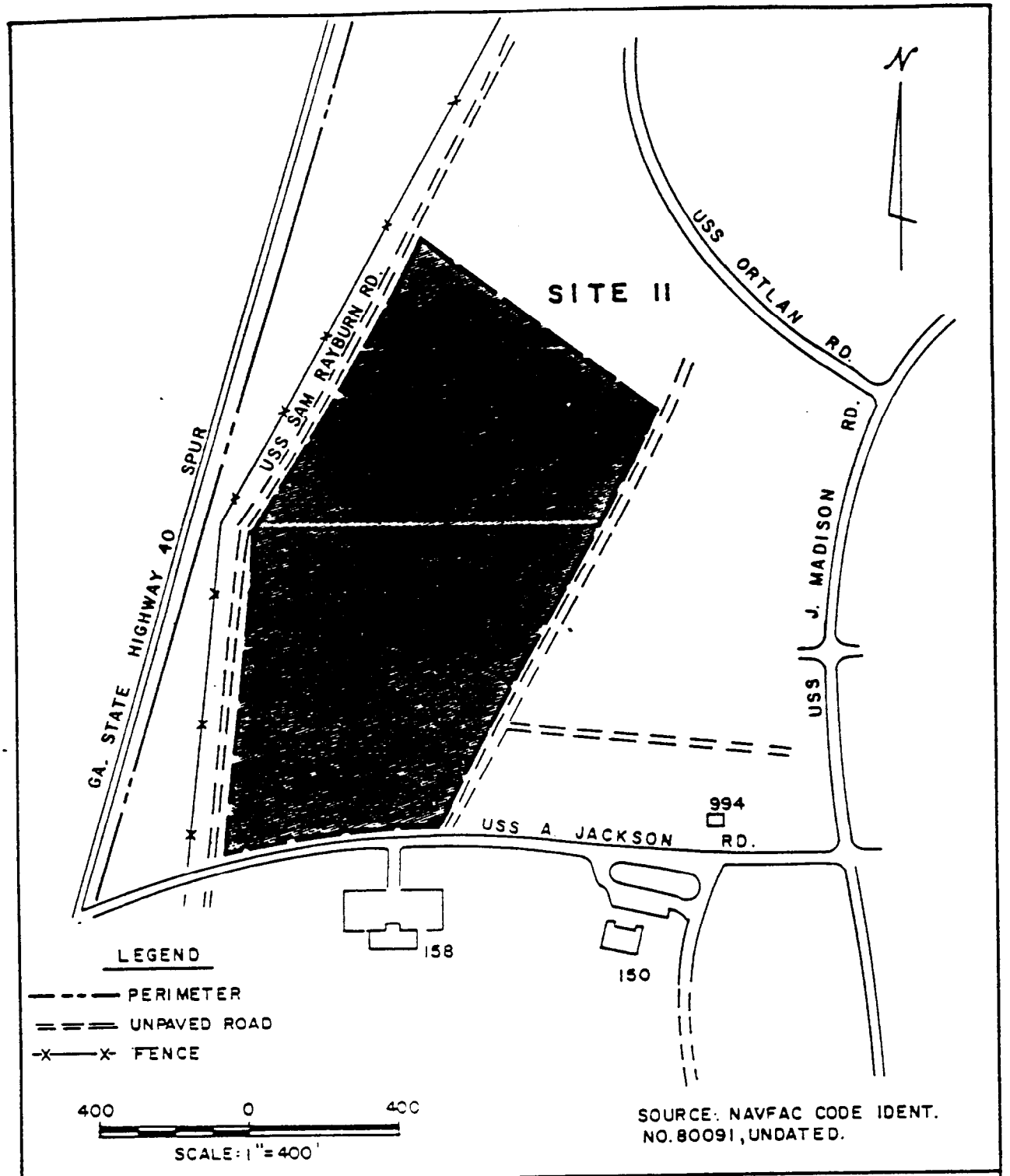


FIGURE 8-8
SITE II - OLD CAMDEN COUNTY LANDFILL.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

8.13 SITE 12, ARMY RESERVE DISPOSAL AREA. Site 12 is located along Kings Bay in the future dry dock area (see Figure 8-3) and was used by the Army for amphibious ship-to-shore materials loading and off-loading training operations from 1974 to 1978. The size of the disposal area is approximately 41 acres. Wastes included empty wooden and metal ammo boxes, concrete slabs, dummy cargo, and six to eight 55-gallon drums of waste engine oil. The site was used by the Army Reserve during their six week summer training camps. Twenty-five to 30 tractor trailer loads of cargo were brought to the base during the training operations with the majority of the materials leaving at the end of the six week period. However about five percent was left behind as waste and buried in pits six to eight feet deep. In 1983, a contractor operating a backhoe in the area uncovered six to eight 55-gallon drums of waste oil. One of the drums was punctured by the backhoe, causing a spill. The stained sediments and drums were removed for off-site disposal. This entire area was excavated in 1983 and the soil buried in the dredge spoil area. Waste quantity was estimated at 467,000 cubic yards.

8.14 SITE 13, OLD DPDO YARD. The Old DPDO yard was located east of Polaris Lane across USS James Monroe Avenue (see Figure 8-9). The size of the yard was reportedly 450 feet by 75 feet. The fenced and asphalt paved area was used from 1979 to 1983 for storage of waste materials. Materials stored here include:

Type	Percentage of Total Materials
Paints (including polyamide paints)	60-70%
Solvents (including methyl ethyl ketone, methyl isobutyl ketone)	10%
Monomethanol Amine	5%
Antifreeze (ethylene glycol)	5%
2190 Lubricating Oil (used on ships and submarines)	1%
Waste Oil and small amounts of unidentified materials	10%

Reportedly, two old transformers were stored at the site. Some types of waste materials were stored on metal pallets. It was reported that during operation of the site, between one and five 55 gallon drums of the unknown types of materials were spilled onto the asphalt paved area but were cleaned up by Public Works personnel soon after they occurred. Corroded and dented drums and cans of materials were generally repacked, sealed and labelled for off-base disposal. When final cleanup of the site was undertaken in 1984, useable materials were sent to the Naval Air Station, Jacksonville and the remaining hazardous materials were hauled off station by contract waste haulers. Empty drums were sent to a contractor for triple rinse. The site is now covered by more than 5 feet of compacted soil as a part of the on-going construction of SUBASE Kings Bay.

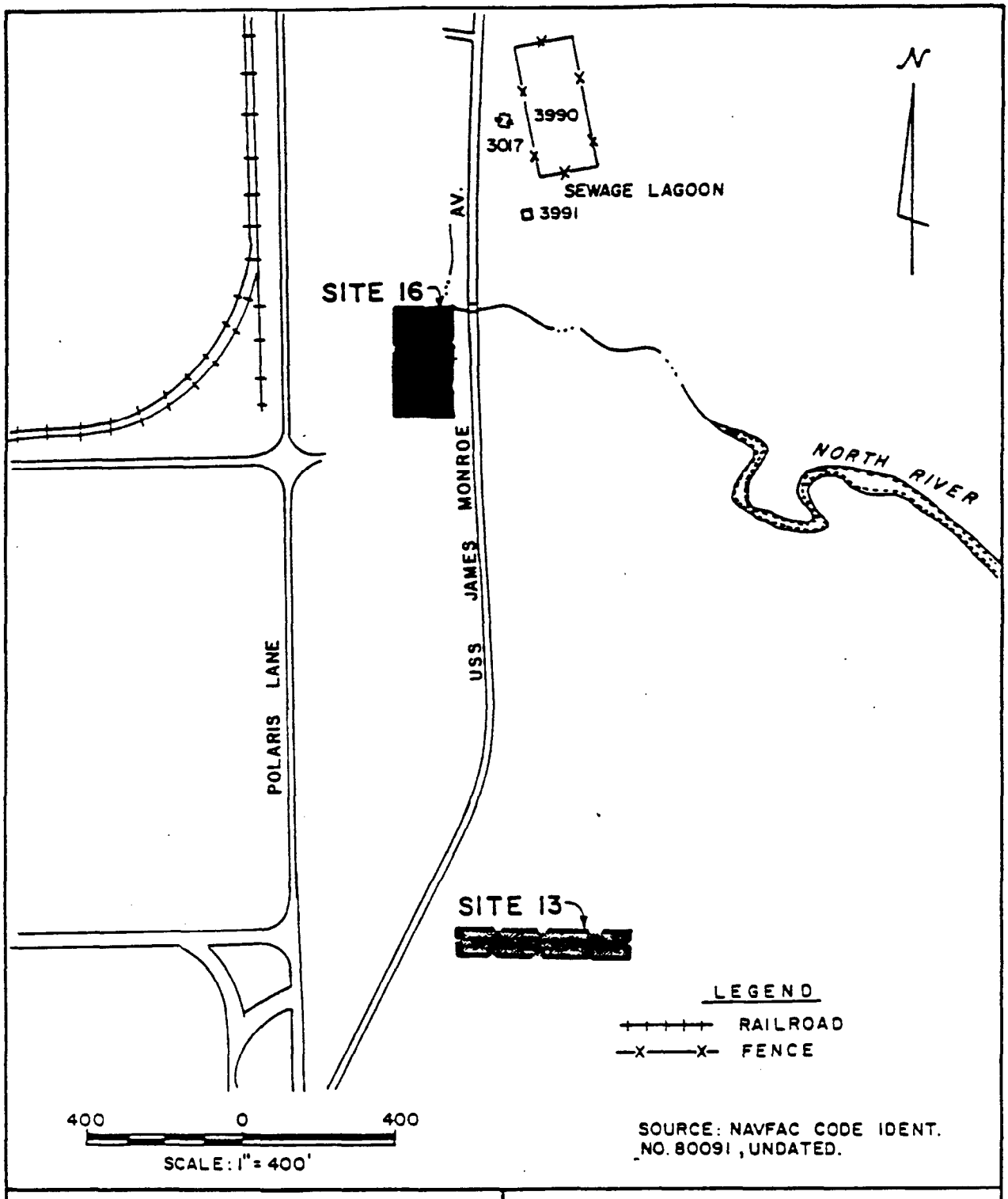


FIGURE 8-9
SITE 13- OLD DPDO YARD.
SITE 16 - ARMY RESERVE DISPOSAL AREA NEAR OLD SEWAGE LAGOON 3990

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

8.15 SITE 14, ARMY RESERVE DISPOSAL AREA, KAMEHAMEHA AVENUE. Site 14 is an area approximately 1500 square feet (60 feet x 25 feet) located west of Kamehameha Avenue (see Figure 8-10). Surface waste disposal was first observed at the site in 1978. The period of operation is estimated to be between 1958 and 1978. Presently, the area is overgrown with forest vegetation. During IAS on-site visit, the following labelled drums were found lying on the ground: 3, 55-gallon drums marked "lube oil" (each drum partially full); 1, 55-gallon drum marked "diesel" (partially full); 1 severely corroded 55-gallon drum with no visible marking (empty); and 1, 5-gallon can of white paint (full). Evidence of oil leakage from several of the drums was apparent on the area immediately surrounding the drums. The estimated spill quantity of the above materials is 100 to 200 gallons.

The site is located approximately 500 feet from a wetland along the North River. Contaminants from the site would reach the river via the surrounding wetlands.

8.16 SITE 15, ARMY RESERVE DISPOSAL AREA NEAR WATER TREATMENT PLANT, STIMSON DRIVE. This site is located north of Stimson Drive near the water treatment plant (see Figure 8-5). The surface waste disposal area is about 10 feet by 5 feet and was reportedly used from 1970 to 1971 by the Army Reserve. During the IAS on-site visit, two 55-gallon drums were observed at the site. One was almost completely corroded but no evidence of leakage was apparent. The other drum was marked "Methanol Tech Grade A" (Phipps Product, Boston, Mass., Stock No. 6810-221-8355, expiration date 9/71) and was partially full. The area is presently wooded. The estimated spill quantity of methanol is 50 to 100 gallons.

Surface water drainage is towards the North River and surrounding wetlands.

8.17 SITE 16, ARMY RESERVE DISPOSAL AREA NEAR OLD SEWAGE LAGOON 3990. Site 16 located west of Woodrow Wilson Avenue and south of old sewage lagoon 3990 (see Figure 8-9), was used every 6 months by the Army Reserve from 1958 to 1964. The site covered an area of one acre and was excavated to a depth of three to five feet. Wastes disposed of included food, wood, trash, scrap metal, tree limbs and empty paint and solvent cans (about one or two 1 gallon cans per month). The waste quantity is estimated at approximately 4000 cubic yards. Reportedly, burning of wastes took place at this location. It is unknown how often burning took place or if any fuel was used to ignite the wastes. The site was covered with soil upon closure by the Army.

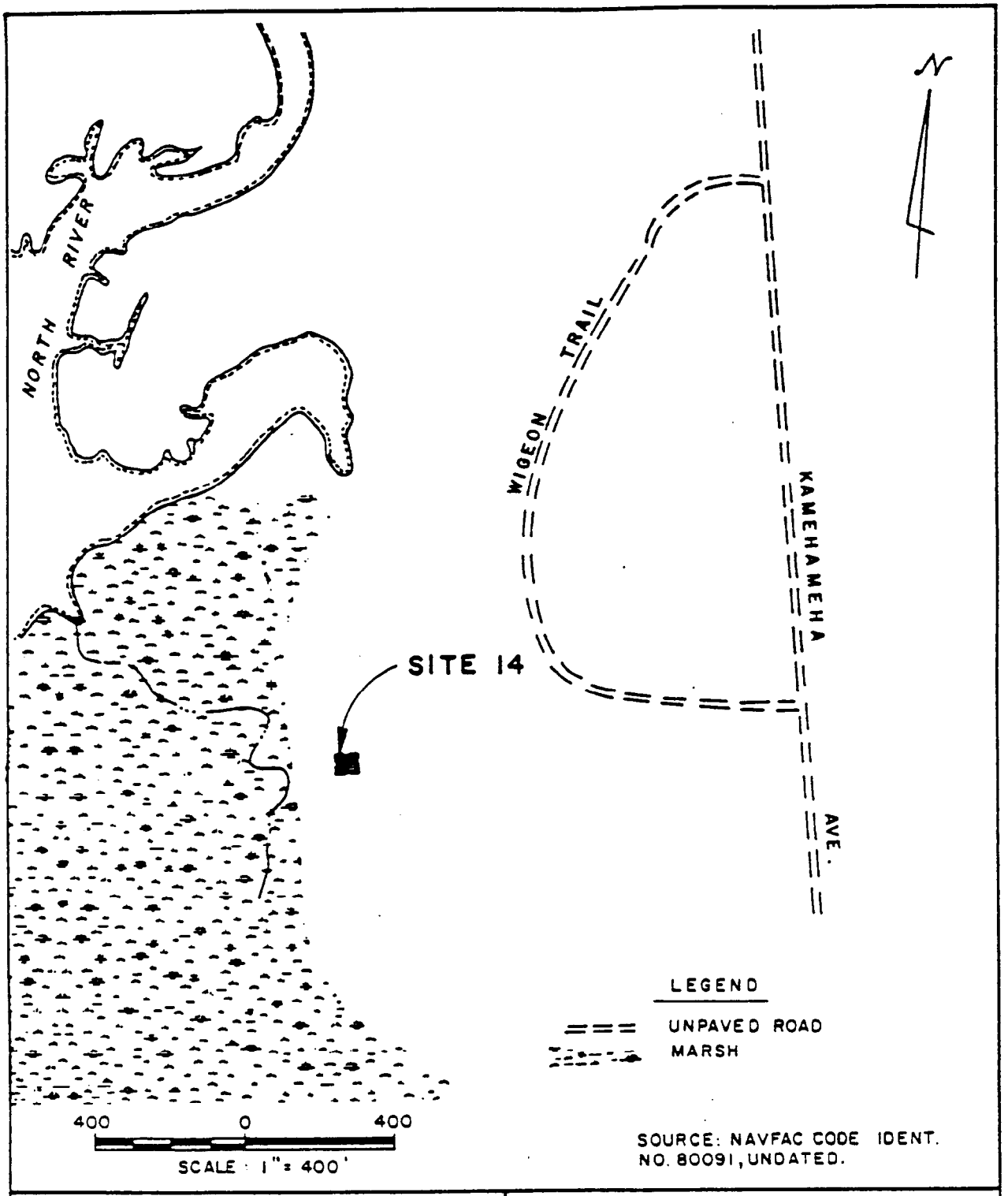


FIGURE 8-10
SITE 14 - ARMY RESERVE DISPOSAL AREA, KAMEHAMEHA AVE.

INITIAL ASSESSMENT STUDY
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

REFERENCES

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APPENDIX A

AGENCIES CONTACTED DURING THE IAS

1. U.S. Army Sunny Point Military Ocean Terminal, Wilmington, North Carolina

2. Army Military Traffic Management Command, Staff Historian, Washington, D.C.

3. NEESA Information Management Department

4. Naval Facilities Engineering Command Historian, Naval Construction Battalion Center, Port Hueneme, California

5. Southern Division, Naval Facilities Engineering Command, Charleston, South Carolina including:

   (a) Control of Hazardous and Industrial Pollutants Section
   (b) Water Resources Management Section
   (c) Applied Biology Section
   (d) Natural Resources Section

6. Naval Facilities Engineering Command, Headquarters, Alexandria, Virginia

7. Naval Historical Center, Washington Navy Yard, Washington, D.C.

8. Naval Sea Systems Command, Alexandria, Virginia

9. Commandant of the Marine Corps, Navy Department, Washington, D.C.

10. Marine Corps History Office, Washington Navy yard, Washington, D.C.

11. Ordnance Environmental Support Office, Indian Head, Maryland

12. DOD Explosives Safety Board, Alexandria, Virginia

13. National Archives, Washington, D.C. and Suitland, Maryland

    (a) Cartographic Branch
    (b) Navy and Old Army Branch

14. Washington National Records Center, Suitland, Maryland

15. Federal Archives and Record Center, East Point, Georgia

16. U.S. Geological Survey, Public Inquiries Office, Reston, Virginia

17. U.S. Geological Survey, Water Resources Division, Tallahasee, Florida

18. Florida Bureau of Geology, Tallahassee, Florida

APPENDIX B

Endangered, Threatened, and Unusual Flora Occurring or Possibly Occurring in the Vicinity of Kings Bay

Scientific Name	Common Name	State*	Counties in Which Recorded	Distance to Nearest Known Population from Kings Bay	Expected in Camden and Adjoining Count (Duncan, 1977
Asplenium heteroresiliens	Blackstem Spleenwort	Threatened	Camden	Directly across Spur 40 from main entrance to NSSB	X
Baptisa arachnifera†	Hairy Wild-Indigo	Endangered	Brantley	35	
Bumelia thornei	Buckthorn	Endangered			
Cacalia diversifolia	Indian Plaintain	Threatened			
Croomia pauciflora	Croomia	Threatened			
Elliottia racemosa	Elliottia	Endangered			
Fimbristylis perpusilla	Fimbristylis	Endangered			
Fothergilla gardenii	Witch-Alder	Threatened			
Hartwrightia floridana	Hartwrightia	Threatened			X
Hymenocallis coronarea	Spider Lily	Endangered			X
Litsea aestivalis	Pond Spice	Threatened			X
Lythrum curtissii	Loose Strife	Endangered			X
Myriophyllum laxum	Water-Milfoil	Threatened			X
Nestronia umbellula	Nestronia	Threatened			X
Oxypolis canbyi	Oxypolis	Threatened			X
Physostegia veroniciformis	Physostegia	Threatened			X
Rhododendron pruniforlium	Plumleaf Azalea	Threatened			
Salix floridana	Florida Willow	Endangered			X
Sarracenia minor	Hooded Pitcher-Plant	Threatened	Camden Glynn Brantley Charlton	Occurs on NSSB	X

APPENDIX B (Continued)

Endangered, Threatened, and Unusual Flora Occurring or Possibly Occurring in the Vicinity of Kings Bay (Continued, page 2 of 2)

Scientific Name	Common Name	State*	Counties in Which Recorded	Distance to Nearest Known Population from Kings Bay	Expected in Camden and Adjoining Counties (Duncan, 1977)
Sarracenia psittacina	Parrot Pitcher-Plant	Threatened	Charlton	--	X
Sarracenia purpurea	Flytrap Pitcher-Plant	Endangered			
Sarracenia rubra	Sweet Pitcher-Plant	Endangered			X
Schizaechyrium niveum	Schizaechyrium	Threatened			X
Thalictrum debile	Meadow Rue	Threatened			

* Georgia Department of Natural Resources, Georgia's Protected Plants, 1977.

† *Baptisa arachnifera* is a federally recognized endangered species, protected by law as listed by U.S. Fish and Wildlife Service, 1978-1979, List of Endangered and Threatened Wildlife and Plants (*In:* Environmental Reporter, Federal Register, Vol. 1, 101:1519-1522).

Source: Environmental Science and Engineering, Inc., 1979.

APPENDIX C

Endangered or Threatened Terrestrial Fauna Occurring or Possibly Occurring in the Vicinity of Kings Bay

KEY: T= Threatened; E = Endangered

Species		Federal* Status	State† Status	Likelihood of Occurre
	MAMMALS			
Felis concolor coryi	Florida Panther	E	E	Low
Geomys colonus	Colonial Pocket Gopher	-	E	Present
Trichechus manatus	Florida Manatee	E	E	Low
Balaenoptera musculus	Bluewhale	E	-	Low
Balaenoptera physalus	Finback Whale	E	-	Low
Megaptera novaeangliae	Humpback Whale	E	E	Low
Balaenoptera borealis	Sei Whale	E	-	Low
Physeter catodon	Sperm Whale	E	-	Low
	BIRDS			
Haliaeetus leucocephalus leucocephalus	Southern Bald Eagle	E	E	Present
Falco peregrinus tundrius	Arctic Peregrine Falcon	E	E	Present
Pelecanus occidentalis carolinensis	Eastern Brown Pelican	E	E	Present
Campephilis principalis	Ivory-billed Woodpecker	E	E	Very Low
Dendrocopus borealis	Red-cockaded Woodpecker	E	E	Low
Vermivora bachmanii	Bachman's Warbler	E	E	Very Low
Dendroica kirtlandii	Kirtland's Warbler	E	E	Very Low
	AMPHIBIANS AND REPTILES			
Alligator mississippiensis	American Alligator	T	E	Present
Lepidochelys olivacea kempii	Atlantic Ridley Turtle	E	E	Moderate
Eretmochelys imbricata	Hawksbill Turtle	E	E	Moderate

APPENDIX C (Continued)

Endangered or Threatened Terrestrial Fauna Occurring or Possibly Occurring in the Vicinity of Kings Bay (Continued, page 2 of 2)

KEY: T= Threatened; E = Endangered

Species		Federal* Status	State† Status	Likelihood of Occurrence
	AMPHIBIANS AND REPTILES (continued)			
Dermochelys coriacea	Leatherback Turtle	E	E	Moderate
Caretta caretta	Loggerhead Turtle	T	-	Present
Chelonia mydas	Green Turtle	T	-	Moderate
Drymarchon corais couperi	Eastern Indigo Snake	T	T	Present
	FISH			
Acipenser brevirostrum	Shortnose Sturgeon	E	E	Low

* U.S. Fish and Wildlife Service, 1979.
† Georgia Department of Natural Resources (1976), Allen (1977).

Source: Environmental Science and Engineering, Inc., 1979.

APPENDIX D

[illegible]

September 22, 1982

POLYCHLORINATED BIPHENYLS ANALYSIS

For

KINGS BAY SUPPORT PROJECT

SITE 1, PCB TRANSFORMER STORAGE AREA NO. 1

One (1) soil sample as received was analyzed using the method specified in the May 31, 1979 Federal Register. (Part VI, Volume 44, Number 106, pages 315 - 38.)

The results are as follows:

Sample I.D.	Date Sampled	Polychlorinated Biphenyls Concentration (mg/l) ppm	Polychlorinated Biphenyls Type
Site #2 - #1	9/14/82	9.2 ppm	1260

TECHNICAL SERVICES, INC.
ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
105 STOCKTON STREET — P.O. BOX 52329
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 41658 August 20, 1981

Sample of Sludge

Date Received July 14, 1981

For Commanding Officer, Southern Division
Naval Facilities Engineering Command
Marks: P. O. Box 10068, Charleston, S.C. 29411

CERTIFICATE OF ANALYSIS OR TESTS

Naval Submarine Support Base, Kings Bay, Ga.
Taken at Firefighting Training Pit - 6 July 1981
Contract No. N62467-80-C-0464

E.P. EXTRACTION PROCEDURE TOXICITY TESTS

Arsenic, mg/l	0.017
Barium, mg/l	0.2
Cadmium, mg/l	<0.002
Chromium, mg/l	0.014
Lead, mg/l	0.057
Mercury, mg/l	<0.0002
Selenium, mg/l	<0.01
Silver, mg/l	0.005
Endrin, mg/l	<0.0005
Lindane, mg/l	<0.0005
Methoxychlor, mg/l	<0.001
Toxaphene, mg/l	<0.005
2,4-D, mg/l	<0.05
2,4-5 TP Silvex, mg/l	<0.001

CC: Dept. of the Navy
Naval Support Base
Kings Bay, Ga 31547
ATTN: Code N5211

Respectfully submitted,

TECHNICAL SERVICES, INC.

BY Harvey C. Gray, Jr.

APPENDIX F

[illegible]

September 22, 1982

POLYCHLORINATED BIPHENYLS ANALYSIS

For

KINGS BAY SUPPORT PROJECT

SITE 3, PCB TRANSFORMER STORAGE AREA NO. 2

Three (3) soil samples as received were analyzed using the method specifie in the May 31, 1979 Federal Register. (Part VI, Volume 44, Number 106, pages 315-38.)

The results are as follows:

Sample I.D.	Date Sampled	Polychlorinated Biphenyls Concentration (mg/l) ppm	Polychlorinated Biphenyls Type
Pole #1 - 141	9/14/82	47.5 ppm	1260
Pole #1 - 150	9/14/82	31.2 ppm	1260
Pole #1 - 166	9/14/82	24.0 ppm	1260

SECTION L
ENVIRONMENTAL PERFORMANCE STANDARDS

The information submitted herein is in accordance with 40 CFR 264.601 and 40 CFR 264.602.

L.1 GROUNDWATER AND SUBSURFACE MIGRATION OF WASTE CONSTITUENTS.

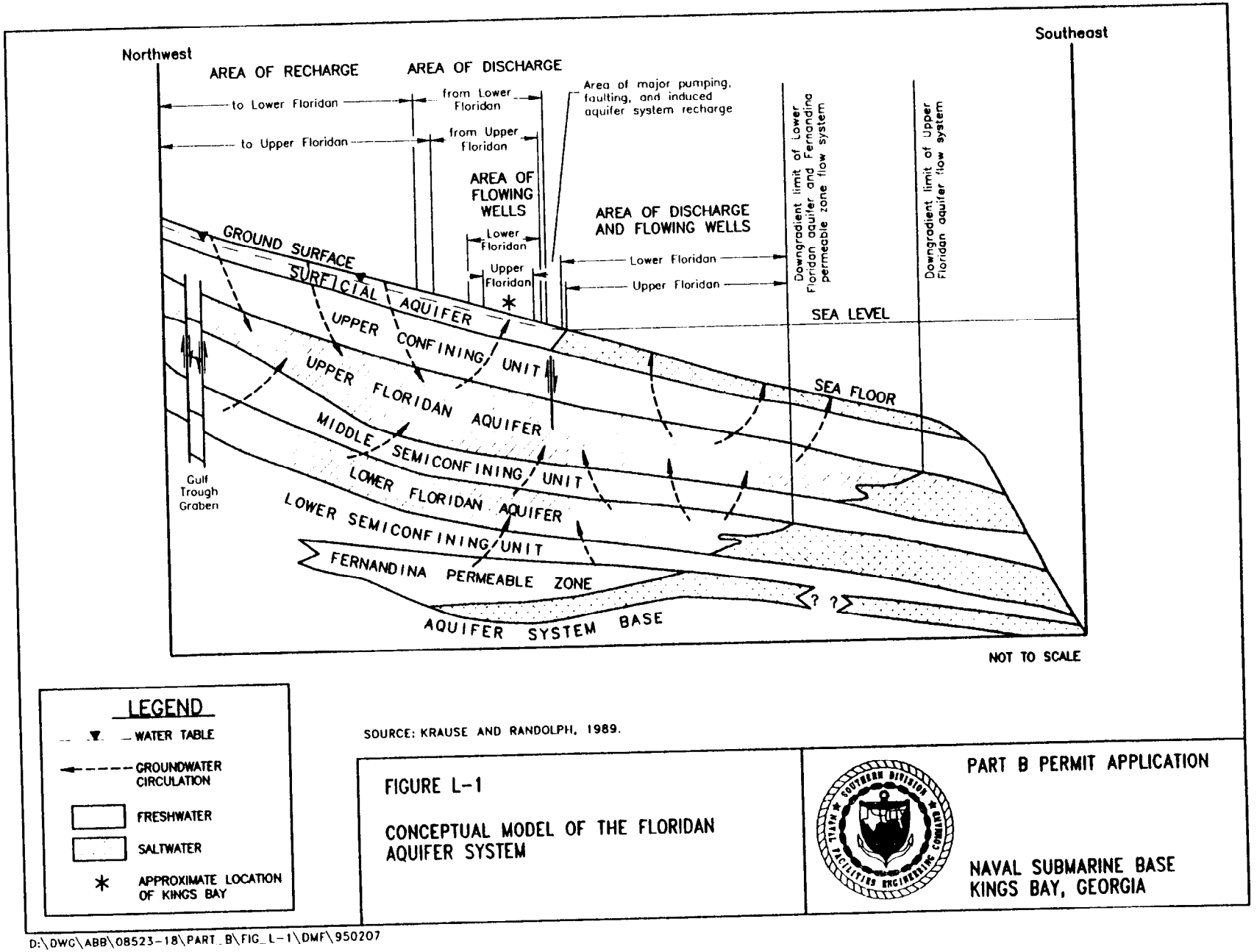
L.1.1 Waste Analysis Plan The volume and physical and chemical characteristics of the waste pyrotechnics and explosives that may be disposed at the OB/OD facility have been described in Section C.

L.1.2 Hydrologic and Geologic Characteristics SUBASE Kings Bay is located on an arm of Cumberland Sound called Kings Bay. It is between the St. Marys River and Crooked River and is connected to the sea by a 12-mile access channel that passes through the St. Marys inlet. Potential migration pathways for pollutants from past waste disposal and spill sites are through surface runoff to unnamed streams or ditches that drain to Kings Bay and its tributaries. An additional potential migration route is through infiltration from surface water into groundwater. Surface runoff at Kings Bay is slow because of the highly permeable soil, flat slopes, and the amount and intensity of rainfall. The average elevation is 30 feet above msl. About one-half of SUBASE Kings Bay, the eastern and southeastern parts, lie within the 100-year floodplain.

The mean annual precipitation at SUBASE Kings Bay is approximately 54 inches. The presence of permeable sand in the area is conducive to rainfall percolation directly into the surficial aquifer, which is generally found within 10 feet of the ground surface. The base of the surficial aquifer ranges from 40 to 90 feet bls and is isolated from the underlying Floridan aquifer table system by a regional confining layer, the Hawthorn Formation. Water in the water table aquifer generally migrates along the confining layer and discharges into streams and springs including the North River, Crooked River, and Marianna Creek. These streams eventually flow east or southeast to Kings Bay and Cumberland Sound.

The upper confining unit, beginning at approximately 40 to 90 feet bls, ranges from 380 to 530 feet thick. This confining unit separates the water table aquifer from the Floridan aquifer system and includes, not only extremely low permeability clay, but also moderately permeable sand beds. The confining unit is a regional formation, the Hawthorn Formation of late and middle Miocene Age, present from north Florida to South Carolina. Over most of the region, the unit consists of middle Miocene Age, interbedded sand, silt, clay, and low permeability sandy clay beds. Groundwater yields in the confining unit are highly variable, and it is not considered a principal source of water (Krause and Randolph, 1989).

The Floridan aquifer system is composed of upper and lower permeable zones, termed the Upper Floridan and the Lower Floridan aquifers, respectively. This unit is used for drinking water, as it is of potable quality and provides sufficient yield. In southeast Georgia and northeast Florida, the aquifer system contains cavities, cavernous zones, and solution channels. Primarily, these zones are found in the Upper Floridan, but the Lower Floridan contains some of the largest in its Fernandina zone. A conceptual model of the Floridan aquifer system is depicted on Figure L-1.



SOURCE: KRAUSE AND RANDOLPH, 1989.

FIGURE L-1

CONCEPTUAL MODEL OF THE FLORIDAN AQUIFER SYSTEM

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

D:\DWG\ABB\08523-18\PART_B\FIG_L-1\DMF\950207

Information regarding locations of water supply wells in the vicinity of SUBASE Kings Bay was obtained from the USGS (1989). Table L-1 includes water level data for nine water supply wells tapping the Upper Floridan aquifer. Comparison of water level elevation to the elevation of land surface at the well indicates that the potentiometric head in the Upper Floridan is as much as 28 feet above land surface. Except for two water level elevations measured in 1985 and 1990 in the well identified as grid no. 33E007 in Table L-1, all water level elevations are above land surface at the well. These data indicate that the potentiometric surface of the Floridan aquifer system is above the water table of the surficial aquifer. Therefore, in the vicinity of SUBASE Kings Bay, the surficial aquifer receives recharge from the Floridan aquifer system. The presence of an upward potential decreases the likelihood that contaminants would migrate downward by advective transport through the confining layer.

In the vicinity of SUBASE Kings Bay, groundwater in the surficial aquifer is used primarily for irrigation. Irrigation water is drawn from the surficial aquifer using shallow wells. Public water supply in the vicinity of SUBASE Kings Bay and surrounding towns and urban areas comes from the Floridan aquifer system.

L.1.3 **Existing Quality of Groundwater** At SUBASE Kings Bay, groundwater quality has been monitored periodically. The studies conducted (Environmental Science and Engineering, Inc., 1975) indicate that the water from the water table aquifer in the Kings Bay area is typically low in minerals and pH. Occasionally, high concentrations of chlorides near saltwater bodies and high concentrations of iron at some places were observed. Further studies concluded that the water from the water table aquifer is acidic in composition (pH range 4.0 to 6.6) with high levels of organic carbon. Occasionally, chlorides were high near saltwater bodies. Mercury exceeded the Federal Primary Drinking Water Limits.

Water in the secondary artesian aquifer has fewer minerals than the underlying primary artesian aquifer, but more than the upper water table aquifer.

Public water supplies for SUBASE and adjacent communities are drawn from the principal artesian aquifer, and the water is of such quality that only chlorination and aeration are required. Aeration removes high concentrations of iron and hydrogen. The treated waters are typically not softened, even though hardness levels exceed 300 milligrams per liter (mg/ℓ) of calcium carbonate. Dissolved solid concentrations sometimes exceed the U.S. Public Health Service limit of 500 mg/ℓ. The water in the principal artesian aquifer is categorized as very hard and alkaline with moderate amounts of dissolved solids.

L.1.4 **Volume and Direction of Groundwater Flow** A potentiometric map of the Upper Floridan aquifer is shown on Figure L-2. Groundwater flow directions are indicated on the potentiometric map. The potential for future groundwater development of the Floridan aquifer system in southeastern Georgia ranges from 0 to 10 million gallons per day. At SUBASE Kings Bay, production wells tapping the Floridan aquifer system are estimated to yield more than 1,000 gallons per minute per well.

In the area of the OB/OD area, groundwater flow in the surficial aquifer can be influenced by the land application system associated with the SUBASE wastewater treatment plant and by dredge disposal operations. The land application area is located on the eastern side of the OB/OD area and a dredge disposal area is located on the western side. Natural groundwater flow direction in the OB/OD area is generally to the east.

Table L-1
Water Elevations of Area Wells

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Grid Number	Latitude	Longitude	Land Surface Elevation	Date Measured	Depth of Water (feet)	Water Elevation	Elevation Effective Length
33E002	30°46'27"	81°37'12"	25.39	5-14-85	-7.00	32.39	-54.61 to -448.61
				5-14-85	-6.00	31.39	
				10-20-86	-7.60	32.99	
				5-17-89	-6.50	32.89	
				5-15-90	-5.83	31.22	
33E004	30°49'10"	81°32'38"	19.39	5-15-85	-18.00	37.39	-766.61 to 496.61
33E007	30°45'10"	81°34'38"	21.39	5-15-85	-2.70	24.09	-503.61 to 748.61
				5-17-85	0.85	20.54	
				5-16-90	1.22	20.17	
33E009	30°50'45"	81°33'46"	15.39	5-15-85	-25.00	40.39	-234.61 to 549.61
				10-20-86	-22.40	37.79	
				5-20-88	-26.81	42.20	
				5-17-89	-25.43	40.82	
				5-16-90	-25.68	41.07	
33E023	30°50'31"	81°34'47"	19.39	5-15-85	-23.00	42.39	-40.61 to 630.61
				10-20-86	-20.00	39.39	
				5-17-89	-21.01	40.40	
33E027	30°47'56"	81°13'11"	13.39	5-25-88	-18.00	31.39	-71.61 to 976.61
				5-17-89	-17.73	31.12	
				5-16-90	-17.86	31.25	
33E046	30°49'16"	81°36'07"	13.39	5-17-89	-17.70	41.09	-231.61 to 636.61
				5-16-90	-28.17	41.56	
33E047	30°45'15"	81°36'57"	16.51	6-10-89	-3.46	19.97	-70.49 to 94.49
33E048	30°45'15"	81°36'57"	16.51	9-28-90	1.60	18.11	-317.49 to 476.49

Notes: All elevations in feet relative to mean low water (feet mean low water).
Grid number is based on U.S. Geological Survey designations for a well location.

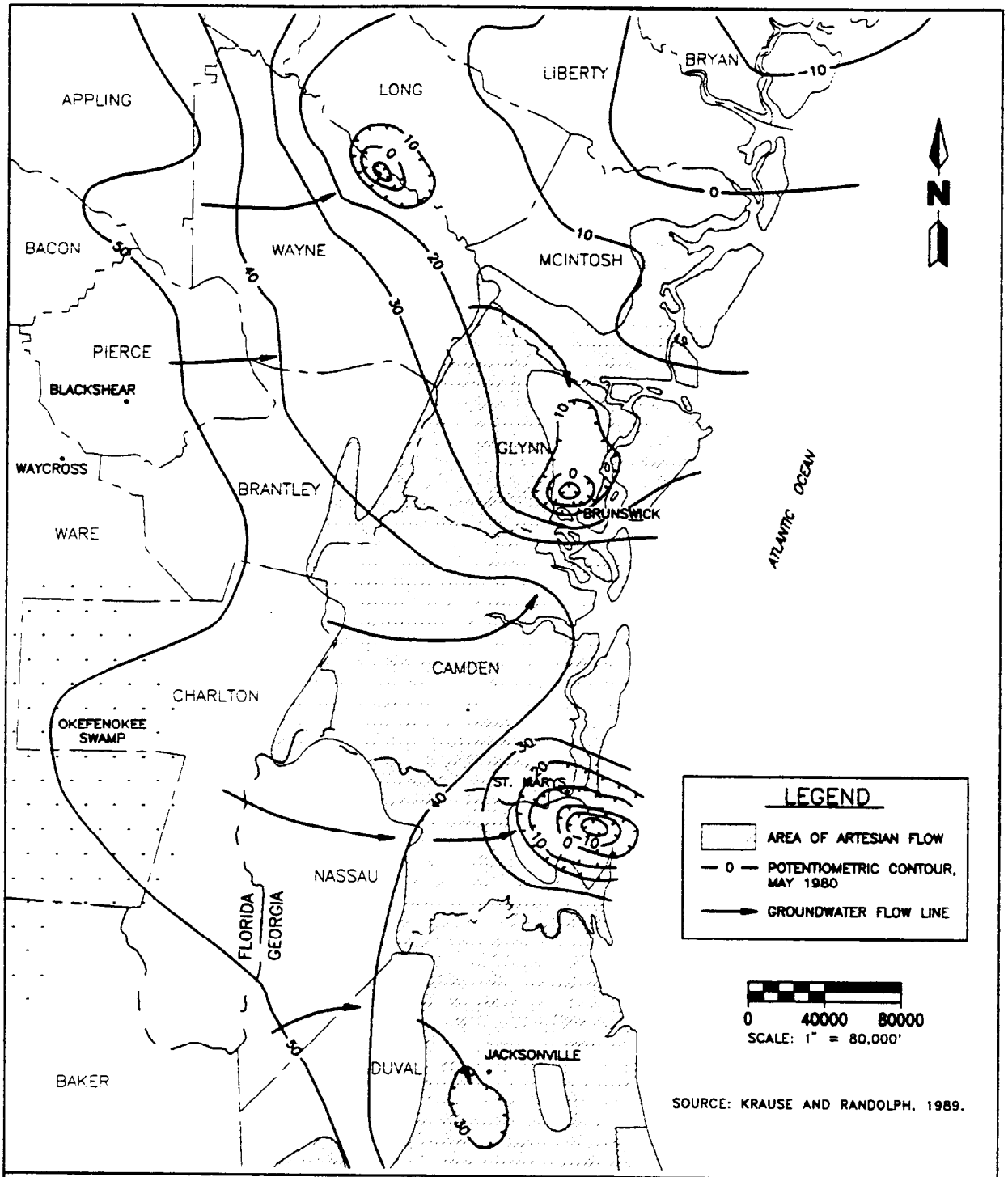


FIGURE L-2

REGIONAL POTENTIOMETRIC SURFACE MAP FOR THE UPPER FLORIDAN AQUIFER

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE KINGS BAY, GEORGIA

D:\DWG\ABB\08523-18\PART_B\FIG_L-2\DMF\950207
KB Site 11 (PART_B.per)#038
mlv.04.95

L.1.5 Withdrawal Rates of Groundwater Flow The major production wells at SUBASE Kings Bay tap the Upper Floridan aquifer. Wells tapping this aquifer are under pressure, and groundwater within a tightly cased well will rise to an altitude of between 20 and 30 feet above sea level. Most wells tapping this aquifer yield in excess of 1,000 gallons per minute. Well depths vary from 600 to 894 feet, with four of the five production wells greater than 800 feet in depth.

L.1.6 Patterns of Land Use The existing land use in the region ranges from highly urbanized to rural development. The north, south, and west areas in the vicinity of the Base are mostly residential with some commercial development on the west side. Camden County lies midway between Jacksonville to the south, and the smaller urban area of Brunswick to the north. The economy of the area has been directly dependent on manufacturing since the mid-1940's. The Gilman Paper Company is located in the city of St. Marys less the 4 miles southwest of the activity. This company is the largest manufacturing company in Camden County, accounting for about 70 percent of the total manufacturing labor force since 1970. On the east side of the base is Kings Bay. The region is predominantly rural with only about 8 percent of the land area developed in the region. The majority of the undeveloped land is either marsh or swamp and does not lend itself to development or agricultural uses.

L.1.7 Migration of Contaminants to Subsurface Structures and the Root Zone of Food Chain Crops There are no subsurface structures or food chain crops within a 1,000-foot radius of the OB/OD facility. Subsurface structures and vegetation are not considered to be potential migration pathways.

L.1.8 Health Risks Given the volume, concentrations, and physical and chemical characteristics of materials treated by the OB/OD unit and considering land use in the vicinity of the OB/OD area, the potential for health risks caused by exposure to waste constituents released to groundwater is considered to be low.

L.1.9 Damage to Domestic Animals, Wildlife, Crops, Vegetation, and Physical Structures Caused by Exposure to Waste Constituents Damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents released to the groundwater is not expected. The only physical structures in the vicinity of the OB/OD area are those associated with OB/OD operations, such as the crew shelter. Land use patterns in the area are not typified by the presence of domestic animals or crops and vegetation is limited. Several endangered species have been listed as possibly occurring in the general area of SUBASE Kings Bay by the U.S. Fish and Wildlife Service and the Georgia DNR. Table L-2 lists endangered, threatened, and unusual flora and fauna possibly occurring in the vicinity of the SUBASE.

L.2 SURFACE WATER, WETLANDS, AND SOIL SURFACE.

L.2.1 Waste Analysis Plan The volume and physical and chemical characteristics of the waste explosives and ordnances have been described in Section C.

L.2.2 Containment Structures Open detonation exercises are performed on the ground without the use of a containment device. However, open burning exercises are conducted in a containment device capable of withstanding extreme temperature and containing initiating fluids and generated ash.

Table L-2
Endangered, Threatened, and Unusual Flora and Fauna Occurring or Possibly Occurring in the Vicinity of Kings Bay

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Common Name	Scientific Name	GA DNR	U.S. Fish and Wildlife Resources
Flora			
Buckthorn	*Bumelia thornei*	E	
Indian-plantain	*Cacalia diversifolia*	Th	
Spider-lily	*Hymenocallis coronaria*	E	
Loosestrife	*Lythrum curtissii*	E	
Cow-bane	*Oxypolis canbyi*	Th	
Panic grass	*Panicum hirstii*	E	
Trumpet leaf	*Sarracenia flava*	Th	
White trumpet	*Sarracenia leucophylla*	Th	
Hooded pitcher plant	*Sarracenia minor*	Th	
Parrot pitcher plant	*Sarracenia psittacina*	Th	
Amphibians			
Georgia blind cave salamander	*Haiedotriton wallacei*	U	
Reptiles			
American alligator	*Alligator mississippiensis*		E
Eastern indigo snake	*Drymarchon corais*	Th	Th
Birds			
Ivory-billed woodpecker	*Campephilus principalis*	E	E
American perigrine falcon	*Falco perigrinus anatum*	E	Th
Arctic perigrine falcon	*Falco peregrinus tundrius*	E	Th
Bald eagle	*Haliaesetus leucocephalus*	E	E
Wood stork	*Mycteria americana*		E
Red-cockaded woodpecker	*Picoides borealis*	E	E
Bachman's warbler	*Vermivora bachmanni*	E	E

Source: ABB Environmental Services, Inc., 1991, Potential Source of Contamination (PSC) Site Investigation/Solid Waste Management Unit (SI/SWMU) RCRA FAcility Investigation (RFI) Workplan, October.

Notes: GA DNR = Georgia Department of Natural Resources.
E = endangered.
Th = threatened.
U = unusual.

L.2.3 Hydrologic Characteristics of the Unit Including Topography The hydrologic characteristics of the SUBASE Kings Bay area have been discussed in Section L.2. A discussion of the topography associated with the SUBASE area is provided below.

The area around SUBASE Kings Bay is generally flat and marshy and traversed by slow, meandering streams. The highest area is about 60 feet above msl, located 10 miles southwest of the SUBASE. The average elevation at SUBASE Kings Bay is 30 feet above msl.

The elevations on SUBASE Kings Bay range from 0 foot msl along the Bay and in streams to slightly above 30 feet msl in the extreme western sections along the State Road 40 spur. Generally, elevations decrease from west to east along the activity with an average of about 15 feet msl. The area is virtually flat; however, steep slopes can be observed along deeper drainways. These drainways are located north of the activity.

L.2.4 Patterns of Precipitation The SUBASE Kings Bay, Georgia, experiences sub-tropical climate, with hot wet summers and cool, dry winters. The mean annual temperature is approximately 68 °F. Most of the precipitation occurs in the form of rain from summertime showers or thundershowers. Snowfall is not very common but has been recorded. The mean annual precipitation is estimated to be 54 inches. Relative humidity varies widely throughout the year from an annual average of 87 percent in the morning to 55 percent during the afternoon. The relative humidity is generally highest during hot summer months (June through September), and lowest during the spring (March through May). Dense fog occurs quite frequently at Kings Bay.

L.2.5 Quantity, Quality, and Direction of Groundwater Flow These items have been addressed in Section L.2.

L.2.6 Proximity of the Unit to Surface Water SUBASE Kings Bay is near a variety of large and small rivers draining into the Atlantic Ocean. Surface water includes the St. Marys River, the Satilla River, and the Crooked River. Several swamps, marshes, and small streams can also be found in and around the facility. The major drainage outlet on the activity is the North River, draining 49 percent of the area to the south. To the north, the Crooked River drains 5 percent and Marianna Creek drains 17 percent of the activity. The remaining 29 percent of the activity generally drains eastward into Cumberland Sound and Kings Bay.

The Satilla River is located north of the activity and extends westward from Cumberland sound for approximately 100 miles and drains 3,400 square miles, with an average flow of 2,700 cubic feet per second.

The St. Marys River demarcates the boundary between Florida and Georgia for approximately 130 miles as it flows from the Okefenokee Swamp to its mouth at the southern end of Cumberland Sound. The river drains an area of 1,500 square miles with an estimated annual mean flow of approximately 1,500 cubic feet per second at its mouth.

The estimated drainage areas for the Crooked River and the North River are 68 and 16 square miles, respectively. The North River, a tributary of the St. Marys River, drains approximately one-half of SUBASE Kings Bay.

Most of the surface runoff at SUBASE Kings Bay is stored in the upland swamps and marshes and is diverted off base through long shallow ditches and meandering, low velocity natural intermittent streams. These ditches and streams discharge surface runoff into Cumberland Sound from the St. Marys and Crooked Rivers.

L.2.7 Uses of Nearby Surface Water and Applicable Standards Kings Bay and the Cumberland Sound have been used by the commercial fishing industry for a number of years. In addition, blue crabs and oysters have been harvested from these waters.

Applicable Federal standards may include those established under the Clean Water Act for non-point discharges and/or the primary drinking water standards established under the Safe Drinking Water Act for the protection of groundwater drinking supplies. The State of Georgia has tailored its general criteria and standards to conform with Federal drinking water and Clean Water Act requirements.

The environmental and economic utilization of surface water provides the basis for classification in the State of Georgia. The specific classifications are included in Chapter 3, Rule 6, Water Quality Control of the Rules and Regulations of the State of Georgia, Title 391 (Bureau of National Affairs, 1991). Surface water not specified in the rule is classified as best used for fishing. Rule 6 specifically classifies littoral waters of the North River on the oceanside of Cumberland Island as best suited for recreational use. No other classifications were specifically listed for surface water bodies in the area of SUBASE Kings Bay.

L.2.8 Existing Quality of Surface Water and Soil This subsection describes surface water quality based on information presented in the IAS (C.C. Johnson, 1985). The natural quality of the St. Marys and Satilla River watersheds occasionally violates Georgia Water Quality Standards, most consistently for pH, and dissolved oxygen levels are below the accepted standard of 4.0 mg/ℓ. Conductivity, suspended solids concentration, and turbidity are low, whereas the color is extremely high. Ammonia and nitrate concentrations are low. Fecal coliform bacteria concentrations are well below the Georgia and Florida State water quality standards, except in winter. Elevated levels of lead and mercury were noticed. Also seen were elevated levels of oil and grease, mainly due to urban runoff.

Water quality in the North River, Marianna Creek, and Mill Creek watersheds were characterized as generally highly colored, clear, with dissolved oxygen concentrations ranging from 9.2 to 13.2 mg/ℓ. Conductivities were higher than in the vicinity freshwater, probably due to salt spray and tidal influence. Some of the Marianna Creek sampling stations were located within the estuarine complex as shown by conductances ranging from 247 to 22,200 micromhos per centimeter. Heavy metal concentrations were low with the exception of mercury. Mercury-based fungicide use was cited as a possible cause for the elevated mercury levels of 3.0 to 9.4 micrograms per liter.

Soil. Four soil map units discussed herein are associated with the SUBASE Kings Bay area, the Mandarin-Rutledge, Pottsburg-Cainhoy, Fripp-Duckston-Beaches, and the Bohicket-Capers soils (Soil Conservation Service, 1980). The Mandarin-Rutledge and Pottsburg-Cainhoy soils are associated with nearly level or gently sloping soils on ridges and flats and in depressions and drainageways. The Fripp-Duckston-Beaches soils are associated with level to rolling soils on dunes

and flats and in depressions, and nearly level beaches. The Bohicket-Capers soils are associated with level soils in tidal marshes (Figure L-3).

Mandarin-Rutledge. Mandarin soils are typically fine-grained sand, somewhat poorly drained, and found on ridges and flats. A very dark gray surface layer approximately 3 inches thick is underlain by a predominantly light gray layer extending to a depth of 19 inches. A weakly cemented organic hardpan extends below this to approximately 34 inches. The hardpan is dark brown in the lower section, very dark brown in the middle section, and black in the upper section. Light gray, white, and grayish-brown layers lie beneath the hardpan to a depth of 62 inches. A second weakly cemented black organic hardpan underlies these layers to a depth of 80 inches or more.

Rutledge soils are typically fine-grained sand, very poorly drained, and found in depressions and drainageways. A black surface layer approximately 15 inches thick is underlain by a layer that is light gray mottled with brownish gray in the upper section, light brownish gray in the middle section, and grayish brown mottled with very dark grayish brown in the lower section. This layer extends to a depth of 70 inches or more.

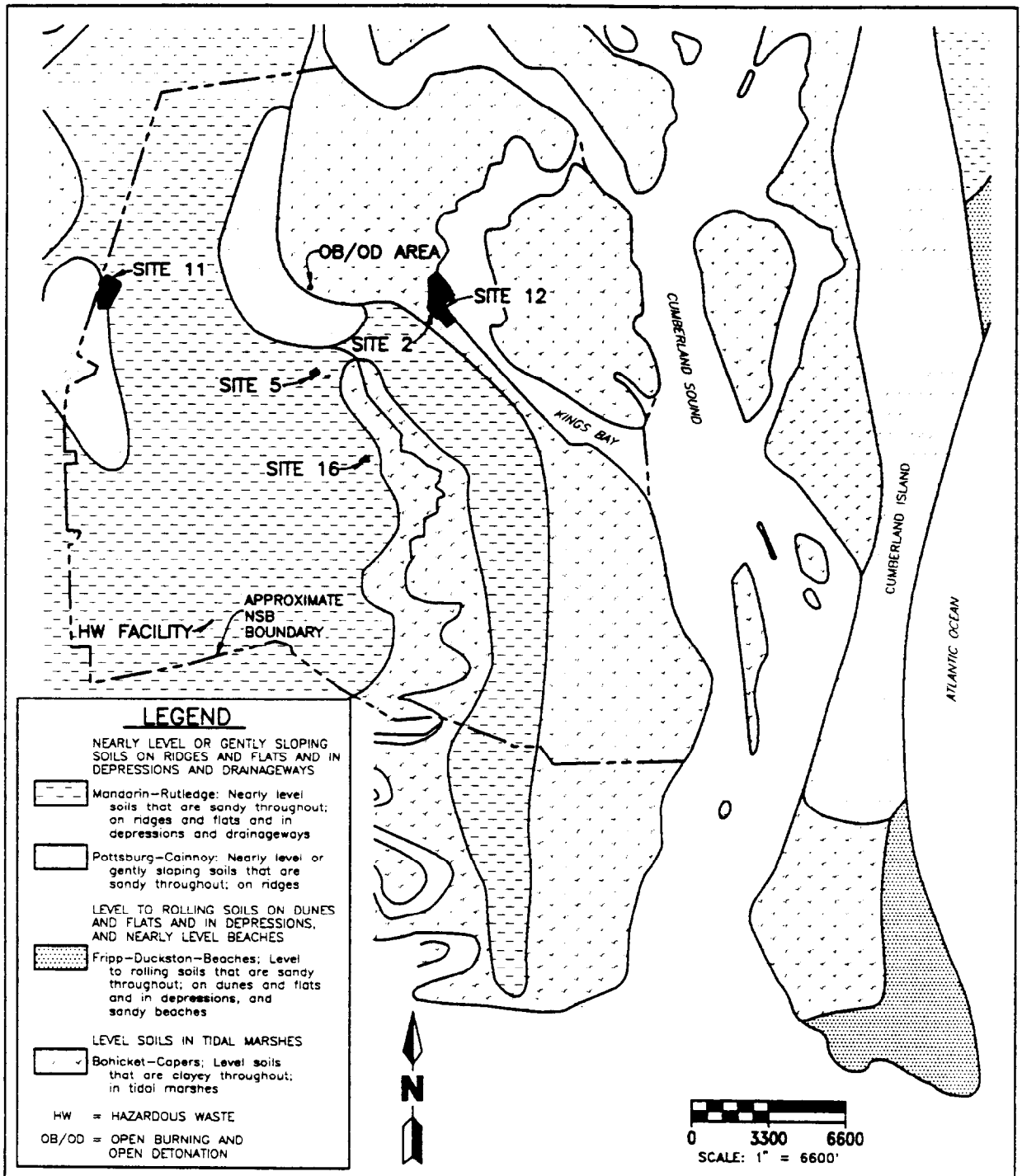
This unit has a slope of mainly less than 1 percent and lies in the east-central and extreme western part of Camden County and on the coastal islands. Because of the wetness of the soil, it has poor potential for most uses except woodlands.

Pottsburg-Cainhoy. Pottsburg soils are typically sand, somewhat poorly drained, and nearly level. A gray surface layer approximately 4 inches thick is underlain by a layer that is light gray with brownish yellow and brown mottles in the upper section, and white with brownish-yellow and dark grayish-brown mottles in the lower section. This layer extends to a depth of 63 inches and is underlain by a weakly cemented, dark brown, organic hardpan that extends to a depth of 80 inches or more.

Cainhoy soils are typically fine-grained sand, somewhat excessively drained, and nearly level and gently sloping. A dark gray surface layer approximately 5 inches thick is underlain by a layer that is brownish yellow and extends to a depth of 23 inches. A very pale brown layer extends to a depth of 50 inches. Below this layer are light gray and white layers to a depth of 101 inches. Next, a black and dark, reddish-brown layer extends to a depth of 120 inches.

This unit has a slope of 5 percent or less and lies on Cumberland Island and in the extreme western part of Camden County. Community development and recreation are the main uses for this unit. Due to the wetness of the soils on the lower landscapes, they have poor potential for urban uses. However, soils on the higher landscapes have good potential for most urban uses. The wetness of the lower landscape soils and the low available water capacity of the higher landscape soils are the main concerns for use and management of this map unit.

Fripp-Duckston-Beaches. Fripp soils are typically fine-grained sand, excessively drained, and found on undulating and rolling dunes. A grayish-brown surface layer approximately 6 inches thick is underlain by a layer that is pale brown in the upper section and white in the lower section. This layer extends to a depth of 80 inches.



SOURCE: MODIFIED FROM SOIL SURVEY OF CAMDEN AND GLYNN COUNTIES, GEORGIA, SOIL CONSERVATION SERVICE, 1980.

FIGURE L-3

REGIONAL SOIL MAP

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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KB Site 11 [PART_B.per]#038
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Duckston soils are typically sand, poorly drained, and found in shallow depressions and on flats. A surface layer approximately 17 inches thick is grayish brown in the upper section and light brownish gray in the lower section. Below this surface layer is a predominantly light gray layer, greenish gray in the lower section, extending to a depth of 80 inches.

Beaches soils are found adjacent to the ocean and are typically fine-grained sand, coarse-grained sand, and varying amounts of small shell fragments. These soils are covered twice daily by the tide.

This unit has a slope ranging from 0 to 20 percent and lies on Cumberland Island. Soils in some areas have been developed for dwellings and recreation. Soils are too sandy for many wildlife and recreational uses. Because of flooding and wetness, the potential for most other uses is poor.

Bohicket-Capers. Bohicket soils are typically very poorly drained soils that border the ocean and are flooded twice daily by the tides. A dark, silty clay loam approximately 8 inches thick is underlain by a dark greenish-gray, silty clay and clay to a depth of 65 inches or more. Grass fibrous roots are found throughout the soil.

Capers soils are typically very poorly drained, extending inland along creeks and rivers, and are flooded frequently by the tide. A surface layer of very dark gray silty clay approximately 8 inches thick is underlain by a very dark gray and dark gray clay to a depth of approximately 42 inches. Next is a greenish-gray clay to a depth of 60 inches or more. Fine grass roots are found throughout the soils.

This unit has a slope of less than 1 percent and is found mainly along the Cumberland Sound and the Satilla River. Soils in some areas have been developed for farming. However, because of flooding, wetness, and natural sulfur content, they are used primarily by wetland wildlife.

L.2.9 Patterns of Land Use The patterns of land use in the vicinity of the SUBASE are discussed in Section L.5.

L.2.10 Health Risks Surface water bodies in the vicinity of SUBASE Kings Bay are generally used for non-contact recreation including boating, fishing, and navigation. Marianna Creek is the nearest surface water body to the OB/OD area. Marianna Creek is generally inaccessible, being within the boundaries of the SUBASE. The potential for exposure to contaminants migrating in surface water is considered to be low.

L.2.11 Damage to Domestic Animals, Wildlife, Crops, Vegetation, and Physical Structures Caused by Exposure to Waste Constituents The potential for damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents have been discussed in Section II.I.

L.3 AIR.

L.3.1 Waste Analysis Plan The volume and physical and chemical characteristics of the waste pyrotechnics and explosives have been described in Section C.

L.3.2 Effectiveness and Reliability of Structures to Reduce or Prevent Emissions of Hazardous Waste Constituents to the Air Due to the nature of treatment, there are no structures in place either for open detonation or open burning that will prevent the emission of hazardous waste constituents to the atmosphere.

L.3.3 Operating Characteristics of the Unit The operating characteristics of the OB/OD facility have been fully described in Section D of this permit application. All treatment operations will follow the general operating procedures established in the NAVSEA OP 5.

L.3.4 Atmospheric, Meteorologic, and Topographic Characteristics of the Unit and the Surrounding Area SUBASE Kings Bay is located in an area characterized by a humid subtropical climate, with hot, wet summers and cool, dry winters. Table L-3 summarizes climatological data for the Kings Bay area. The normal annual temperature is approximately 70 °F. Because of the moderating effect of the ocean, temperatures rarely rise above 100 °F. Normal annual precipitation is estimated to be 53 inches (Thibodeaux, 1979xxx). Precipitation occurs mainly as rain during summer months. Evapotranspiration rates range from 35 to 36 inches per year (in/yr). The average annual runoff for the southeastern Georgia area is estimated at less than 10 in/yr (Krause and Randolph, 1989). Based on the above estimates for annual precipitation, evapotranspiration, and surface water runoff, the annual infiltration to the surficial aquifer is estimated to be 7 inches. Relative humidity varies widely throughout the year, with an annual average of 87 percent in the morning and 55 percent in the afternoon. The highest relative humidity is generally encountered during June through October. The relative humidity is generally lowest during March through May (Thibodeaux, 1979).

Prevailing winds are westerly, with strong northerly components in winter and southerly components in summer. Figure L-4 is a wind rose diagram for data obtained from the National Climatic Data Center for the period of record 1973 through 1982 from Jacksonville, Florida. Prevailing wind speeds are highest (9 to 10 mph) in late winter and early spring and lowest during the summer. The seasonal and annual wind patterns are influenced by the land and water temperatures along the coast. Thunderstorms occur most frequently in summer months, and tornadoes commonly occur during March through May. Generally, hurricanes have occurred during the months of August and September.

L.3.5 Existing Quality of the Air, Including Other Sources of Contamination and the Cumulative Impact on the Air An investigation of the existing air quality has not been conducted at this time. However, a list of chemical by-products generated through open burning and open detonation has been provided in Appendix C-4 of this permit application. The constituents of concern are those for which national ambient air quality standards have been established under the Clean Air Act. Those constituents are sulfur oxides, nitrogen oxides, hydrocarbons, and carbon monoxide.

As a worst case scenario, the expected combustion products resulting from open burning operations are as given in Table L-4.

The data in Table L-4 were generated through computer modeling and assumed that the explosive was burned at a ratio of 25 percent explosive to 75 percent air.

Table L-3
Summary of Climatological Data[1]

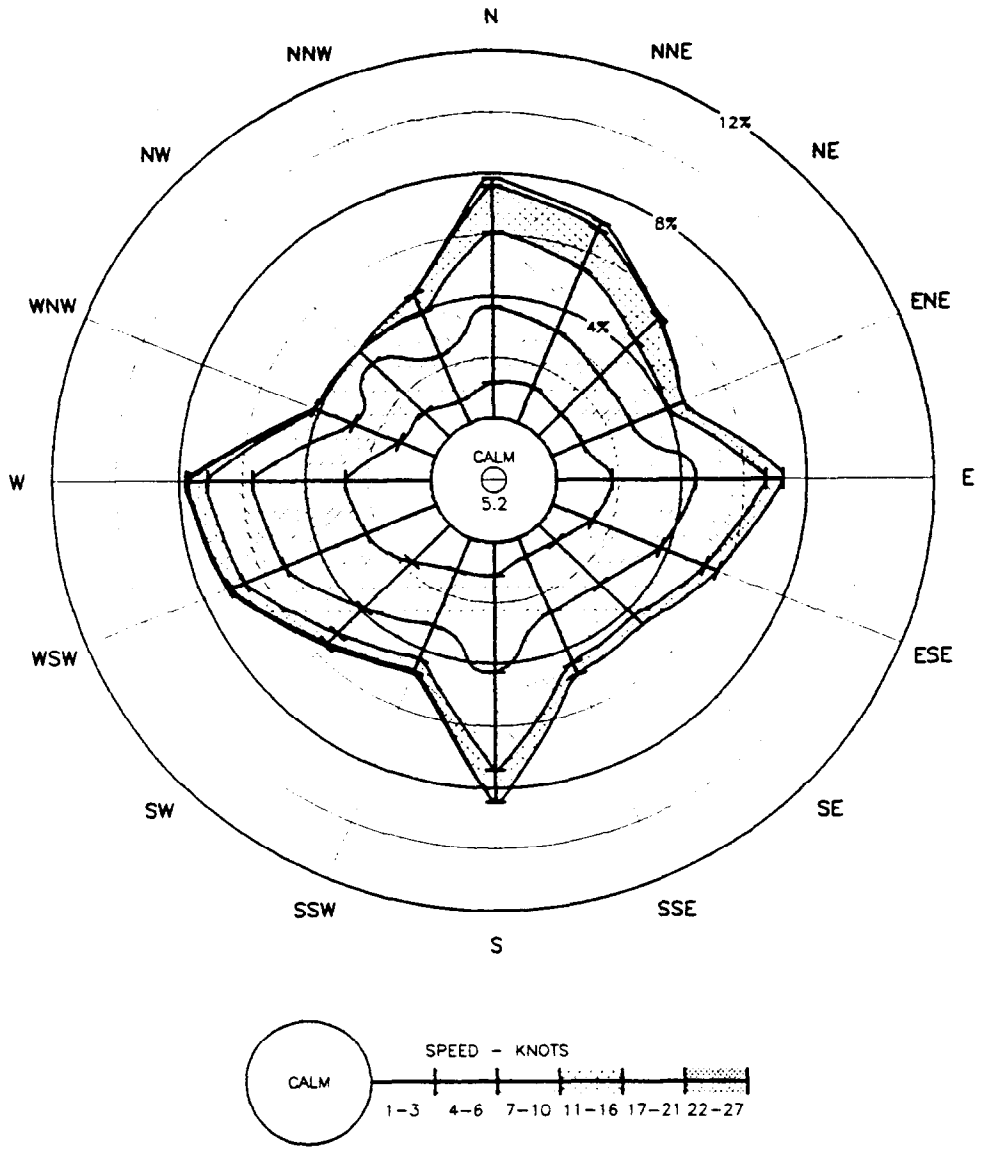
Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

	Length of Record (years)	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Average Relative Humidity (%)[2]	35	87/57	85/52	85/49	85/47	83/48	86/55	87/58	90/59	91/62	90/58	88/55	87/57	87/55
Normal Monthly and Annual Precipitation (inches)	NR	2.45	2.91	3.49	3.55	3.47	6.33	7.68	6.85	7.56	5.16	1.69	2.22	53.36
Normal Monthly and Annual Average Temp (°F)	NR	55.9	57.5	62.2	68.7	75.8	80.8	82.6	82.3	79.4	71.0	61.7	56.1	69.5
Average Wind speed (mph)	22	8.7	9.8	9.8	9.5	9.1	8.7	7.9	7.7	8.8	9.0	8.6	8.4	8.8

Source: Thibodeaux, 1979.

[1] Information reported for Jacksonville, Florida, Station.
[2] The first number equals average relative humidity for 7:00 a.m. and the second number is the average relative humidity for 1:00 p.m.

Notes: % = percent.
NR = not reported.
°F = degrees Fahrenheit.
mph = miles per hour.



SOURCE: NATIONAL CLIMATIC DATA CENTER.

FIGURE L-4

WIND ROSE FOR
JACKSONVILLE, FLORIDA,
1973 TO 1982, ALL MONTHS

PART B PERMIT APPLICATION

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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Table L-4
Worst Case Scenario for Expected Combustion Products Created at Open Burning Operations

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Product	Emission Rate (g per 100 g explosive)	Total Yearly Emissions (g per year)
Sulfur oxides	2.316	23.16
Nitrogen oxides	0.3426	3.426
Hydrogens	0.000	0.000
Carbon monoxide	0.008	0.080

Note: g = gram(s).

As a worst case scenario, Table L-5 lists the estimated average and maximum yearly emissions based on data presented in Appendix C-4 and an estimated yearly open detonation treatment rate of 1,500 pounds of explosives per year. However, the maximum emissions are unrealistic because to achieve them, only the compound referenced could be detonated. Thus, the actual emission rates from open detonation activates are expected to be at or below the average value listed in Table L-5.

Table L-5
Estimated Yearly Emissions

Class 2 Modification to the Part B Permit Application
Naval Submarine Base
Kings Bay, Georgia

Product	Emission Rate[1] (g per 100 g explosive)		Average Yearly Processing Rate (g explosive)	Estimated Total Yearly Emission (g)	
	Average	Maximum		Average	Maximum
Sulfur oxides	3.834	[2]49.84	680,389	26,090	339,100
Nitrogen oxides	0.0128	[3]0.116	680,389	87.1	789
Hydrocarbons	0.0	0.0	680,389	0.0	0.0
Carbon monoxide	0.0	0.0	680,389	0.0	0.0

[1] Data generated through computer modeling assuming explosives were burned at a ratio of 20 percent explosive to 80 percent air.
[2] Emission rate for flash powder. No other compounds listed in Appendix C-4 released sulfur oxides under the test conditions (20 percent explosive, 80 percent air).
[3] Emission rate for HBX-3. Emission rates for all other compounds listed in Appendix C-4 had nitrogen oxide emission rates of less than 0.116 gram (g) per 100 g explosive.

Notes: g = gram.
HBX-3 = type of explosive.

L.3.6 Potential for Health Risks Due to the short duration of releases, small quantities of material involved, and infrequent nature of OB/OD treatment releases of chemical byproducts to the atmosphere are not expected to result in health effects.

L.3.7 Damage to Domestic Animals, Wildlife, Crops, Vegetation, and Physical Structures Caused by Exposure to Waste Constituent Damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste

constituents released to the atmosphere are not expected. The only physical structures in the vicinity of the OB/OD area are those associated with OB/OD operations, such as the crew shelter. Land use patterns in the area are not typified by the presence of domestic animals or crops and vegetation is limited. Several endangered species have been listed as possibly occurring in the general area of SUBASE Kings Bay by the U.S. Fish and Wildlife service and the Georgia DNR. Table L-2 lists endangered, threatened, and unusual flora and fauna possibly occurring in the vicinity of the SUBASE.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
EARTH AND WATER DIVISION

HARRIETTS BLUFF QUADRANGLE

GEORGIA—CAMDEN CO.
7.5 MINUTE SERIES ORTHOPHOTOMAP
(TOPOGRAPHIC—BATHYMETRIC)

Produced by the United States Geological Survey and the National Ocean Service

Control by USGS, NOS/NOAA, and USCE

Orthophotomap prepared by the Geological Survey from aerial photograph taken April 19, 1974. Topography by planetable surveys 1958; revised from aerial photographs taken 1974. Field checked 1975. Map edited 1980

Bathymetry compiled by the National Ocean Service from tide-coordinated hydrographic surveys
Soundings compiled from NOS 11503 and 11504
This information is not intended for navigational purposes
Mean lower low water (dotted) line and mean high water (solid) line compiled by NOS from tide-coordinated aerial photographs
Apparent shoreline (outer edge of vegetation) shown by photoimagery
Projection and 10,000-foot grid ticks: Georgia coordinate system, east zone (transverse Mercator)
1000-meter Universal Transverse Mercator grid: zone 17
1927 North American Datum
To place on the projected North American Datum 1983 move the projection lines 21 meters south and 17 meters west as shown by dashed corner ticks
There may be private inholdings within the boundaries of the National or State reservations shown on this map

UTM GRID AND 1988 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOURS AND ELEVATIONS IN METERS

HYDROGRAPHIC SURVEY INFORMATION

Survey Number	Survey Date	Survey Scale	Survey Line Spacing (Nautical Miles)
H-5752	1935	1:10,000	02-12
H-5754	1934-35	1:10,000	02-08
H-5756	1935	1:10,000	02-10
H-9805	1979	1:2,500	01-02

Revisions shown in purple compiled in cooperation with State of Georgia agencies from aerial photographs taken 1983 and other sources.

SCALE 1:24 000

CONTOUR INTERVAL 1.5 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
BATHYMETRIC CONTOUR INTERVAL 1 METER WITH SUPPLEMENTARY 0.5 METER CONTOURS – SOUNDINGS IN METERS
DATUM IS MEAN LOWER LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE

BASE MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
BATHYMETRIC SURVEY DATA COMPLIES WITH INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO) SPECIAL PUBLICATION 44 ACCURACY STANDARDS AND/OR STANDARDS USED AT THE DATE OF THE SURVEY
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092 AND NATIONAL OCEAN SERVICE, ROCKVILLE, MARYLAND 20852
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

NATIONAL OCEAN SERVICE HYDROGRAPHIC SURVEY INDEX

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Trails
Interstate Route — U. S. Route — State Route

HARRIETTS BLUFF, GA.

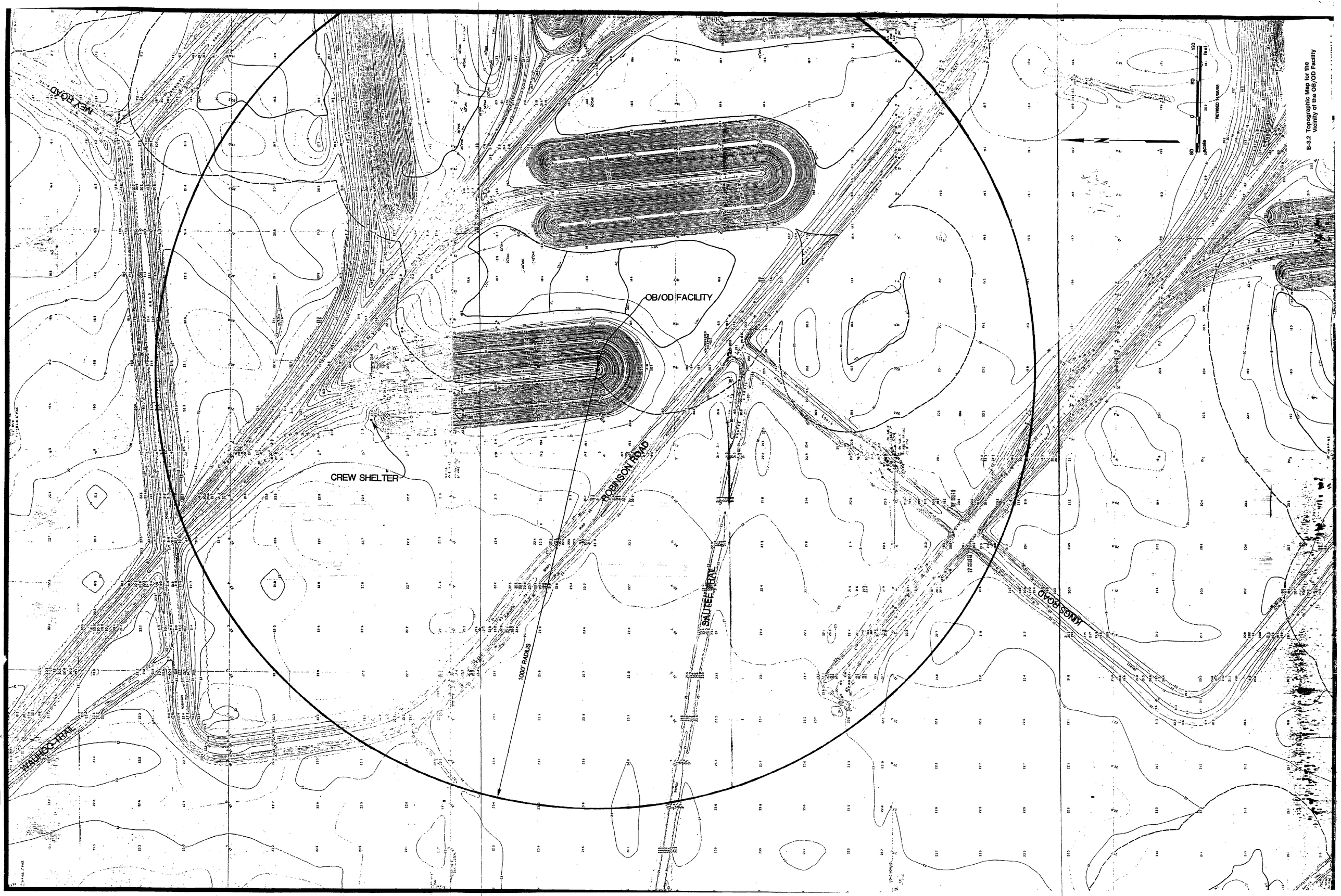
30081-G5-OM-024

1980
PHOTOREVISED 1988
DMA 4645 I SE-SERIES V8450

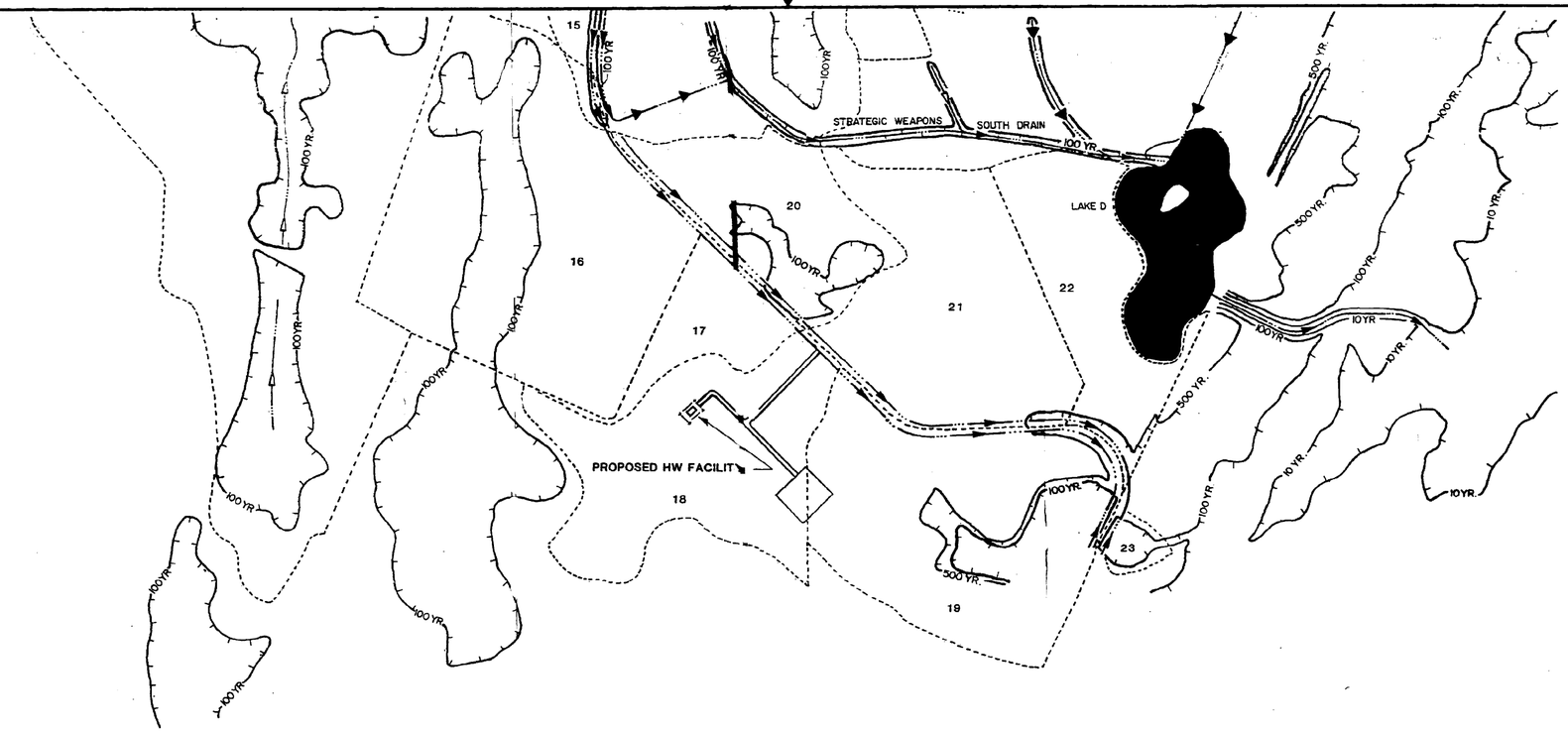
1"=100' 100 0 100 200 scale feet

FIGURE B-3
TOPOGRAPHIC MAP
SUBASE KINGS BAY

B-3.1 Topographic Map for Hazardous Waste Container Storage and Transfer Facility



B-3.2 Topographic Map for the Vicinity of the OB/OD Facility



NOTE: LOCATION OF THE HW FACILITY ADDED BY ENVIRONMENTAL & SAFETY DESIGNS, INC.

Sub-Drainage Area Number	Structure (S) or Cross Section (X) No.	Drainage Areas (Acres) Sub-Area	Drainage Areas (Acres) Total	Estimated Flood Flows (cfs) 10 yr	Estimated Flood Flows (cfs) 100 yr	Estimated Flood Flows (cfs) 500 yr	Estimated Flood Elev. (Ft. above MLW) 10 yr	Estimated Flood Elev. (Ft. above MLW) 100 yr	Controlling Overflow Elev. (Feet/MLW)	Recommended Minimum Floor Elev. (Ft/MLW)	Upstream Invert Elev. (Ft/MLW)	Drainage Structure Preliminary Design Description
15	S-1	1.9	1.9	4.1	5.3	6.2	25.5	26.0	28.1	29.6	24.2	15" RCP
16	X-1	108.8	108.8	101.0	159.2	200.0			24.1	25.6		
17	S-2	19.2	129.9	86.4	125.2	153.6	23.5	24.8	24.7	26.2	20.7	3 - 24" x 38" ELP RCP
18	X-3	65.3	195.2	135.8	197.1	242.0			23.0	24.5		
19	S-4	83.8	279.0	176.6	243.4	293.4	18.1	19.5	19.0	21.5	14.5	3' x 10' Box
20	S-3	40.3	40.3	38.5	43.0	46.5	22.7	22.9	24.7	26.2	20.7	2 - 24" x 38" ELP RCP
21	X-5	55.0	95.4	73.3	100.7	118.2			23.5	25.0		
22	S-5	40.3	135.7	106.4	149.5	179.1	18.3	19.1	18.0	19.5	15.0	2 - 36" RCP
23	S-48	3.7	418.6	277.4	380.9	454.9	15.9	16.2	16.0	17.5	11.9	2 - 4' x 6' Box

NOTES :

USE OF THIS TABLE

The results of the computer analysis to predict flood flows and flood elevations are summarized in this table. Additional details can be found in the supporting calculations which include listings of the computer output.

The table is organized by drainage area numbers, which are shown on the accompanying maps. For any given drainage area, referring to the table will yield the following information:

1. The structure or cross section numbers which are found within the given drainage area. A structure is typically a culvert or bridge. A cross section is a reference point at which flood flows have been estimated in the computer model.
2. Drainage areas are given in acres for each sub-drainage area and for the accumulated total area at the structure or cross section.
3. Estimated flood flows in cubic feet per second are given for the 10-year, 100-year, and 500-year storms.
4. Estimated flood elevations are given in feet above mean low water (MLW) for the 10-year and 100-year storms.
5. The controlling overflow elevation in feet above mean low water is the elevation of the land form, roadway, or other obstruction to flow which would influence the elevation of flood waters during a major storm event. For example, a raised roadway would act as a dike, particularly if culverts passing beneath the roadway were temporarily plugged with debris.
6. The recommended minimum floor elevation in feet above mean low water is given for each drainage area. This elevation is based on setting the floor 1.5 feet above the controlling overflow elevation or the 100-year flood elevation, whichever is greater.
7. Drainage structures have been designed on a preliminary basis for inclusion in the model. The last two columns of the table give the upstream invert elevation in feet above mean low water for each drainage structure and a preliminary design description of the structure. It may be necessary to modify the drainage structure during final design. This is acceptable provided that the revised design is of similar hydraulic performance.

WARNING ON USE OF RECOMMENDED MINIMUM FLOOR ELEVATIONS

Recommended minimum floor elevations are given for each drainage area. The designer of a particular facility must use responsible judgment in making the final determination of floor elevation. Decisions by the designer should be based on the type of structure, its use and occupancy, the damage which would occur in the event the structure was flooded, and other factors which the designer of the facility deems appropriate. Particular attention must be given to the local drainage in the immediate vicinity of the building. The master plan cannot foresee the potential effects of local site drainage design, parking lot drainage design, and adjacent roadway design. These must be carefully considered.

FLOORS SHOULD NOT BE SET AT THE RECOMMENDED MINIMUM FLOOR ELEVATION WITHOUT CAREFUL STUDY AND CONSIDERATION BY THE DESIGNER OF THE FACILITY.

ANY CHANGE IN THE MASTER PLAN OF THE BASE OR OF THE DRAINAGE MASTER PLAN MAY CAUSE A CHANGE IN ESTIMATED FLOOD FLOWS AND/OR FLOOD ELEVATIONS.

COASTAL FLOODING

Much of the base is subject to flooding from coastal storm surge. According to NOAA Technical Memorandum NWS HYDRO-19, September, 1974, the following tide heights have been estimated at Kings Bay:

Average Return Period	Tide Height Ft. above MLW
10 years	9.8
50 years	13.4
100 years	15.4
500 years	19.5
Maximum of Record at Savannah, 1893	21.5

Critical facilities should be designed for potential flooding levels greater than the 100-year event. Extreme tides to heights above 19.5 feet MLW, the estimated 500-year return period event, and even above 21.5 feet MLW, the maximum of record at Savannah, Georgia, are possible.

FOOTNOTES TO TABLE

1 Overflow elevation is subject to change by design of MLA. Verify before final design.

2 Flood elevations subject to coastal surge levels of 9.8 feet MLW for 10-year storm and 15.4 feet MLW for 100-year storm.

ABBREVIATIONS USED IN TABLE

NWS	Normal Water Surface Elevation
CMP	Corrugated Metal Pipe
Exist.	Existing
ELP RCP	Elliptical Reinforced Concrete Pipe
RCP	Reinforced Concrete Pipe (Circular)
Box	Box Culvert
Auto. Gate	Automatic Gate to control water surface elevation
MLW	Datum of Mean Low Water

500 0 500 1000 1500 2000 2500

GRAPHIC SCALE IN FEET

FIGURE B-5

GEORGIA REGISTERED NO. 8222 PROFESSIONAL ENGINEER JOHN M. LOWE

BOYLE Engineering Corporation

DES EA | DR TLO | CHK HWH

SUBMITTED BY: DATE 19 Nov 80

ST-06 | ST-061
ST-06A | ST-041
PHILI ENGR | ST-042
FIRE PROT | ST-043

APPROVED DATE

APPROVED DATE

FOR COMMANDER, NAVFAC

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
OFFICER IN CHARGE OF CONSTRUCTION, TRIDENT
KINGS BAY, GEORGIA

NAVAL SUBMARINE BASE, KINGS BAY, GEORGIA

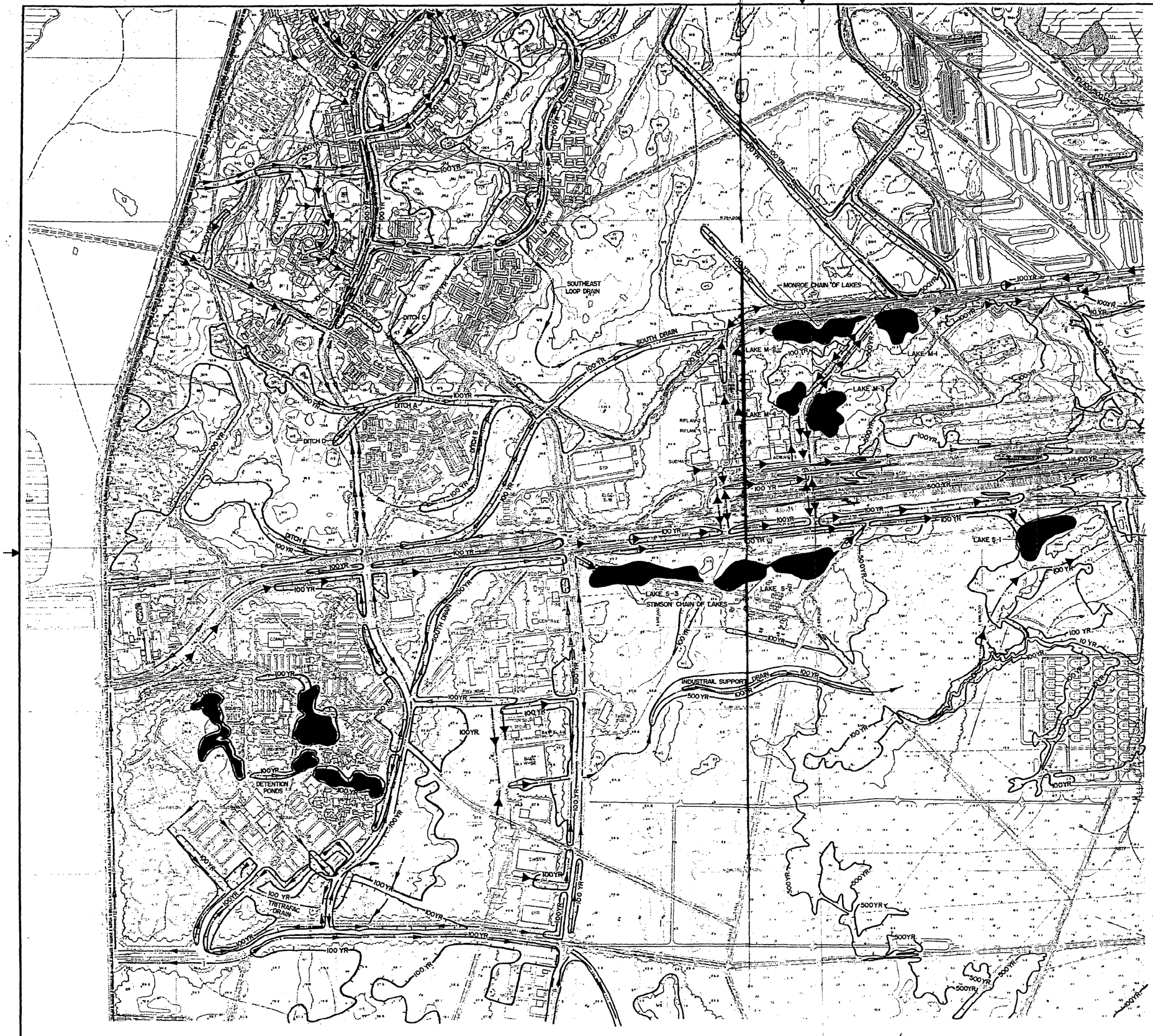
FLOOD CONTOURS

SIZE F | CODE IDENT NO 80091 | NAVFAC DRAWING NO. 5086564

SCALE NOTED

13

B-5.1 100-Year Floodplain for the Vicinity of the Hazardous Waste Storage and Container Facility



500 0 500 1000 1500 2000 2500

GRAPHIC SCALE IN FEET

GEORGIA REGISTERED NO. 8222 PROFESSIONAL ENGINEER JOHN M. LOWE

BOYLE Engineering Corporation

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
OFFICER IN CHARGE OF CONSTRUCTION, TRIDENT
KINGS BAY, GEORGIA

NAVAL SUBMARINE BASE, KINGS BAY, GEORGIA

FLOOD CONTOURS
FIGURE B - 5 . 2

DES EA	DR RDF	CHK MWH	
SUBMITTED BY		DATE	
ST-00		ST-04	
ST-00A		ST-041	
PROJ ENGR		ST-042	
FIRE PROT		ST-043	

APPROVED DATE

APPROVED DATE

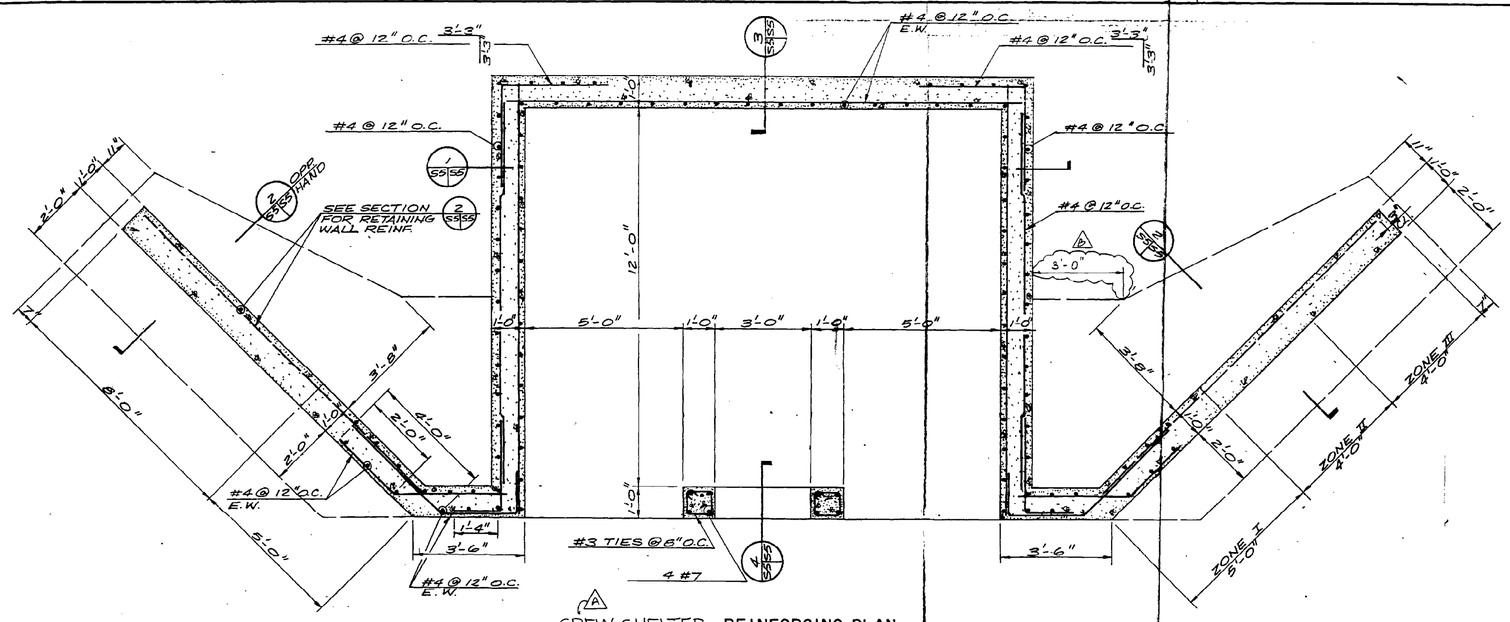
FOR COMMANDER, NAVFAC

11

SIZE	CODE IDENT NO	NAVFAC DRAWING NO.
F	80091	5086562
		A/E CONTR NO N68248-80-C-0105
SCALE NOTED		SHEET 11 OF 14

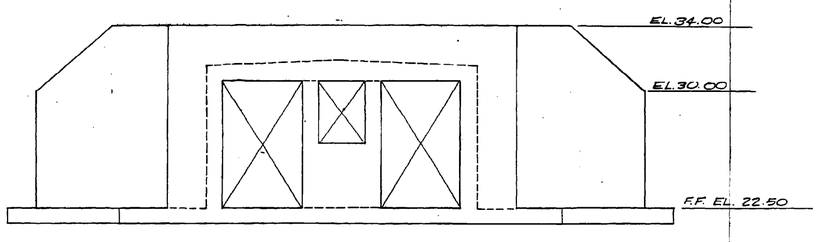
PWD NO 7003-186

REVISIONS				
LET	DESCRIPTION	PREP'D BY	DATE	APPROVED
A	"WORKSHOP" CHANGED TO "CREW SHELTER" WATERSTOPS ADDED AND DOOR	DJB	4JUL82	
B	FINAL RECORD	JMT	8JUL83	



CREW SHELTER - REINFORCING PLAN

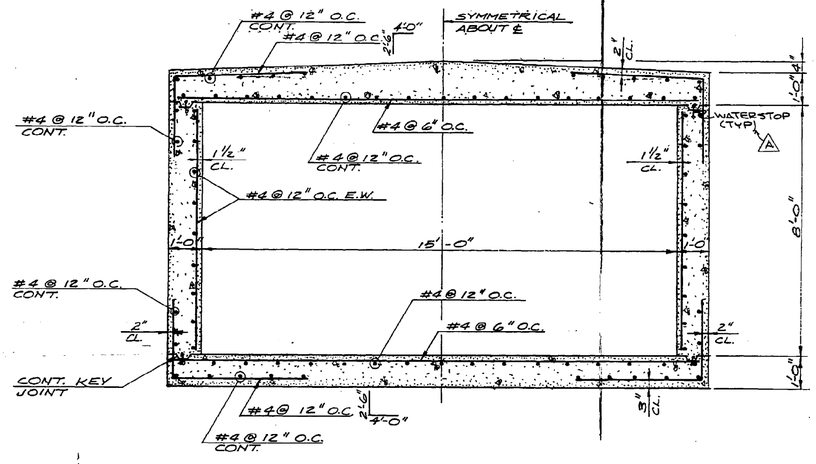
SCALE: 1/2" = 1'-0"



CREW SHELTER ELEVATION

SCALE: 1/4" = 1'-0"

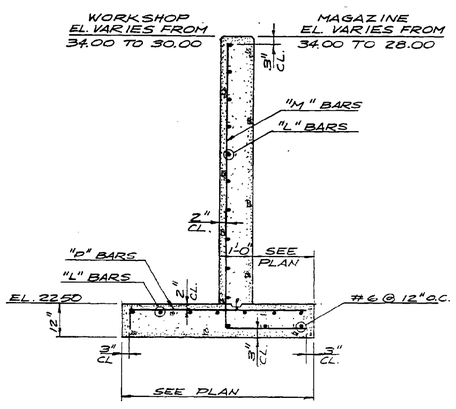
NOTE: FOR WATERPROOF MEMBRANE SEE ARCH.



SECTION 1

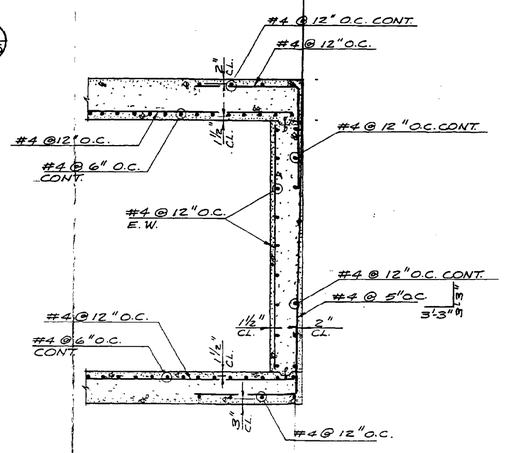
SCALE: 1/2" = 1'-0"

RETAINING WALL REINFORCING			
ZONE	"M" BARS	"P" BARS	"L" BARS
	SIZE & SPACING	SIZE & SPACING	SIZE & SPACING
I	#4 @ 6	#4 @ 10	#5 @ 11
II	#4 @ 8	#4 @ 12	#5 @ 11
III	#4 @ 18	#4 @ 18	#5 @ 11



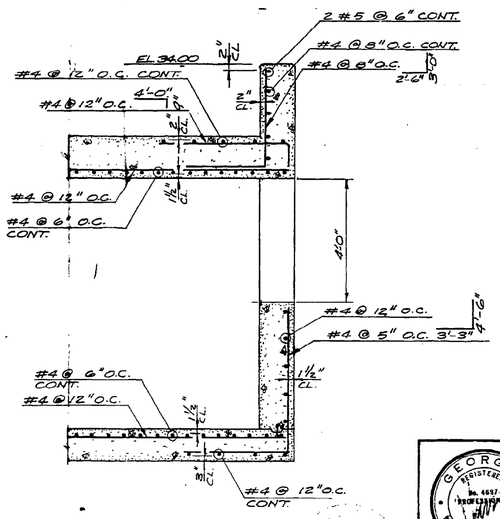
SECTION 2

SCALE: 1/2" = 1'-0"



SECTION 3

SCALE: 1/2" = 1'-0"



SECTION 4

SCALE: 1/2" = 1'-0"

GRAPHIC SCALES

1/4" = 1'-0" 12" 0 5' 10'

1/2" = 1'-0" 12" 0 1' 2' 3' 4'

RECORD DRAWING

DATE 13 JUL 83

D-8 Detailed Plans of Crew Shelter at OB/OD Area

JOHN A. TUTEN & ASSOCIATES -ARCHITECTS- BRUNSWICK GEORGIA

DSGN MAULDEN DRG. EMMONS CHK SAUSSY

SUPV MAULDEN CH ENGR SAUSSY

SUBMITTED BY PFES DATE 1/12/81

FIRM MEMBER (TITLE)

SOUTHERN DIV — DESIGN DIVISION

POE DIR

APPROVED DATE

OFFICER IN CHARGE

APPROVED P.E. DATE 2/10/81

FOR COMMANDER, NAVFAC

GEORGIA REGISTERED No. 4697 PROFESSIONAL ENGINEER WILLIAM H. SAUSSY, JR.

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

SOUTHERN DIVISION

CHARLESTON, S. C.

FBM SUB SUP BASE KINGS BAY ST. MARYS, GEORGIA

OPERATIONAL SUPPORT FACILITY

E.O.D. CREW SHELTER

SECTIONS & ELEVATION

S-5

SIZE	CODE IDENT NO.	NAVFAC DRAWING NO.
F	80091	5072586

CONSTR CONTR NO. N62248-80-C-3018

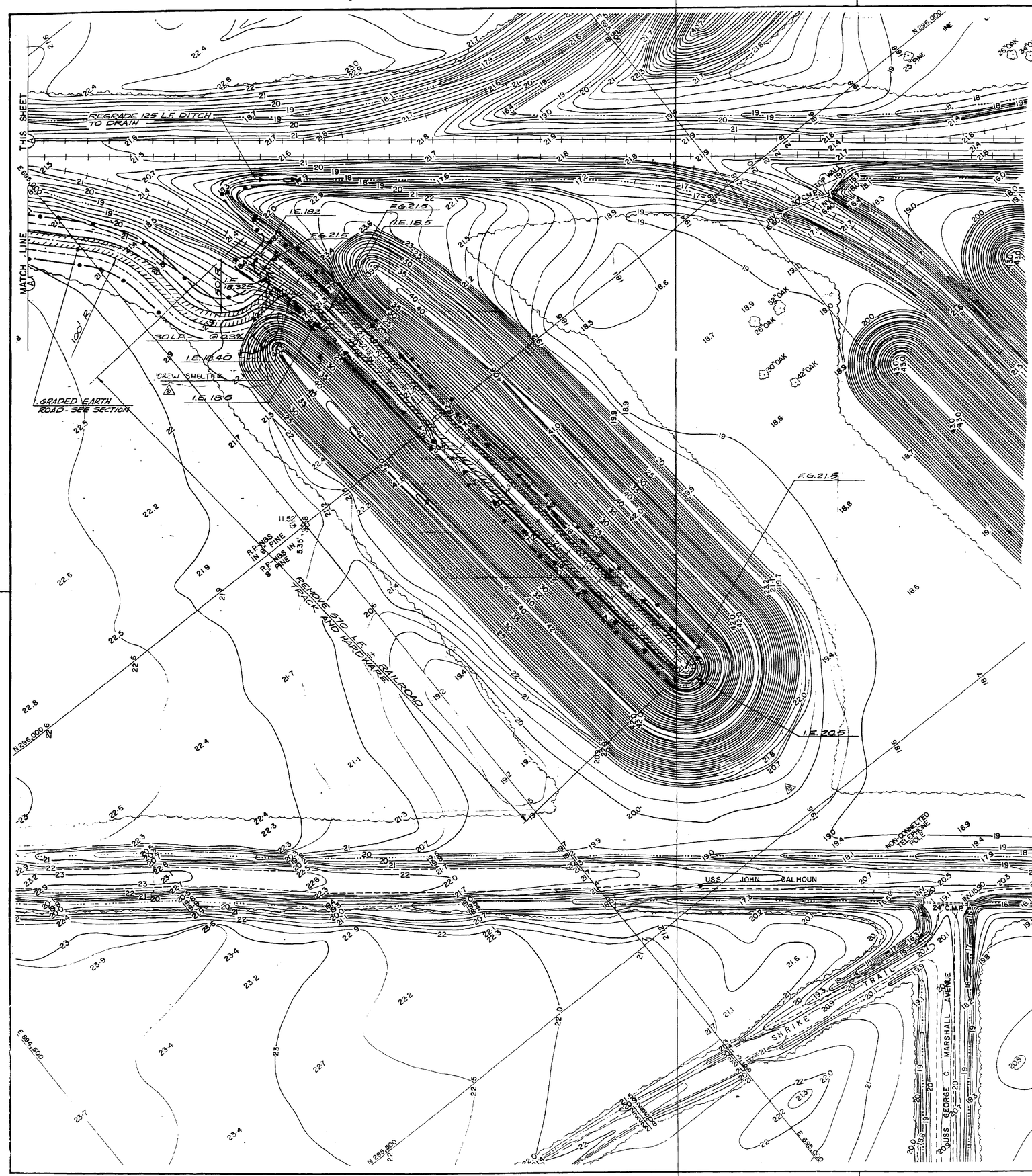
SCALE AS NOTED

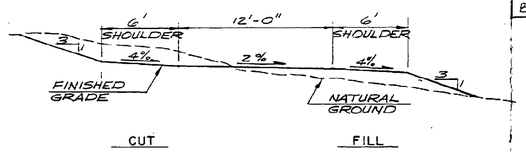
SPEC 68-80-3018 SHEET 27 OF

PWDWG 2013-023

SOUTHNAFACENGCOMM 11012-119 (REV. 4/75)

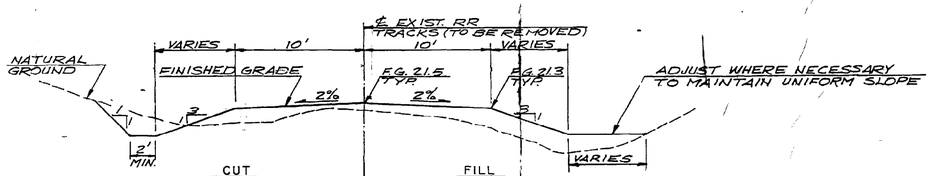
REVISIONS				
LET	DESCRIPTION	PREP'D BY	DATE	APPROVED
A	CREW SHELTER RELOCATED TO DISPOSAL AREA AMD 0002	D J B	4 JUNE	
B	FINAL RECORD	JMT	1 JUL 83	





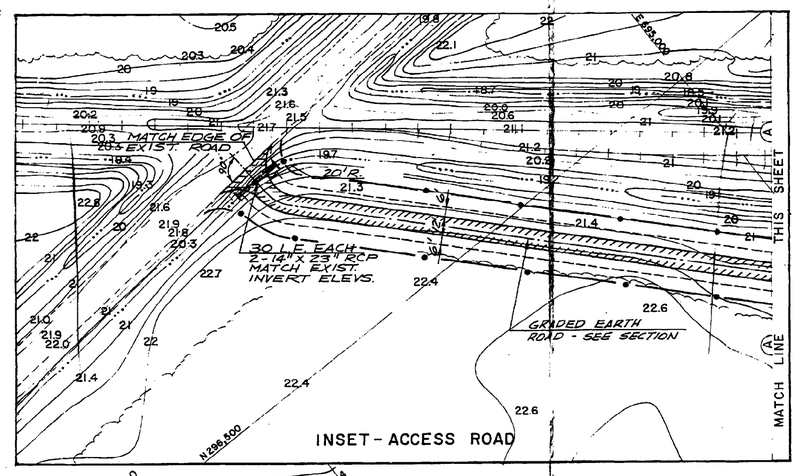
TYPICAL CROSS SECTION - ACCESS ROAD

NOT TO SCALE



TYPICAL CROSS SECTION - DISPOSAL AREA

NOT TO SCALE



INSET - ACCESS ROAD

NOTE:
FOR LEGEND SEE C-4.

HORIZONTAL & VERTICAL CONTROL DATA

CONCRETE MONUMENT, EL 20.79 M.L.W.,
N 294,999.16
E 694,999.54

CONCRETE MONUMENT, EL 19.21 M.L.W.,
N 297,000.00
E 695,000.00

50 25 0 50 100 150

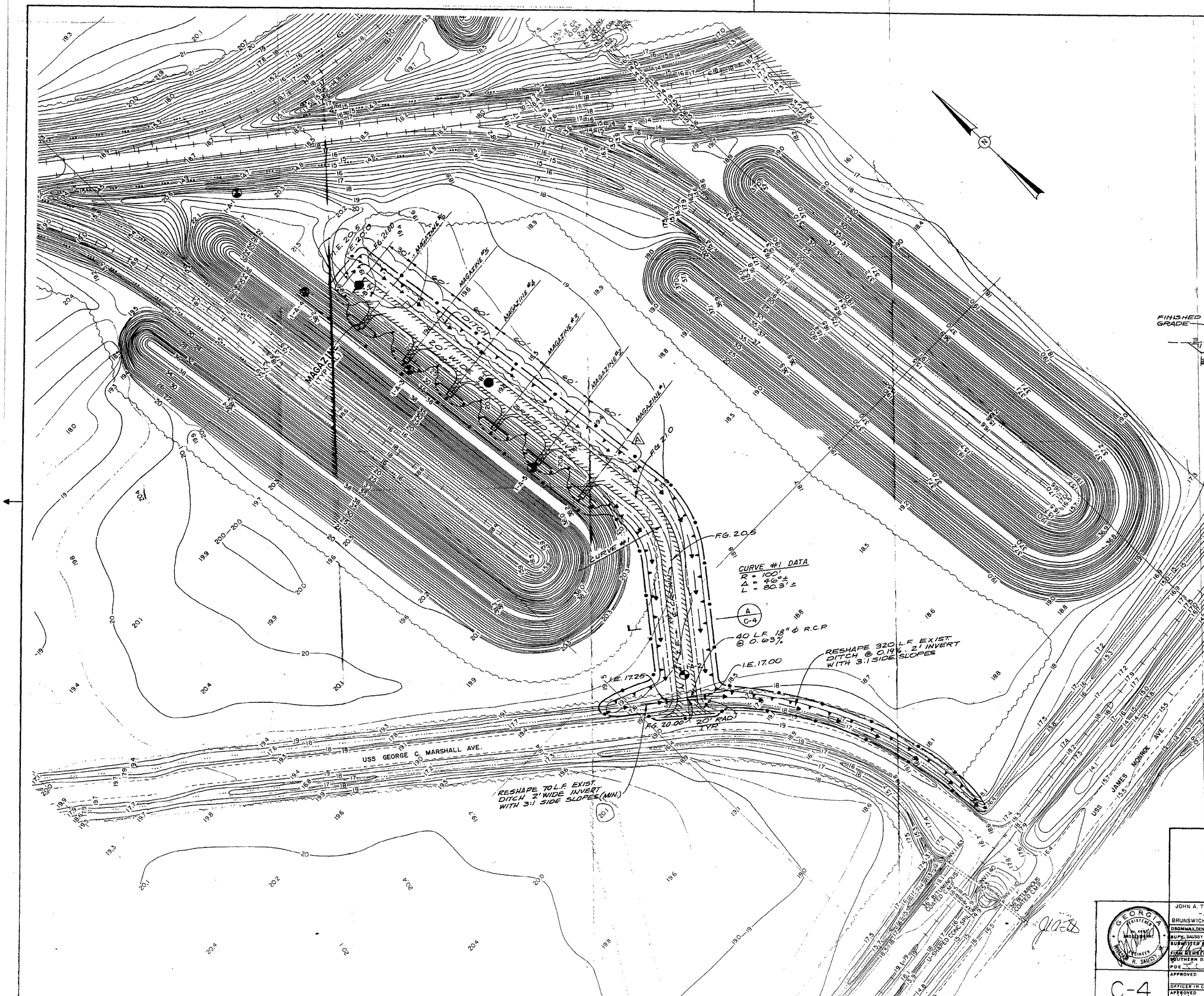
SCALE IN FEET
1" = 40'

RECORD DRAWING

DATE 13 JUL 1983

GEORGIA REGISTERED PROFESSIONAL ENGINEER WILLIAM W. SAUSSY, JR.	JOHN A. TUTEN & ASSOCIATES - ARCHITECTS - BRUNSWICK GEORGIA	DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND SOUTHERN DIVISION CHARLESTON, S. C.
	DSGN: MAUL DEV. DR: C. LEMMONS CHK. SAUSSY	FBM SUB SUP BASE KINGS BAY ST. MARYS, GEORGIA
	SUPV: SAUSSY CH ENGR: SAUSSY	OPERATIONAL SUPPORT FACILITY
	SUBMITTED BY: J. T. PLESS DATE 1/3/81 (FBM MEMBER TITLE)	E.O.D. DISPOSAL AREA & CREW SHELTER
	SOUTHERN DIV — DESIGN DIVISION PDE — DIR	
C-3	APPROVED DATE	SIZE F · CODE IDENT NO. 80091 · NAVFAC DRAWING NO. 5072564
	OFFICER IN CHARGE	CONSTR CONTR NO. N68248-80-C-3018
	APPROVED DATE 2/18/81 CEC FOR COMMANDER, NAVFAC	SCALE AS NOTED

ENG-SOUTH DFW-4-1198-18 SCOTT GRAPHICS AP-81

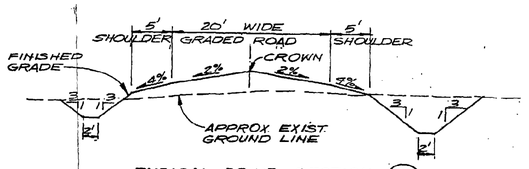


REVISIONS

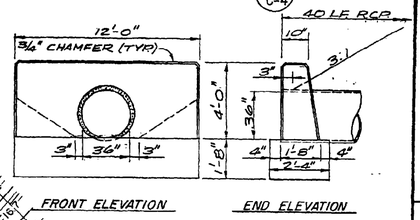
LET	DESCRIPTION	PREP'D BY	DATE	APPROVE
A	WORKSHOP DELETED DRAINAGE REVISED AMD 0002	D.J.B.	4 JUN 81	D.J.Ba

LEGEND

NEW	EXISTING	DESCRIPTION
		BUILDING
		EARTH ROAD
		SHOULDER
—18—	—18—	CONTOUR
		TOP OF SLOPE
		LIMIT OF CLEARING AND/OR GRADING
		CULVERT WITH HEADWALL
		RAILROAD TRACK
		TREE
		WOOD LINE



TYPICAL DRIVE SECTION (A / C-4)



CONCRETE ENDWALL STRAIGHT TYPE

40 0 40 80
SCALE IN FEET
1" = 40'

RECORD DRAWING
DATE 13 JUL 1983

JOHN A. TUTEN & ASSOCIATES - ARCHITECTS -
BRUNSWICK GEORGIA

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
CHARLESTON, S. C.

FBM SUB SUP BASE KINGS BAY ST. MARYS, GEORGIA
OPERATIONAL SUPPORT FACILITY
E.O.D. MAGAZINES
SITE PLAN

GEORGIA REGISTERED No. 4697 PROFESSIONAL ENGINEER WILLIAM H. SAUSSY, JR.

DSGN: MULDEN DR: CLEMMONS CHK: SAUSSY
SUPV: SAUSSY CH ENGR: SAUSSY
SUBMITTED BY PRES DATE
FIRM MEMBER (TITLE)
SOUTHERN DIV — DESIGN DIVISION
PDE DIR
APPROVED DATE
OFFICER IN CHARGE
APPROVED DATE 3/16/81
EFD FOR COMMANDER, NAVFAC

C-4

SIZE F | CODE IDENT NO. 80091
SCALE AS NOTED

D-10 Engineering Drawing for Temporary Storage Magazine

PUBLIC PARTICIPATION PACKAGE
HAZARDOUS WASTE FACILITY
PERMIT MODIFICATION
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

Naval Sub Base
St. Marys Public Library

SIGN IN SHEET

NAME: _____
ADDRESS: _____
_____
REPRESENTING: _____

NAME: _____
ADDRESS: _____
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REPRESENTING: _____

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DRAFT

State of Georgia

Department of Natural Resources

ENVIRONMENTAL PROTECTION DIVISION

AMENDMENT TO

HAZARDOUS WASTE FACILITY PERMIT

Amendment To Permit No. HW-014(S)(2)

Effective Date Of Amendment

In accordance with the provisions of the Georgia Hazardous Waste Management Act and the Rules, Chapter 391-3-11, (as amended through December 28, 1995), adopted pursuant to that Act, Permit No. HW-014(S)(2) issued on Sept. 29, 1989 to:

Naval Submarine Base, Kings Bay, Georgia

for the following:

Storage in containers of 68,200 gallons of hazardous waste
Corrective action for four solid waste management units

Is hereby amended as follows:

Reduce storage in containers to 59,840 gallons of hazardous waste
Add treatment in containers of 220 gallons per day of low-level radioactive mixed waste
Add treatment by open burning and open detonation for 4,150 pounds per day of hazardous waste
Add three solid waste management units
Revise corrective action requirements to reflect current regulation
Renumber permit to HW-014(S&T)(2)

Reason for Amendment:

New information provided to the State

This Permit Amendment is further subject to and conditioned upon the terms, conditions, limitations, standards, or schedules contained in or specified on the attached 20 page(s), which page(s) are a part of this Amendment. This Amendment is hereby made a part of Permit No. HW-014(S)(2) and compliance with this Amendment is hereby ordered.

DRAFT

Director
Environmental Protection Division

DRAFT

Naval Submarine Base, Kings Bay, Georgia, GA4170090001, is hereinafter referred to as the Permittee.

SECTION I. GENERAL PERMIT CONDITIONS

A. Scope and Effect of Permit

1. The Permittee is allowed to store and treat hazardous waste, and perform corrective action for solid waste management units and areas of concern only in accordance with the conditions of this permit. Any hazardous waste treatment, storage or disposal not authorized in this permit is prohibited. The Permittee must comply with the Georgia Hazardous Waste Management Act and the Rules for Hazardous Waste Management, Chapter 391-3-11, which Rules include certain portions of the Federal Hazardous Waste Regulations (found at Title 40 of the Code of Federal Regulations (40 CFR) Parts 260-268, 270, 273, 279 and 124). Where a citation to the Federal Regulations is made in this permit, it refers to the specific regulations adopted by EPD.

2. The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

3. Compliance with this permit does not constitute a defense to any action brought by the Director under the emergency powers provisions of the Georgia Hazardous Waste Management Act, O.C.G.A.§12-8-75, as amended.

4. Nothing in this permit shall be construed to preclude the institution of any legal action under Section 3008 of the Federal Resource Conservation and Recovery Act or under the Georgia Hazardous Waste Management Act, O.C.G.A. §§12-8-81 - 12-8-82, as amended.

5. This permit may be modified, revoked and reissued, or terminated for cause as specified at Section 391-3-11.11(7) of the Rules and 40 CFR §§270.41, 270.42, 270.43, 270.50(d) and 270.51(a). The filing of a request for a permit modification, variation and reissuance, or termination or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay the applicability of any permit condition.

6. The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

B. Management Requirements

1. The Permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the facility, or of any planned changes in the processes generating the hazardous waste, which changes might affect the performance of the permitted unit.

DRAFT

2. The Permittee shall maintain at the facility until closure and corrective action are completed and certified by an independent registered professional engineer, the following documents and amendments, and any revisions and modifications to these documents:

   a. Complete copy of this permit and permit application and any plans and reports required thereunder
   b. Inspection Schedule and Log
   c. Waste Analysis Plan
   d. Operating Record
   e. Personnel training documents and records
   f. Contingency plan
   g. Closure plan
   h. Sampling and Analysis Plans for corrective action, as such are approved

3. All amendments, revisions and modifications to any plan or cost estimates required by this permit shall be submitted to the Director for approval and permit modification as necessary.

4. When the Permittee becomes aware that the Permittee failed to submit any relevant facts in the permit application or in any report to the Director, or submitted incorrect information in a permit application or in any report to the Director, the Permittee shall promptly submit corrected facts or information.

5. The Permittee shall at all times properly operate and maintain all facilities, equipment, apparatus, devices or other improvements which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance include effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of a backup or auxiliary facility or similar systems only when necessary to achieve compliance with the conditions of this permit.

6. The Permittee may not commence treatment, storage or disposal of hazardous waste on any new or modified portion of the facility or perform corrective action until the Permittee has submitted to the Director by certified mail or hand delivery an application for a permit modification. No changes to the current permit may be implemented until the Director has modified the permit and an executed copy of the modified permit has been received by the Permittee.

C. Monitoring and Reporting

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method from Appendix I of 40 CFR Part 261. Laboratory methods must be those specified in the most recent editions of Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, or Standard Methods for the Examination of Water and Wastewater.

DRAFT

Sampling and analyses of groundwater shall be conducted in accordance with methods and procedures acceptable to the Director.

2. The Permittee shall retain all records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this permit and records of all data used to complete the application for this permit including the certification required by 40 CFR §264.73(b)(9) for a period of at least five years from the date of the sample, measurement, report or record. These periods are automatically extended during the course of any unresolved enforcement action regarding this facility and also may be extended at any time at the Director's discretion.

3. Records of monitoring information shall include:

   a. The date, exact place and time of sampling or measurements.
   b. The name(s) of the individual(s) who performed the sampling.
   c. The date(s) analyses were performed.
   d. The name(s) of the individual(s) who performed the analyses.
   e. The analytical techniques or methods used, the method of sample preservation, quality assurance methods, and appropriate Method Detection Limits and Practical Quantitation Limits.
   f. The results of such analyses.
   g. Sampling methods.

4. The Permittee shall report orally to the Director or his representative within one (1) hour from the time the Permittee becomes aware of any circumstances resulting from the operation of the hazardous waste management facility (including periods of noncompliance) which may endanger human health or the environment, including but not limited to:

   a. Release of any hazardous waste, hazardous waste constituent, or hazardous constituent that may cause an endangerment to public drinking water supplies.

   b. Release or discharge of hazardous waste, hazardous waste constituent, hazardous constituent, or a fire or explosion which could threaten human health or the environment.

   c. The description of the occurrence shall include:

      i. Name, address and telephone number of the owner or operator.
      ii. Name, address and telephone number of facility.
      iii. Date, time and type of incident.
      iv. Name and quantity of materials involved.
      v. The extent of injuries, if any.
      vi. An assessment of actual or potential hazards to the environment and human health outside the facility, where this is applicable.

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vii. Estimated quantity and disposition of recovered material that resulted from the incident.

5. Within fifteen days of becoming aware of any reportable incident as in Section I.C.4. above which may endanger human health or the environment, the Permittee shall submit a written report of the incident to the Director including the following:

   a. Description of occurrence as in Section I.C.4.c. above
   b. Cause of occurrence
   c. Period of occurrence, including exact dates and times
   d. Expected duration of occurrence (if not already corrected)
   e. Steps taken or planned to reduce, eliminate, and prevent recurrence

6. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the Director no later than 14 days following each schedule date.

7. The Permittee shall report to the Director instances of noncompliance, other than those described in Sections I.C.4. and I.C.6., semiannually on July 15 (covering January 1 - June 30) and January 15 (covering July 1 - December 31). The report shall include information as required under Section I.C.4.c. for each incident.

8. All plans and schedules required by the conditions of this Section are, upon approval by the Director, incorporated into this Section by reference and become an enforceable part of this permit. Any non-compliance with such approved plans and schedules shall be termed non-compliance with this permit.

9. All reports of other information requested by the Director shall be signed and certified according to the requirements in 40 CFR 270.11.

D. Responsibilities

1. Right of Entry. The Permittee shall allow the Director of EPD, the Regional Administrator of EPA, and/or their authorized representatives, agents, or employees, upon the presentation of credentials and other documents as may be required by law to:

   a. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit.

   b. Have access to and copy any records that must be kept under the conditions of this permit.

   c. Inspect any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit.

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d. Sample or monitor, for the purposes of assuring permit compliance or as otherwise authorized by the Georgia Hazardous Waste Management Act, any substances or parameters at any location.

2. Transfer of Permits. This permit may be transferred to a new owner or operator only if it is modified or revoked and reissued pursuant to 40 CFR §§270.40 and 270.41(b)(2). Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the applicable requirements of 40 CFR Parts 264 and 270.

3. Duty to Comply. The Permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any noncompliance with this permit constitutes a violation of the Georgia Hazardous Waste Management Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application.

4. Duty to Re-apply. The Permittee must submit a complete application for a new Corrective Action permit at least 180 days before this permit expires. If the Permittee wishes to continue any other activity regulated by this Permit after the expiration date of this Permit, the Permittee must submit a complete application for a new permit at least 180 days before this permit expires.

5. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce any activity in order to maintain compliance with the conditions of this permit.

6. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment or human health resulting from noncompliance with this permit.

7. Duty to Provide Information. The Permittee shall furnish to the Director, within a reasonable time, any relevant information which the Director may request, to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or, to determine compliance with the permit. The Permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

8. Anticipated Non-Compliance. The Permittee shall give advance notice to the Director of any planned changes in the facility or activity which may result in noncompliance with permit requirements.

9. Reporting Planned Changes. The Permittee shall give notice to the Director within thirty (30) days prior to any planned physical alterations or additions, including voluntary corrective measures, which impact any SWMU(s) (or the areas contaminated by them) and/or AOC(s) referenced in Sections V.A and/or V.B.

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10. Obligation for Corrective Action. The Permittee will continue corrective action as required in this Permit. The Corrective Action Permit will be continued as necessary to complete corrective action.

E. Definitions

For purposes of this permit, terms used herein shall have the same meaning as those in 40 CFR Parts 124, 260-268, 270, 273, and 279 unless this permit specifically provides otherwise. Where terms are not defined in the regulations or the permit, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

1. Area of Concern (AOC) for the purposes of this permit includes any area having a probable release of a hazardous waste or hazardous constituent which is not from a solid waste management unit and is determined by the Director to pose a current or potential threat to human health or the environment. Such areas of concern may require investigation and remedial action as required under the Georgia Hazardous Waste Management Act, §12-8-60, et. seq. and 40 CFR 270.32(b)(2) in order to ensure adequate protection of human health and the environment.

2. Contamination for the purposes of this permit refers to the presence of any hazardous waste, hazardous waste constituent, or hazardous constituent in a concentration which exceeds the concentration of that waste or constituent in the immediate vicinity of the facility (in areas not affected by the facility).

3. Corrective Action for prior or continuing releases from any solid waste management unit at the facility, as well as for other releases, for the purposes of this permit shall be any measure necessary to protect human health and the environment for all releases of hazardous waste, hazardous waste constituents, or hazardous constituents from said solid waste management units at the facility, regardless of the time at which waste was placed in the unit, as required under 40 CFR 264.101 and/or 40 CFR 264.100 and as required under the Georgia Hazardous Waste Management Act, §12-8-60, et. seq. Corrective Action may address releases to air, soils, surface water, sediment or groundwater.

4. Extent of Contamination for the purposes of this permit is defined as the horizontal and vertical area in which the concentration of any hazardous waste, hazardous waste constituent or hazardous constituent in the environmental media being investigated is above estimated quantitation limits, as defined in the most recent version of SW-846 or is a naturally occurring concentration representative of the facility.

5. Facility for the purposes of this permit is defined as in Section 391-3-11-.02 of the Rules (40 CFR 260.10: "Facility"), amended to include the definition of "On-site" as defined at Volume 60 of the Federal Register, page 56468. The Facility, as applied to the Permittee, includes all property within the boundary marked "SUBASE BOUNDARY" on the Facility Map, Figure B-2 of the Permit Application dated August 16, 1995, as amended.

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6. Hazardous Constituents for the purposes of this permit are those substances listed in 40 CFR Part 261 Appendix VIII and 40 CFR Part 264 Appendix IX "Groundwater Monitoring List."

7. Investigation-Derived Waste (IDW) for the purposes of this permit is defined as waste generated through investigative processes. IDW may include, but is not limited to, drilling muds, cuttings, and purge water from test pit and well installations; purge water, soil, and other materials from collection of samples; residues (e.g. ash, spent carbon, well development purge water) from testing of treatment technologies including pump and treat systems; contaminated personal protective equipment (PPE); and solutions (aqueous or otherwise) used to decontaminate equipment.

8. Interim Measures for the purposes of this permit are actions necessary to minimize or prevent the further migration of contamination or limit actual or potential human and environmental exposure to contamination while long-term Corrective Action remedies are evaluated and, if necessary, implemented.

9. Land Disposal Facility for the purposes of this permit refers to a facility that uses a surface impoundment, landfill, land treatment or waste pile to manage or dispose of hazardous waste pursuant to §12-8-66 of the Georgia Hazardous Waste Management Act, as amended, and §3004 of RCRA, as amended.

10. Qualified Groundwater Scientist for the purposes of this permit means a scientist who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in groundwater hydrology and related fields, as demonstrated by current State of Georgia registration and completion of accredited university courses, that enable that individual to make sound professional judgements regarding groundwater monitoring and contaminant fate and transport.

11. Release for the purposes of this permit includes any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of any hazardous waste, hazardous waste constituents, or hazardous constituents.

12. Solid Waste for the purposes of this permit includes any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923).

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13. Solid Waste Management Unit (SWMU) for the purposes of this permit includes, but is not limited to, any landfill, surface impoundment, waste pile, land treatment unit, incinerator, injection well, tank (including storage, treatment, and accumulation tanks), container storage unit, wastewater treatment unit, including all conveyances and appurtenances used in waste management or storm water handling, elementary neutralization unit, transfer station, or recycling unit from which hazardous waste, hazardous waste constituents, or hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and/or hazardous waste. SWMUs include areas that have been contaminated by routine and systematic releases of hazardous wastes or hazardous constituents.

14. Unit for the purposes of this permit include, but is not limited to, any landfill, surface impoundment, waste pile, land treatment unit, incinerator, injection well, stilling well, tank, container storage area, septic tank, drain field, wastewater treatment unit, elementary neutralization unit, transfer station, waste pump station, or recycling unit.

F. Conditions Related to Compliance with General Facility Standards
(40 CFR Part 264 Subparts B, C, D, E, G, H)

1. The Permittee must follow the procedures and plans described in detail in the permit application dated August 16, 1995, as amended, which are hereby incorporated by reference and include at least the following:

a.	Waste Analysis Plan	Section C
b.	Inspection Schedule	Section F
c.	Contingency Plan	Section G
d.	Training Program	Section H
e.	Closure Plan	Section I

2. The following activities must be carried out as prescribed in 40 CFR Part 264, Subparts B, C, D, and E, and in accordance with the appropriate Sections of the permit application.

a. Security - §264.14(b) and (c)
b. Repairs and inspection log - §264.15(c) and (d)
c. Operating record - §264.73 and disposition of records - §264.74
d. Reports - §264.75 and §264.77
e. Annual review of training - §264.16
f. General requirements for ignitable, reactive and incompatible wastes - §264.17
g. Design and operation - §264.31
h. Access to communications or alarm system - §264.34
i. Testing and maintenance of equipment - §264.33
j. Arrangements with local authorities - §264.37
k. Amendment of contingency plan - §264.54
l. Maintain aisle space - §264.35

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3. The following activities must be carried out as prescribed in 40 CFR Part 264, Subparts G and H, and Section I of the permit application.

   a. Closure in accordance with approved Plan, contingent upon submittal, at the time of notification of closure, of statistical analyses for the number of samples and their locations that will be taken to verify clean closure - §264.113
   b. Amendment of Closure Plan and Notification of Closure - §264.112(b) and (c)
   c. Disposal or decontamination of equipment - §264.114
   d. Certification of Closure - §264.115

   The following are applicable only to the Explosive Ordnance Disposal Unit:

   e. Contingent Post-Closure - §264.117
   f. Contingent Post-Closure Plan and amendment of plan - §264.118
   g. Post-Closure Notices - §264.119
   h. Certification of Completion of Post-Closure Care - §264.120

G. Special Conditions Applicable to Entire Facility

1. Waste Minimization. The Permittee shall certify no less often than annually that the Permittee has a program in place to reduce the volume and toxicity of hazardous waste that he generates to the degree determined by the Permittee to be economically practicable, and the proposed method of treatment, storage or disposal is that practicable method currently available to the Permittee which minimizes the present and future threat to human health and the environment in accordance with 40 CFR 264.73(b)(9).

2. Land Disposal Restrictions. 40 CFR Part 268 identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise prohibited waste may continue to be placed on or in a land treatment, storage, or disposal unit. The Permittee shall maintain compliance with the requirements of 40 CFR Part 268. Where the Permittee has applied for an extension, waiver, or variance under this Part, the Permittee shall comply with all restrictions on land disposal under this Part once the effective date for the waste has been reached pending final approval of such application.

3. Relationship with Tenant Commands and Other Activities. Each tenant command, contractor worksite, AAFES operation, or other activity at the Facility is subject to the conditions of this Permit.
   a. All satellite accumulation areas including those at tenant commands and other activities shall be operated in accordance with all requirements of Section 391-3-11-.08 of the Rules (40 CFR 262 Subpart C).
   b. Accumulated waste at any satellite accumulation area shall be removed within three days of completion of accumulation to Building 6020 or to the proper 90-day accumulation area, the Temporary Containment Area (TCA) at each tenant command or other activity.

4. Generator Accumulation Sites. The Permittee shall provide the following at each individual or group generator accumulation site, TCA, satellite accumulation area, or area where IDW is managed at the Facility:

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a. Secondary containment and leak detection for containers, conforming to the requirements of 40 CFR 264 Subpart I. All containers, regardless of age or contents, are subject to this requirement.
b. Secondary containment and leak detection for tanks, conforming to the requirements of 40 CFR 264 Subpart J. All tanks, regardless of age or contents, are subject to this requirement.
c. The secondary containment requirement for satellite accumulation areas may be waived if the SAA is located on a competent, impervious, compatible surface, and protected from precipitation.

H. Standards for the Management of Used Oil

1. Definitions. Terms used in this section shall be defined as in 40 CFR Part 279.

2. Applicability. The conditions in this section apply to all used oil generation and management points at the Facility. The Facility is also subject to the applicable Spill Prevention, Control and Countermeasures requirements (40 CFR Part 112) and, for those sites utilizing underground tanks, the Underground Storage Tank requirements (40 CFR Part 280), whether or not the used oil exhibits any characteristics of hazardous waste. Determination of jurisdiction for underground storage tanks at the Facility shall be performed by the Director on a unit-by-unit basis.

3. General. The Permittee shall be subject to the requirements of 40 CFR Part 279 for the generation and management of used oil generated by, received at, or shipped from the Facility. Unless otherwise stated in Sections I.H.4. below, used oil activities at the Facility shall comply with the requirements of 40 CFR Part 279 Subpart C.

4. Storage of Used Oil. The Permittee shall store used oil only in tanks or containers. Storage containers and tanks shall be maintained and labeled, and releases responded to, as in 40 CFR Part 279 Subpart F. Containers of used oil generated at the facility shall be transferred to a TCA or Building 6020 within 72 hours of completion of accumulation.

SECTION II. STORAGE IN CONTAINERS

A. General. The conditions in this section apply to the Hazardous Waste Storage and Transfer Facility, Building 6020, as depicted in the Topographic Map, Figure B-3, and shown in Figures D-1 through D-5, of the permit application dated August 16, 1995, as amended. These conditions also apply to each TCA or satellite accumulation area at the Facility.

B. Conditions Related Solely to Storage in Containers

1. The Permittee is authorized to store a maximum of 59,840 gallons of hazardous waste in Building 6020, as identified in Section A of the permit application.

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2. No storage over 90 days of any hazardous waste is allowed in any area of the Facility other than Building 6020. Any container which has been in storage for 90 days shall be moved within twenty-four (24) hours to Building 6020.

3. No storage over 72 hours of any full container of hazardous waste is allowed in any satellite accumulation area.

4. For the purposes of this permit, the term "container" shall include any drum, tote box, tote tank, rolloff, tanker trailer, or other portable device used to accumulate, treat, store, or otherwise manage waste for any length of time.

5. If a container holding hazardous waste is not in good condition, or if it begins to leak, the Permittee shall transfer the hazardous waste from such container to a container that is in good condition.

6. Containers must be managed according to 40 CFR 264.173.

7. Each container in Building 6020 or in any 90-day storage area must be clearly marked with the words "Hazardous Waste," the applicable EPA Hazardous Waste Number(s) found in 40 CFR Part 261, and a description of the actual contents of that container.

8. Spilled or leaked waste and accumulated precipitation must be managed in accordance with 40 CFR 264.175(b)(5).

9. Incompatible wastes and materials must be managed according to 40 CFR 264.177.

10. The Permittee shall provide to the Director semiannually a list of changes to TCAs and satellite accumulation areas. The information to be provided shall include location and dates the unit commenced or terminated; waste streams managed or proposed; and estimated amounts of generation or other management of hazardous waste and of nonhazardous waste. This list may be submitted as part of the semiannual report required under Section I.C.7.

SECTION III. TREATMENT IN CONTAINERS

A. General: Conditions in this Section apply to the Trident Refit Facility LLRMW treatment area, the High Bay in Building 5063. Treatment is expressly limited to the designated treatment area.

B. Conditions Related Solely to Treatment in Containers

1. The Permittee is authorized to treat a maximum of 220 gallons per day of LLRMW in the treatment area. Treatment shall consist of stabilization of waste as described in Appendix D-2 of the permit application dated August 16, 1995, as amended.

2. Treatment shall be performed only in drums. Addition of treatment chemicals, mixing, and curing shall be performed entirely within the treatment area.

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3. Total volume of LLRMW, whether untreated, in process, or treated, in inventory at the treatment area shall not exceed 220 gallons.

4. Waste streams permitted to be treated are limited to the following, as described in Appendix C-8 of the permit application dated August 16, 1995, as amended. Other waste streams may be added only upon advance written approval of the Director.

   a. Radioactive Potassium Chromate Solution
   b. Radioactive Mercuric Nitrate Solution
   c. Radioactive Silver Nitrate Solution
   d. Radioactive Liquids with low pH

5. If a container holding waste, whether treated or untreated, is not in good condition, or if it begins to leak, the Permittee shall transfer the waste from such container to a container that is in good condition.

6. Containers must be managed according to §264.173.

7. Spilled or leaked waste and accumulated precipitation must be managed per §264.175(b)(5).

8. Incompatible wastes and materials must be managed according to §264.177.

SECTION IV. TREATMENT OF ENERGETIC MATERIALS BY OPEN BURNING OR OPEN DETONATION

A. General. The conditions in this section apply to the Explosive Ordnance Disposal Unit, Buildings 4979 and 4980, and the associated Magazines, Buildings 4969, 4970, 4971, 4972, and 4973, as depicted in the Facility Map, Figure B-2, and shown in Figures D-7 through D-10, of the permit application dated August 16, 1995, as amended.

1. Treatment is expressly limited to the designated treatment area delineated in the scale drawing of the facility, Figure D-9. No treatment by open burning or open detonation is allowed on any other area of the Facility. Emergency detonation-in-place will be allowed only in accordance with the Rules.

2. Storage of untreated waste is limited to the Magazines. No storage of treated or untreated waste is permitted in the treatment area. Treated waste, including ash and contaminated soil, shall be removed to Building 6020, or the appropriate TCA, within twenty-four (24) hours of treatment. Metallic debris generated by treatment may be managed as scrap metal at the option of the Permittee.

3. Treatment is expressly prohibited during meteorological conditions which could result in run-on or runoff, or atmospheric inversion or other event which limits dispersion of air pollutants.

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4. Operation of the unit in accordance with the conditions of this Permit and the procedures described in the permit application does not constitute a "fire" or an "explosion" as specified in 40 CFR Subparts C and D, or Section I.C.4.b. of this permit.

B. Conditions Related Solely to Treatment by Open Burning

1. The Permittee is allowed to treat by open burning a maximum gross weight of four thousand (4,000) pounds of energetic hazardous waste per calendar day. The wastes to be treated are limited to propellants and other non-detonating energetics as described in Section C, Appendix C-2 of the permit application dated August 16, 1995, as amended.

2. All treatment shall be performed within the Open Burning Device as depicted in Figure D-6, and in the manner described in Section D-2 of the permit application dated August 16, 1995, as amended.

3. No hazardous waste may be used as accelerant in the operation of the unit. The following are specifically excluded from use as accelerant: waste solvents, waste paint or paint-related materials, OTTO fuel, and gasoline. Waste loose granular smokeless powder may be used as accelerant.

4. For each treatment event, the effectiveness of treatment must be determined as soon as practicable (but no later than twenty-four hours after treatment) in accordance with the procedures described in Section C of the permit application dated August 16, 1995, as amended.

5. Spilled or leaked waste, whether treated or untreated, and accumulated precipitation must be managed in accordance with 40 CFR 264.175(b)(5).

6. Containers must be managed according to §264.173.

7. Incompatible wastes and materials must be managed according to §264.177.

C. Conditions Related Solely to Treatment by Open Detonation

1. The Permittee is allowed to treat by open detonation a Net Explosive Weight (NEW) of hazardous waste not to exceed one hundred fifty (150) pounds per calendar day. The wastes to be treated are limited to explosives and detonating energetics as described in Section C, Appendix C-2 of the permit application dated August 16, 1995, as amended.

2. All treatment shall be performed within the Open Detonation Treatment Area as depicted in Figures D-7 through D-10, and in the manner described in Section D-2 of the permit application dated August 16, 1995, as amended.

3. For each treatment event, the effectiveness of treatment must be determined as soon as practicable (but no later than twenty-four hours after treatment) in accordance

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with the procedures described in Section C of the permit application dated August 16, 1995, as amended.

4. Prior to any treatment event the Open Detonation Treatment Area must be cleared of all solid objects, including stones, metallic debris, or other potential projectiles, equal to or greater than 5.56 millimeters (0.223 inch) diameter or 3.63 grams (56 grains) mass as follows:

   a. For the soil surface, a two-feet radius around the charge, or twice the radius of the expected crater, whichever is greater.

   b. For the subsurface, a volume no less than the volume of the expected crater.

5. Spilled or leaked waste, whether treated or untreated, and accumulated precipitation must be managed in accordance with 40 CFR 264.175(b)(5).

6. Containers must be managed according to §264.173.

7. Incompatible wastes and materials must be managed according to §264.177.

D. Monitoring Requirements

1. The Permittee shall install, operate and maintain a system for the detection of release of any hazardous constituent from the treatment of hazardous waste at the Explosive Ordnance Disposal Unit. The monitoring system shall be designed so as to detect releases to surface soil, subsurface soil, and groundwater.

2. Compliance Schedule. The Permittee shall, within one hundred eighty (180) days of the effective date of this Permit, submit for EPD approval a monitoring plan for detection of releases described in IV.D.1. above. The monitoring plan must comply with 40 CFR §§264.95, 264.97, and 264.98. The plan shall at a minimum include the following:

   a. Design of the detection monitoring system
   b. Sampling and analysis plan
   c. Sampling schedule
   d. Surface and subsurface soil sampling points
   e. Groundwater monitoring well locations and construction specifications
   f. Provisions for establishing background concentrations in each medium
   g. Proposed inspection schedule and provisions for inspection log
   h. Implementation schedule

3. Upon approval of the Director, the Permittee shall implement the detection monitoring system according to the design and schedule in the approved plan.

4. If the detection monitoring system identifies a release to groundwater, the Permittee will prepare a plan for a compliance monitoring system conforming to the requirements of 40 CFR 264.99.

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SECTION V. CORRECTIVE ACTION FOR RELEASES FROM SOLID WASTE MANAGEMENT UNITS AND OTHER RELEASES

For the purposes of this permit, the need to conduct corrective action shall be determined for any releases into the environment of hazardous waste, hazardous waste constituents, or hazardous constituents, including releases beyond the Permittee's property boundary. Corrective action is required for any releases of hazardous waste, hazardous waste constituents, or hazardous constituents regardless of whether or not the releases were from a solid waste management unit.

A. Applicability

1. The determination of the need for and subsequent implementation of Corrective Action is required by 40 CFR 264.101(a) and §12-8-66 of the Georgia Hazardous Waste Management Act for releases from all Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) contained within the facility property boundaries and, as required by §12-8-66 of the Georgia Hazardous Waste Management Act and 40 CFR 264.101(c), for releases extending beyond the facility property boundaries.

2. The conditions of this Section apply to the following SWMUs as identified in the RCRA Facility Assessment (RFA) dated June 9, 1993, and in Appendix K-1 of the permit application dated August 16, 1995, and any additional SWMUs or AOCs discovered by any other means:

SWMU 1:	Area adjacent to the boat paint kitchen at Refit #2
SWMU 2:	Outside building 5117 at the 90-day storage area
SWMU 3:	(NEESA Site 11) Old Camden County Landfill
SWMU 4:	(NEESA Site 5) Army Reserve Disposal Area, Towhee Trail
SWMU 5:	(NEESA Site 2) Fire Fighting Pit
SWMU 6:	(NEESA Site 16) Army Reserve Disposal Area near Old Sewage Lagoon 3990
SWMU 7:	Paint mix and storage building inside the Hull Cleaning Support Shop Building 5073

B. Notification and Assessment Requirements for Newly Identified SWMUs or AOCs

1. The Permittee shall notify the Director in writing, within fifteen (15) calendar days of the discovery of any additional SWMUs or AOCs discovered under Section V.A. Notification shall include, at a minimum, the location of the SWMU or AOC and all available information pertaining to the nature of the release (e.g., media affected, hazardous constituents released, magnitude of release, etc.). The permit shall be modified in accordance with 40 CFR Part 270 to incorporate the newly discovered SWMUs or AOCs.

2. The Permittee shall prepare a SWMU Assessment Report (SAR) for each additional SWMU or AOC discovered subsequent to issuance of this permit which is known or suspected to have releases to the environment. The SAR shall be submitted within

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sixty (60) days of discovery of a new SWMU or AOC. The report must also include, at a minimum, the following information for each SWMU or AOC:

a. Type of unit
b. Location of the unit on a topographic map of appropriate scale
c. General dimensions and capacities (including available plans or drawings)
d. Function of the unit
e. Dates that the unit was operated
f. Description of the wastes that were placed in the unit
g. Description of any known releases or spills (to include groundwater data, soil analyses, sediment, air and/or surface-water data)

3. Based on the contents of the SAR, the Director shall determine the need for further investigations at the SWMUs or AOCs covered in the SAR. If the Director determines that such investigations are needed, the Permittee shall be notified to prepare an RFI workplan, as outlined in Section V.D., for such investigations.

C. Notification Requirements for Newly Discovered Releases at Previously Identified SWMUs and AOCs

1. The Permittee shall notify the Director in writing of any newly discovered release(s) at SWMUs or AOCs previously identified in Section V.A & V.B, discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means, within fifteen (15) calendar days of discovery.

2. The Director will determine whether the Permittee shall perform further investigation of such newly discovered releases. If required by the Director, the Permittee shall prepare a workplan for a RCRA Facility Investigation (RFI). The RFI workplan shall conform to the requirements outlined in Section V.D.2.

D. RCRA Facility Investigation (RFI)

1. The Permittee shall complete and submit an RFI Workplan for:

a. SWMUs or AOCs discovered subsequent to issuance of this permit which are known or suspected to have releases to the environment. This workplan shall be submitted not later than one hundred eighty (180) days after EPD notification as per Section V.B.3.

b. SWMUs and AOCs identified in Section V.A requiring investigation. This workplan shall be submitted within one hundred eighty (180) days of the effective date of this permit.

2. The RFI Workplan, required by Section V.D.1. shall include, but is not limited to, a schedule of implementation and report submittal; a description of the specific actions necessary to determine the nature and extent of contamination; potential migration pathways for releases (e.g., air, land, surface water, and groundwater); actual or potential receptors and applicable background concentrations. The Permittee must

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provide sufficient justification that migration through a potential pathway is unlikely before it can be excluded from the Workplan. Such exclusions are subject to the approval of the Director.

3. Upon approval by the Director of the RFI Workplan(s) required by Section V.D.1., the Permittee shall conduct the RFI in accordance with the schedule contained therein.

4. RFI Reports

   a. The Permittee shall complete and submit the RFI Report(s) in accordance with the schedule contained in the RFI Workplan required by Section V.D.1. The Reports shall provide a summary of all activities undertaken during the RFI(s) to implement the approved Workplan. The Report shall provide a complete description of the nature and extent of contamination identified during the RFI(s) including sources, migration pathways, actual or potential receptors and applicable background concentrations. The RFI Report shall address all releases which extend beyond the facility property boundary unless the Permittee demonstrates to the Director's satisfaction that, despite the Permittee's best efforts, the Permittee was unable to obtain permission to undertake actions required by the Workplans.

   b. If the time required to conduct the RFI is greater than one hundred eighty (180) calendar days, the Permittee may be required to provide the Director with semiannual RFI Progress Reports (six-calendar-month intervals) beginning one hundred eighty (180) calendar days from the initiation of the RFI as specified in the approved RFI Workplan. The Progress Reports shall, at a minimum, contain the following information:

      i. A description of the portion of the RFI completed
      ii. Summaries of findings
      iii. Summaries of any deviations from the approved RFI Workplan during the reporting period
      iv. Summaries of all contacts with local community public interest groups or State government regarding RFI investigations
      v. Summaries of any problems or potential problems encountered during the reporting period
      vi. Actions taken to rectify problems
      vii. Changes in relevant personnel
      viii. Projected work for the next reporting period

5. The Director shall review the final RFI Report required by Section V.D.4., and upon determination that each Report is complete, shall notify the Permittee of the need for further investigative actions and/or the need for Corrective Action as required under 40 CFR 264.101(a), 40 CFR 264.101(c), and §12-8-71(b) of the Georgia Hazardous Waste Management Act.

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E. Corrective Action Plan (CAP)

1. Upon written notification by the Director that Corrective Action is needed, the Permittee shall submit a Corrective Action Plan in accordance with a schedule to be determined by the Director. The Corrective Action Plan must include a description of the remedial actions to be taken at each SWMU and/or AOC, media and/or structure clean-up values, a schedule of implementation and completion, and a cost estimate for completion of Corrective Action as required by 40 CFR 264.101(b).

2. Upon approval by the Director of any Corrective Action Plan required by Section V.E.1., the Permittee shall implement any required Corrective Action in accordance with the schedule in the approved CAP.

3. If the Director or the Permittee at any time determine that any SWMU and/or AOC investigation, Corrective Action Plan or Interim Measure required under Sections V.D., V.E. or V.F. no longer satisfy the requirements of 40 CFR §264.101 or this permit for prior or continuing releases from SWMUs or AOCs, the Permittee must submit an amended plan or report to the Director within sixty (60) days of such determination.

4. If the Permittee is required to develop a Corrective Action Plan under Section V.E., the Permittee shall apply for a permit modification pursuant to 40 CFR 270.42 to incorporate the approved CAP into the permit.

F. Interim Measures (IM)

1. Requirement for Interim Measures

The Permittee shall conduct Interim Measures (IM) for any SWMU or AOC, either upon notification by the Director that IM are necessary or if the Permittee wishes to implement IM in order to stabilize a release.

2. IM Workplan

a. The IM Workplan shall be submitted within thirty (30) calendar days of such notification and shall include the elements listed in Section V.F.2.b. Such Interim Measures may be conducted concurrently with investigations required under the terms of this permit.

b. The IM Workplan shall be consistent with and integrated into any long-term Corrective Action at the facility. The IM Workplan shall include: the Interim Measures objectives, procedures for implementation (including any designs, plans, or specifications), and schedules for implementation.

c. The IM Workplan must be approved by the Director, in writing, prior to implementation. The Director shall specify the start date of the IM in the letter approving the IM Workplan.

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3. IM Implementation

a. The Permittee shall implement the Interim Measures in accordance with the schedule contained in the approved IM Workplan.

b. The Permittee shall give notice to the Director, for approval, at least fifteen (15) days prior to any planned changes, reductions or additions to the IM Workplan.

c. Final approval of Corrective Action required by 40 CFR 264.101 which is achieved through Interim Measures shall be in accordance with 40 CFR 270.41.

4. IM Reports

a. Within ninety (90) days of completion of Interim Measures, the Permittee shall complete and submit to the Director an Interim Measures Report. The Report shall provide, but is not limited to, the following information:

i. A description of Interim Measures implemented
ii. A summary of all data or other information obtained during implementation of Interim Measures
iii. A summary of the effectiveness of the Interim Measures in achieving the objective of containing, removing and/or treating Contamination resulting from a Release from a SWMU or AOC in order to protect human health and the environment
iv. A summary of all problems encountered during the Interim Measures implementation, and the solutions to those problems
v. Copies of all relevant laboratory/monitoring data

b. If the time required for completion of Interim Measures is greater than one year, the Permittee shall provide the Director with Progress Reports at intervals specified in the approved IM Workplan. The Progress Reports shall contain the following information at a minimum:

i. A description of the portion of the Interim Measures completed
ii. Summaries of any deviations from the IM Workplan during the reporting period
iii. Summaries of any problems or potential problems encountered during the reporting period and the solutions to those problems
iv. Projected work for the next reporting period
v. Copies of laboratory/monitoring data

G. Reporting, Recordkeeping and Response

1. All Workplans and schedules shall be subject to approval by the Director prior to implementation. Upon approval, the Permittee shall implement all Workplans and schedules as written, or as specified by the Director.

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2. In the event of the Director's disapproval (in whole or in part) of any document required by this Section of the permit, the Director shall specify any deficiencies in writing.

3. All Workplans and Reports shall be submitted in accordance with the approved schedule. Extensions of the due date for submittals may be granted by the Director based on the Permittee's demonstration that sufficient justification for the extension exists.

4. The Permittee shall enter all monitoring, testing and analytical data obtained pursuant to the conditions of this permit into the operating record, as required by 40 CFR 264.73(b)(6).

5. The Permittee shall have all workplans and reports, which involve installation of groundwater monitoring wells or systems and/or the interpretation of data gathered from those wells or systems, prepared and certified by a Qualified Groundwater Scientist.

6. All raw data, such as laboratory reports, drilling logs, bench-scale or pilot-scale data, and any other supporting information gathered or generated during activities undertaken pursuant to this Section shall be maintained at the facility during the term of this permit, including any reissued permits.

7. The Permittee shall ensure that all plans, reports, notifications, and other submissions to the Director required in this Section are signed and certified in accordance with 40 CFR 270.11.

PUBLIC NOTICE
NOTICE OF PUBLIC HEARING

The Environmental Protection Division (EPD) of the Georgia Department of Natural Resources, under the authority of the Georgia Hazardous Waste Management Act, O.C.G.A. Section 12-8-60, *et seq.*, as amended, announces its intent to issue a modified Hazardous Waste Facility Permit, to be numbered HW-014(S & T)(2) to the Naval Submarine Base, Kings Bay, Georgia 31547, ID Number GA4170090001.

The Naval Submarine Base, Kings Bay generates large quantities of hazardous wastes from its various maintenance activities. The facility also treats waste misfired or damaged munitions by open burning and open detonation. On September 29, 1989, the EPD issued Hazardous Waste Facility Permit No. HW-014(S)(2) to Subase for the storage of 68,200 gallons of hazardous waste in a permitted storage area. This permit included provisions for corrective action for prior and continuing releases (that is, historical contamination) from the facility. The facility in August 1995 submitted a revised application, requesting a reduction in its permitted capacity, changes to its corrective action provisions and including a complete application for treatment of munitions by open burning and open detonation. The first two requests were approved in September 1995. The application for open burning and open detonation of munitions, and a new request for treatment in drums of low-level mixed radioactive hazardous waste, are the subject of the current permitting action. The EPD has decided that the permit application is complete, and that the requested permit should be issued.

A draft permit, prepared in accordance with the provisions of the Georgia Rules for Hazardous Waste Management, Chapter 391-3-11, contains the conditions Subase must follow to continue its treatment and storage of hazardous wastes, and for investigating and cleaning up past, present, and future contamination. The draft permit does not allow any disposal of hazardous wastes at the site.

Before making a final decision to issue the permit, Section 391-3-11-.01 (40 CFR §124.10) of the Rules requires EPD to provide an opportunity for public comment. Accordingly, a public comment period extends from August 7, 1996 to September 27, 1996. During the public comment period, a copy of the draft permit and supporting documents will be available for public review at:

Georgia Environmental Protection Division
Hazardous Waste Management Program
205 Butler Street, S.E., Suite 1154
Atlanta, Georgia 30334
Monday - Friday 8:00 a.m. to 4:30 p.m.
(404) 656-2833

St. Marys Public Library
101 Herb Bauer Dr.
St. Marys, Georgia 31549
Call library for hours
(912) 882-4800

The EPD invites comments to be made in writing during the public comment period. A public hearing will be held on Thursday, September 26, 1996 at 6:00 p.m. at the meeting room of the St. Marys Public Library. The public hearing will provide a forum for receipt of oral and written comments.

All comments received in the Hazardous Waste Branch office by the close of business on September 27, 1996 will be considered when the final decision to issue or deny the permit

renewal is made. The applicant and persons who submit written comments will be notified of the final decision by the Director of EPD. EPD will announce any substantial changes in the final outcome by public notice.

All comments should be addressed to:

Mr. Jim Ussery, Program Manager
Hazardous Waste Management Branch
Georgia Environmental Protection Division
205 Butler Street, S.E., Suite 1154
Atlanta, Georgia 30334

For additional information please contact Billy Hendricks at (404) 656-2833.

FACT SHEET
Naval Submarine Base - Kings Bay
Kings Bay, Georgia

A draft permit has been prepared to modify Hazardous Waste Facility Permit No. HW-014(S&T)-2, for the Naval Submarine Base, Kings Bay. This fact sheet has been prepared in accordance with Georgia's Rules for Hazardous Waste Management, Section 391-3-11-.11(5)(h) in order to advise the public of the principal facts and the significant legal, methodological and policy questions considered in preparing the draft permit.

I. PERMIT PROCESS

The purpose of the permitting process is to afford the Environmental Protection Division (EPD), interested citizens and other governmental agencies the opportunity to evaluate the ability of the Naval Submarine Base, Kings Bay, (the "Permittee") to comply with the applicable hazardous waste management requirements promulgated under Georgia Hazardous Waste Management Act. The permit conditions are set forth in one concise document which describes all the applicable requirements with which the Permittee must comply for the permit's duration.

II. PROCEDURES FOR REACHING A FINAL DECISION

The hazardous waste permit for the Naval Submarine Base will be administered by EPD. EPD has rules which require a permit to be issued for all facilities which treat, store, or dispose of hazardous waste.

The State of Georgia received final authorization for the 1984 amendments to the Resource Conservation and Recovery Act (RCRA), as amended, on September 18, 1986. Therefore, upon issuance, this permit will constitute a full RCRA permit as required by the Georgia Hazardous Waste Management Act and RCRA.

Georgia's Rules for Hazardous Waste Management, Section 391-3-11-.01 (40 CFR 124.10), require that the public be given a forty-five (45) day comment period for each draft permit prepared. The comment period will begin on the day of publication of the public notice in a major local newspaper of general circulation. Any person interested in commenting on the draft permit amendment must do so within the forty-five (45) day comment period. All comments should be submitted in writing to EPD at 205 Butler Street, SE, Suite 1154, Atlanta, Georgia 30334, Attention: Jim Ussery, Hazardous Waste Management Branch.

When the Director of EPD makes his final decision, notice will be given to the applicant and each person who has submitted written comments or requested notice of the final permit issuance decision. The permit is effective immediately upon issuance, but may be appealed for a period of thirty (30) days after the date of issuance.

Contact person for the Naval Submarine Base Draft Hazardous Waste Facility Permit issuance is:

Billy Hendricks
Hazardous Waste Management Branch
Georgia Environmental Protection Division
205 Butler Street, SE, Suite 1162
Atlanta, Georgia 30334
(404) 656-2833.

III. FACILITY DESCRIPTION

The Naval Submarine Base, Kings Bay, Georgia, or "Subase," is the home port for the U.S. Navy's Fleet Ballistic Missile submarines in the Atlantic theater of operation. These are said to be Trident submarines because of the missiles they carry, the Trident D-5, but are more properly known as Ohio-class submarines. Maintenance and refit of these submarines, and contract maintenance for naval surface ships and attack submarines, is undertaken here. The submarine force has recently expanded to comprise nine of these Ohio-class ships.

Subase is the permit holder; the permit allows storage in containers of 59,840 gallons of hazardous waste, and corrective action for solid waste management units (SWMUs). The base also has interim status for one Subpart X unit, an open burning/open detonation unit operated by the Subase's explosive ordnance disposal, or EOD, operation. The permitted storage unit is operated by Johnson Controls, the Base Operating Systems, or BOS, contractor.

Hazardous waste activities at the base include generation of waste paint, paint chips, and other paint related materials from the maintenance of interior and exterior surfaces of submarines; maintenance of ships' systems; and maintenance of base operations. The majority of these wastes are generated by the Trident Refit Facility, which is tasked with the majority of the maintenance work done aboard Subase. Other operations at Subase which generate wastes include the Strategic Weapons Facility, Atlantic or SWFLANT, which has the responsibility for maintaining the Trident ballistic missiles, their warheads, and associated systems; the Trident Training Facility, which has the responsibility for training ships' crews; and Subase itself, which maintains all of the land side assets of the naval operation here. Group Ten and Squadron Twenty, which are the command structure for the ships themselves, generate only minor amounts of waste.

The facility first submitted a RCRA Part B application in April 1984 and was issued EPA Identification number GA4170090001. They were granted Hazardous Waste Facility Permit Number HW-014(S) in 1984, for storage of a variety of hazardous waste in containers. This Permit was revoked and reissued September 29, 1989,

incorporating a new storage building and other improvements.

Because of the variety of process operations at the Naval Sub Base, the universe of hazardous wastes generated is quite broad. Its Part A Application includes most D and F waste codes, and about 100 U and P waste codes. Most of this is waste paint and paint-related materials, oils and fuels intrinsically hazardous or being handled as hazardous, and corrosive wastes such as batteries.The current permit does not allow the disposal of any additional hazardous wastes at the facility.

IV. PERMIT ORGANIZATION

The permit is divided into six sections. A cover sheet first sets forth the basic, legal authority for issuing the permit. Section I specifies the standard conditions which are applicable to all hazardous waste management facilities. Section II addresses storage of hazardous waste in containers. Section III addresses treatment in containers of low-level radioactive mixed waste from the Trident Refit Facility. Section IV addresses treatment by open burning and open detonation of waste munitions. Section V addresses corrective action for releases from solid waste management units and other releases.

RULES
OF
GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

CHAPTER 391-3-11
HAZARDOUS WASTE MANAGEMENT

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Adopted: December 6, 1995
Effective: December 28, 1995

391-3-11-.01 General Provisions. Amended.

(1) Purpose-The purpose of these rules is to establish policies, procedures, requirements, and standards to implement the Georgia Hazardous Waste Management Act, O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995). These rules are promulgated for the purpose of protecting and enhancing the quality of Georgia's environment and protecting the public health, safety and well-being of its citizens.

(2) Any reference in these rules to standards, procedures, and requirements of Title 40 of the Code of Federal Regulations (40 C.F.R.) Parts 260-268 and Part 279 or 40 C.F.R. Parts 124 or 270 shall constitute the full adoption by reference of the Part, Subpart, and Paragraph so referenced including any notes and appendices as may be associated, unless otherwise stated. Provided, however, nothing in 40 C.F.R. Parts 260-268 and Part 279 or 40 C.F.R. Parts 124 or 270, as pertains to permits for Underground Injection Control Program (U.I.C.) under the Safe Drinking Water Act, the Dredge or Fill Program under § 404 of the Clean Water Act, National Pollution Discharge Elimination System (NPDES) under Clean Water Act or Prevention of Significant Deterioration Program (PSD) under the Clean Air Act is adopted or included by reference herein.

(a) When used in any such provisions as may be adopted from 40 C.F.R. Parts 260-268 and Part 279, and Parts 124 and 270: United States, except in reference to regulations on international shipments, shall mean the State of Georgia; Environmental Protection Agency, except in reference to regulations on international shipments, shall mean Environmental Protection Division; and Regional Administrator, except in reference to regulations on international shipments, shall mean Director of the Environmental Protection Division. Unless specifically indicated otherwise, any reference to implementation by, submissions to, or inspections, investigations or enforcement to or by the Environmental Protection Agency in such regulations as may be adopted by reference by these rules shall be construed to mean the Georgia Environmental Protection Division, unless such interpretation would be inconsistent with the intent of the Georgia Hazardous Waste Management Act.

(b) Any reference to 40 C.F.R. Parts 124 or 270 in any provisions adopted by reference from 40 C.F.R. Parts 260-268 and Part 279 shall be construed to refer to the permitting provisions contained in § 391-3-11-.11 of these rules, and references to EPA forms or reports, except in reference to regulations on international shipments, shall mean EPD forms and reports as may be provided by the Director.

(c) 40 C.F.R. Part 260.3 (1994) is hereby incorporated by reference.

(3) As of July 10, 1992, any facility which failed to qualify for federal interim status for any waste code promulgated pursuant to HSWA or who lost interim status for failing to certify under HSWA for any newly promulgated waste code, is also denied interim status under State law.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.02 Definitions. Amended.

(1) 40 C.F.R. §§ 260.10-260.11 (1994), as amended by 60 Fed. Reg. 3,095 (Jan. 13, 1995), 60 Fed. Reg. 17,004 (April 4, 1995), and 60 Fed. Reg. 25,540 (May 11, 1995), are hereby incorporated by reference.

(2) Differences between State and Federal Definitions: When the same word is defined both in the Georgia Hazardous Waste Management Act and in 40 C.F.R. §§ 260.10, 268.2, and 270.2 (1994), as adopted by reference above, and the definitions are not identical, the definitions as given in the Georgia Hazardous Waste Management Act shall be applied unless such application would render these rules inconsistent with Federal Hazardous Waste rules and regulations.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.03 Confidentiality of Information. Amended.

(1) Any records, reports, or information obtained from any person by the Director under these rules shall be available to the public for inspection and copying at the expense of the person requesting copies, except that upon a showing satisfactory to the Director by any person that any records, reports, or information or any particular part thereof, to which the Director has access under these rules would, if made public, divulge information entitled to protection or confidentiality under law, the Director shall consider such information or any particular portion thereof confidential in accordance with the purposes of the law under which confidentiality or protection is claimed, except that such records, reports, documents, or information may be disclosed to officers, employees or authorized representatives of the United States government concerned with carrying out the terms of the Federal Act, or when required by any court in any proceedings under the Federal Act or under the Georgia Hazardous Waste Management Act.

(2) Any claim of confidentiality filed pursuant to this section must be asserted at the time of initial submission of the record, report, or information in question, or it shall be deemed waived.

(3) Any claim of confidentiality filed pursuant to this section must be accompanied by a statement of the legal basis supporting

the claim of confidentiality.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995), and O.C.G.A. § 50-18-70, et seq (1994 and Supp. 1995).

391-3-11-.04 Notification of Hazardous Waste Activities. Amended.

(1) Every hazardous waste generator, transporter, and owner or operator of a hazardous waste storage, treatment, or disposal facility shall notify the Division of such activities on forms provided by the Director.

(2) Any person who, on the effective date of these rules or effective date of any subsequent revisions of these rules, is generating or transporting hazardous waste or who owns or operates a hazardous waste storage, treatment, or disposal facility must notify the Division of such activities within 90 days after these rules or revisions to these rules become effective, unless such notification has previously been provided to the Regional Administrator of the Environmental Protection Agency in accordance with § 3010 of the Federal Act.

(3) Any person who, on the effective date of these rules or effective date of any subsequent revisions to these rules, is not generating hazardous waste and who subsequently begins to generate hazardous waste must, within 30 days after commencing such generation, notify the Division of such generation in accordance with subsection (1) above.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.05 Financial Responsibility. Amended.

(1) 40 C.F.R. Part 264, Subpart H (1994), and Part 265, Subpart H (1994), are hereby incorporated by reference.

(2) The Director shall require proof of adequate financial responsibility to insure any corrective action required as a condition of a permit issued pursuant to these rules.

(3) Methods other than those provided for in subsection (1) above may be used to insure financial responsibility if the owner or operator can show that an equivalent degree of protection can be provided concerning human health and the environment.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.06 Variances. Amended.

A variance shall be granted only if it is consistent with the requirements of the Georgia Hazardous Waste Management Act, as amended, and these rules and consistent with the Federal Act and regulations promulgated thereunder. The Director will evaluate the application for a variance and issue a draft notice tentatively granting or denying the application. Notification of this tentative decision will be provided by newspaper advertisement and radio broadcast in the locality where the applicant is located. The Director will accept comment on the tentative decision for thirty (30) days, and may also hold a public hearing upon request or at his discretion. The Director will issue a final decision after receipt of comments and after the hearing, if any.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.07 Identification and Listing of Hazardous Waste. Amended.

(1) 40 C.F.R. Part 261 (1994), as amended by 59 Fed. Reg. 38,545 (July 28, 1994), 59 Fed. Reg. 48,041 (Sept. 19, 1994), 60 Fed. Reg. 7,848 (Feb. 9, 1995), 60 Fed. Reg. 19,165 (April 17, 1995), 60 Fed. Reg. 25,540 (May 11, 1995), 60 Fed. Reg. 25,620 (May 12, 1995), and 60 Fed. Reg. 33, 913 (June 29, 1995), is hereby incorporated by reference.

(2) 40 C.F.R. Part 260, Subpart C (1994), as amended by 59 Fed. Reg. 48,041 (Sept. 19, 1994), is hereby incorporated by reference.

(3) The Director shall provide public notice of any petition to delist a waste and shall provide an opportunity for public comment thereon. Such public notice shall be paid for by the person requesting the delisting.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.08 Standards Applicable to Generators of Hazardous Waste. Amended.

(1) 40 C.F.R. Part 262 (1994), as amended by 60 Fed. Reg. 25,540 (May 11, 1995), is hereby incorporated by reference.

(2) Hazardous Waste Manifests shall be on forms as designated by the Director and shall be completed as required by the instructions supplied.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.09 Standards Applicable to Transporters of Hazardous Waste. Amended.

40 C.F.R. Part 263 (1994) is hereby incorporated by reference.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.10 Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities. Amended.

(1) 40 C.F.R. Part 265, Subparts A-G, Subparts I-R, Subpart W, Subpart AA, Subpart BB, and Subpart DD (1994), as amended by 59 Fed. Reg. 48,041 (Sept. 19, 1994), and 60 Fed. Reg. 25,540 (May 11, 1995), is hereby incorporated by reference.

(2) 40 C.F.R. Part 264, Subparts A-G, Subparts I-O, Subpart S, Subpart W, Subpart X, Subpart AA, Subpart BB, and Subpart DD (1994), as amended by 59 Fed. Reg. 48,041 (Sept. 19, 1994), and 60 Fed. Reg. 25,540 (May 11, 1995), is hereby incorporated by reference.

(3) 40 C.F.R. Part 266 (1994), as amended by 59 Fed. Reg. 38,545 (July 28, 1994), 59 Fed. Reg. 43,499 (Aug. 24, 1994), 59 Fed. Reg. 48,041 (Sept. 19, 1994), 60 Fed. Reg. 25,540 (May 11, 1995) and 60 Fed. Reg. 33,913 (June 29, 1995), is hereby incorporated by reference.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.11 Hazardous Waste Facility Permits. Amended.

(1) Permits Required: No person shall and it shall be unlawful and a violation of the Georgia Hazardous Waste Management Act to construct, install, operate or substantially alter a hazardous waste facility without first obtaining and possessing a hazardous waste facility permit from the Director.

(a) Scope of the RCRA Permit Requirement: 40 C.F.R. § 270.1(c) (1994), as amended by 60 Fed. Reg. 25,540 (May 11, 1995), is hereby incorporated by reference.

(b) 40 CFR § 124.1(a) (1994) is hereby incorporated by reference.

(2) Interim Status: Any person who owns or operates a facility required to have a permit under subsection (1) above, which facility was in existence on November 19, 1980, or is in existence on the effective date of statutory or regulatory changes pursuant to the Georgia Hazardous Waste Management Act that render the facility subject to the requirement to have a permit pursuant to

subsection (1) above, shall be accorded interim status, which means that such person shall be treated as having been issued a permit until such time as final administrative disposition of the person's application has been made, if and to the extent the person:

(a) Has notified the Director of the existence of such facility as required pursuant to Rule 391-3-11-.04;

(b) Has filed an application for a permit as required pursuant to these rules;

(c) Furnishes to the Director information reasonably required or requested for processing such application;

(d) Does not treat, store, or dispose of hazardous waste not specified in the permit application, nor employ processes not specified in the permit application, nor exceed the design capacity specified in the permit application; and

(e) Complies with all standards applicable to interim status facilities set forth in these rules.

(3) Application for Permit: An application for a Hazardous Waste Facility Permit shall be submitted in such manner and on such forms as the Director may prescribe.

(a) Application shall be complete and accurate and accompanied by required plans, data, specifications, engineering reports, design and other information as the Director deems necessary to make a determination of compliance with the Act, applicable standards and requirements and these rules. An application for a permit shall include a demonstration of financial responsibility including but not limited to guarantees, liability insurance, the posting of bonds, or any combination of guarantees, liability insurance, or bonds, in accordance with O.C.G.A. § 12-8-68 (1992) and § 391-3-11-.05 of these rules. Applications for permits will be reviewed together with such other information as may be necessary to ascertain the effect upon the environment and the health of humans.

(b) Permit Application and Updating Permit Applications for Existing and New Hazardous Waste Management Facilities: 40 C.F.R. § 124.3 (1994) and 40 C.F.R. § 270.10 (1994), as amended by 60 Fed. Reg. 33,913 (June 29, 1995), are hereby incorporated by reference.

(c) Signatories to Permit Applications and Reports: 40 C.F.R. § 270.11 (1994) is hereby incorporated by reference.

(d) Confidentiality of Information: 40 C.F.R. § 270.12(b) (1994) is hereby incorporated by reference.

(e) Interim Status: 40 C.F.R. §§ 270.70-270.73 (1994) are hereby incorporated by reference.

(f) Contents of Part A: 40 C.F.R. § 270.13 (1994) is hereby incorporated by reference.

(g) Contents of Part B: 40 C.F.R. §§ 270.14-270.27 (1994) are hereby incorporated by reference.

(4) Upon the first receipt of an application for a Hazardous Waste Facility Permit, the Director, within fifteen (15) days, shall provide to the government of the county in which the facility is located or proposed to be located, to each city government located wholly or partially within that county, and to the government of each county and city having territorial boundaries within two miles of the hazardous waste facility or proposed hazardous waste facility a written notice indicating that an application has been received and describing the hazardous waste activities the applicant proposes to conduct. Within a 30 day period after first receipt of such application, the director shall also publish in at least one local newspaper of general circulation in the county a public notice that an application for a hazardous waste facility permit has been received. A public hearing shall be held if such is requested in writing within thirty (30) days after publication of notification and is requested by twenty-five (25) or more persons who claim to be affected by the pending permit application, by a governmental subdivision, or by an association having no fewer than twenty-five (25) members. If requested, the public hearing shall be conducted at the county seat of the county in which the hazardous waste facility is proposed to be located. At least forty-five (45) days prior to the date of the public hearing, the Director shall provide written notice to the various local governmental subdivisions and other interested parties in the locality in which the proposed facility may be located that a public hearing has been requested, which written notice shall also include the date, time, location and purpose of the public hearing. The date, time, location and purpose of such public hearing shall be advertised in the legal organ of the county in which the facility is proposed at least forty-five (45) days in advance of the date set for the hearing. Such public hearings shall be held for the purpose of receiving comments and suggestions concerning the location and requirements for the operation of a hazardous waste facility. The Director shall consider fully all written and oral submissions regarding the proposed facility and the pending application.

(a) Public Notice of Permit Actions and Public Comment Period: 40 C.F.R. § 124.10 (1994) is hereby incorporated by reference.

(b) Public Comments and Request for Public Hearings: 40 C.F.R. § 124.11 (1994) is hereby incorporated by reference.

(c) Public Hearings: 40 C.F.R. § 124.12(a) (1994) is hereby incorporated by reference.

(d) Obligation to Raise Issues During Public Comment: 40 C.F.R. § 124.13 (1994) is hereby incorporated by reference.

(e) Reopening of the Public Comment Period: 40 C.F.R. § 124.14 (1994) is hereby incorporated by reference.

(f) Issuance and Effective Date of Permit: 40 C.F.R. § 124.15 (1994) is hereby incorporated by reference.

(g) Response to Comments: 40 C.F.R. § 124.17(a) and (c) (1994) is hereby incorporated by reference.

(h) The owner or operator of any hazardous waste treatment, storage or disposal facility shall pay any costs or expenses associated with public notices or notifications required by these rules including, but not limited to, public notices or notifications relating to permitting and closure activities.

(5) Issuance of Permit: A permit shall be issued to an applicant on evidence satisfactory to the Director of compliance with the provisions of the Act, any applicable standards or requirements and these rules.

(a) Any permit shall contain such terms and conditions, including conditions requiring corrective action beyond the facility boundary, as are deemed necessary by the Director to protect the environment and the health of humans, and the Director may require such testing and construction supervision as he deems necessary to protect the environment and the health of humans. Any permit issued subsequent to November 8, 1984, shall contain conditions requiring corrective action for any releases into the environment of hazardous waste or hazardous constituents at the facility seeking a permit, regardless of the time at which waste was placed at such facility.

(b) Conditions Applicable to all Permits: 40 C.F.R. § 270.30 (1994) is hereby incorporated by reference.

(c) Establishing Permit Conditions: 40 C.F.R. § 270.32 (1994) is hereby incorporated by reference.

(d) Schedules of Compliance: 40 C.F.R. § 270.33 (1994) is hereby incorporated by reference.

(e) Requirements for Recording and Reporting of Monitoring Results: 40 C.F.R. § 270.31 (1994) is hereby incorporated by reference.

(f) Effect of a Permit: 40 C.F.R. § 270.4 (1994) is hereby incorporated by reference.

(g) Draft Permits: 40 C.F.R. § 124.6 (a), (d) and (e) (1994) is hereby incorporated by reference.

(h) Fact Sheet: 40 C.F.R. §§ 124.7 and 124.8 (1994) are hereby incorporated by reference.

(i) Deadlines for Issuance: In the case of all hazardous waste facilities in existence on November 8, 1984, the Director must make a decision to issue or deny a permit by the following dates:

1. By November 8, 1988, for all land disposal facilities;

2. By November 8, 1989, for all incinerators; and

3. By November 8, 1992, for all other hazardous waste facilities.

(6) Denial of Permit: In the event of denial of a permit application, the Director shall send written notice of such action to the applicant and shall set forth in such notice the reason for the action. The denial of any permit by the Director shall become final unless a petition for hearing in accordance with O.C.G.A. § 12-8-73 (1992) is filed.

(a) 40 C.F.R. § 124.6 (b) (1994) is hereby incorporated by reference.

(b) 40 C.F.R. § 270.29 (1994) is hereby incorporated by reference.

(7) Amendment, Modification, Revocation or Suspension of Permit:

(a) The Director may amend, modify, suspend or revoke any permit issued for cause, including but not limited to, the following:

1. violation of any condition or provision of such permit or failure to comply with any final order of the Director;

2. failure to comply with the Act or these rules;

3. obtaining a permit by misrepresentation or failure to disclose fully all relevant facts; or

4. when the permitted facility poses a threat to the environment or the health of humans.

(b) In the event of amendment, modification, suspension or revocation of any permit, the Director shall serve written notice of such action on the permit holder and shall set forth in such notice the reason for such action.

(c) Modification, Revocation, Reissuance, or Termination of Permits: 40 C.F.R. §§ 270.41, 270.43 and 124.5 (1994) are hereby incorporated by reference.

(d) Permit Modification at the Request of Permittee: 40 C.F.R. § 270.42, and § 124.5 (1994) are hereby incorporated by reference.

(8) Transfer of Permits: Permits are not transferable from one person to another or from one site or facility to another unless such transfer is approved by the Director.

(a) 40 C.F.R. § 270.40 (1994) is hereby incorporated by reference.

(9) Duration of Permit: A permit shall be effective for a fixed term not to exceed 10 years.

(a) Each permit for a land disposal facility shall be reviewed by the Director five years after the date of permit issuance or reissuance and shall be modified as necessary to assure that the facility continues to comply with the currently applicable requirements of these rules.

(10) Special Forms of Permits: 40 C.F.R. §§ 270.60 - 270.63, 270.65, and 270.66 (1994) are hereby incorporated by reference.

(11) Noncompliance and Program Reporting by the Director: 40 C.F.R. § 270.5 (1994) is hereby incorporated by reference.

(12) Definitions Applicable to RCRA Permits: Definitions of words or terms applicable to RCRA permits as defined in 40 C.F.R. § 270.2 (1994), as amended by 60 Fed. Reg. 33,913 (June 29, 1995), are hereby incorporated by reference.

(13) References: 40 C.F.R. § 270.6 and 270.66 (1994) are hereby incorporated by reference.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.12 Inspection and Investigation. Amended.

(1) The Director or his authorized representative, upon presentation of his credentials, shall have a right to enter upon, to or through premises of persons subject to this Act, or premises whereon a violation of the Act or rules and regulations is reasonably believed to be occurring or is reasonably believed to be about to occur, to investigate, take samples, copy all records relating to hazardous wastes, and inspect for compliance with the

requirements imposed under the Act or the rules and regulations or to determine whether such a violation or threatened violation exists, in accordance with the following purposes:

(a) for the purpose of determining whether any person subject to the requirements of the Act is in compliance with these rules;

(b) for the purpose of investigating conditions relating to hazardous waste management or hazardous waste management practices where the Director is in possession of information sufficient to form a reasonable belief that a violation of the Act or these rules is occurring or is about to occur; or

(c) for the purpose of determining whether there has been a violation of any of the provisions of the Act, or these rules, or any permit or order issued pursuant to the Act and these rules.

(2) In the event any person does not consent to an inspection or investigation, the Director or his authorized representative may seek to obtain a warrant authorizing the inspection or investigation pursuant to O.C.G.A. § 12-2-2(d) (1992 and Cum. Supp. 1995).

(3) Each such inspection or investigation shall be commenced and completed with reasonable promptness. If the Director or his authorized representatives obtain any samples prior to leaving the premises, he or they shall give to the owner, operator, or agent in charge a receipt describing the sample obtained and, if requested, a portion of each sample equal in volume or weight to the portion retained. If any analysis is made of such samples, a copy of the results of such analysis shall be furnished promptly to the owner, operator, or agent in charge.

(4) This Section of these rules shall be construed so as to be consistent with § 3007(a) of the Federal Act, 42 U.S.C. § 6927(a) (1988).

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.13 Enforcement. Amended.

The administration and enforcement of these rules and regulations shall be in accordance with the Georgia Hazardous Waste Management Act, O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995) O.C.G.A. § 12-2-1, et seq. (1992 and Cum. Supp. 1995); and the Georgia Administrative Procedure Act, O.C.G.A. § 50-13-1, et seq. (1994).

Authority O.C.G.A. §12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.14 Public Participation. Amended.

Interested persons may participate in the enforcement of the Georgia Hazardous Waste Management Act and these rules pursuant to the applicable provisions of the Georgia Hazardous Waste Management Act, O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995); O.C.G.A. § 12-2-1, et seq. (1992 and Cum. Supp. 1995); the Georgia Administrative Procedure Act, O.C.G.A. § 50-13-1, et seq. (1994); the Georgia Civil Practice Act, O.C.G.A. § 9-11-1, et seq. (1993, and Cum. Supp. 1995); or any other applicable provision of Georgia law.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.15 Availability of Information. Amended.

(1) The Director shall make disclosure of records to the public within three working days of receipt of a request for disclosure, if and to the extent the requester:

(a) has filed a request in writing with the Director at 1252 Floyd Towers East, 205 Butler Street, S.E., Atlanta, Georgia 30334;

(b) has requested records which are subject to the Georgia Open Records Act, O.C.G.A. § 50-18-70, et seq. (1994 and Supp. 1995); and

(c) has requested records that are not exempt from disclosure pursuant to state law, O.C.G.A. § 50-18-70, et seq. (1994 and Supp. 1995), and O.C.G.A. § 12-8-78(a) (1992).

(2) No fee shall be charged for record inspection. Reasonable fees for copying records may be charged in accordance with procedures developed by the Director.

(3) If a request to inspect or copy records is denied, the Director shall furnish to the requester in writing the basis for the denial and a statement of the judicial remedies available to seek to obtain the requested records.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.16 Land Disposal Restrictions. Amended.

40 C.F.R. Part 268 (1994), as amended by 59 Fed. Reg. 43,499 (Aug. 24, 1994), 59 Fed. Reg. 47,980 (Sept. 19, 1994), 59 Fed. Reg. 48,041 (Sept. 19, 1994), 60 Fed. Reg. 244 (Jan 3, 1995) and 60 Fed. Reg. 25,540 (May 11, 1995), is hereby incorporated by reference, except for 40 CFR 268.5, 268.6, 268.42(b), and 268.44, which will be implemented by the U.S. Environmental Protection Agency.

Authority O.C.G.A. § 12-8-60, et seq. (1992 and Cum. Supp. 1995).

391-3-11-.17 Recycled Used Oil Management Standards

40 C.F.R. Part 279 (1994) is hereby incorporated by reference.

Authority O.C.G.A. § 12-8-60, et. seq. (1992 and Cum. Supp. 1995).

391-3-11-.18 Standards for Universal Waste Management

40 C.F.R. Part 273 (1994) [60 Fed. Reg. 25,540 (May 11, 1995)], is hereby incorporated by reference.

Authority O.C.G.A. § 12-8-60, et. seq. (1992 and Cum. Supp. 1995).

ARTICLE 3

HAZARDOUS WASTE

Cross references. — Regulation of transportation, storage, and disposal of pesticides and pesticide containers, § 2-7-106. Regulation of storage, handling, and transportation of gasoline, liquefied petroleum gases, anhydrous ammonia, and other flammable or hazardous substances, § 25-2-16. General power of Department of Human Resources and county boards of health to prevent environmental conditions which, if permitted to develop or continue, would endanger public health, Ch. 12, T. 31. Permits for disposal of radioactive waste, § 31-13-7. Regulation of transportation of radioactive materials, liquefied natural gas, and polychlorinated biphenyl, Ch. 11, T. 46. Abatement and removal of asbestos and other hazardous materials from public premises, § 50-9-80 et seq.

Editor's notes. — Ga. L. 1992, p. 2234, § 5 designated the existing provisions of Article 3, Code Sections 12-8-60 through 12-8-83, as Part 1.

Law reviews. — For survey article on constitutional law, see 34 Mercer L. Rev. 53 (1982). For survey article on environment, natural resources, and land use, see 34 Mercer L. Rev. 145 (1982). For article, "The Resource Conservation and Recovery Act (RCRA) and the Georgia Solid Waste Management Act," see 38 Mercer L. Rev. 569 (1987). For article, "The Installation Restoration Programs (IRP): Georgia's Perspective," see 38 Mercer L. Rev. 665 (1987).

RESEARCH REFERENCES

ALR. — Validity of local regulation of hazardous waste, 67 ALR4th 822.

Validity, construction, and application of state hazardous waste regulations, 86 ALR4th 401.

PART 1

HAZARDOUS WASTE MANAGEMENT

Editor's note. — Ga. L. 1992, p. 2234, § 5 designated the existing provisions of Article 3, Code Sections 12-8-60 through 12-8-83, as Part 1.

12-8-60. Short title.

This part shall be known as and may be cited as the "Georgia Hazardous Waste Management Act." (Ga. L. 1979, p. 1127, § 1; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, substituted "part" for "article".

JUDICIAL DECISIONS

Constitutionality. — Section 50-13-10 did not authorize plaintiffs to obtain declaratory judgment as to validity of rules enacted pursuant to the Hazardous Waste Management Act, where plaintiffs were contending that the Act and rules promulgated thereunder were unconstitutional. George v. Department of Natural Resources, 250 Ga. 491, 299 S.E.2d 556 (1983).

Cited in Earth Mgt., Inc. v. Heard County, 248 Ga. 442, 283 S.E.2d 455 (1981).

Cited in South Carolina Ins. Co. v. Coody, 813 F. Supp. 1570 (M.D. Ga. 1993).

RESEARCH REFERENCES

ALR. — Right to maintain action based on violation of § 7003 of Resource Conservation and Recovery Act (42 USCS § 6973) pertaining to imminent hazards from solid or hazardous waste, 105 ALR Fed. 800.

12-8-61. Legislative policy.

It is declared to be the public policy of the State of Georgia, in furtherance of its responsibility to protect the public health, safety, and well-being of its citizens and to protect and enhance the quality of its environment, to institute and maintain a comprehensive state-wide program for the management of hazardous wastes through the regulation of the generation, transportation, storage, treatment, and disposal of hazardous wastes. (Ga. L. 1979, p. 1127, § 2; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, near the end of the section, inserted "transportation,".

RESEARCH REFERENCES

Am. Jur. 2d. — 1 Am. Jur. 2d, Administrative Law, §§ 69-84, 123. 25 Am. Jur. 2d, Drains and Drainage Districts, §§ 2, 3. 61A Am. Jur. 2d, Pollution Control, § 247 et seq.

C.J.S. — 28 C.J.S., Drains, §§ 2-4.

12-8-62. Definitions.

As used in this part, the term:

(1) "Board" means the Board of Natural Resources of the State of Georgia.

(2) "Designated hazardous waste" means any solid waste identified as such in regulations promulgated by the board. The board may identify as "designated hazardous waste" any solid waste which the board concludes is capable of posing a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of or otherwise managed, based on the factors set forth in regulations promulgated by the administrator of the United States Environmental Protection Agency pursuant to the federal act which are codified as 40 C.F.R. Section 261.11(a)(3), in force and effect on February 1, 1991, if such solid waste contains any substance which is listed on any one or more of the following lists:

(A) List of Hazardous Constituents, codified as 40 C.F.R. Part 261, Appendix VIII, in force and effect on February 1, 1991;

(B) Ground-water Monitoring List, codified as 40 C.F.R. Part 264, Appendix IX, in force and effect on February 1, 1991;

(C) List of Hazardous Substances and Reportable Quantities, codified as 40 C.F.R. Table 302.4, and all appendices thereto, in force and effect on February 1, 1991;

(D) List of Regulated Pesticides, codified as 40 C.F.R. Part 180, in force and effect on February 1, 1991;

(E) List of Extremely Hazardous Substances and Their Threshold Planning Quantities, codified as 40 C.F.R. Part 355, Appendix A, in force and effect on February 1, 1991; or

(F) List of Chemicals and Chemical Categories, codified as 40 C.F.R. Part 372.65 in force and effect on February 1, 1991.

(3) "Director" means the director of the Environmental Protection Division of the Department of Natural Resources.

(4) "Disposal" means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

(5) "Division" means the Environmental Protection Division of the Department of Natural Resources.

(6) "Federal act" means the federal Solid Waste Disposal Act, as amended, particularly by the Resource Conservation and Recovery Act of 1976 (Public Law 94-580, 42 U.S.C. Section 6901, et seq.), as amended, particularly by but not limited to the Used Oil Recycling Act of 1980 (Public Law 96-463), the Solid Waste Disposal Act Amendments of 1980 (Public Law 96-482), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Public Law 96-510), the Hazardous and Solid Waste Amendments of 1984 (Public Law 98-616), and the Superfund Amendments and Reauthorization Act of 1986 (Public Law 99-499), as amended.

(7) "Final disposition" means the location, time, and method by which hazardous waste loses its identity or enters the environment, including, but not limited to, disposal, disposal site closure and post closure, resource recovery, and treatment.

(8) "Guarantor" means any person, other than the owner or operator, who provides evidence of financial responsibility for an owner or operator pursuant to this article.

(9) "Hazardous constituent" means any substance listed as a hazardous constituent in regulations promulgated by the administrator of the United States Environmental Protection Agency pursuant to the federal act which are in force and effect on February 1, 1991, codified as Appendix VIII to 40 C.F.R. Part 261 — Identification and Listing of Hazardous Waste.

(10) "Hazardous waste" means any solid waste which has been defined as a hazardous waste in regulations promulgated by the administrator of the United States Environmental Protection Agency pursuant to the federal act which are in force and effect on February 1, 1991, codified as 40 C.F.R. Section 261.3 and any designated hazardous waste.

(11) "Hazardous waste facility" means any property or facility that is intended or used for storage, treatment, or disposal of hazardous waste.

(12) "Hazardous waste generation" means the act or process of producing hazardous waste.

(13) "Hazardous waste management" means the systematic recognition and control of hazardous wastes from generation to final disposition or disposal, including, but not limited to, identification, containerization, labeling, storage, collection, source separation, transfer, transportation, processing, treatment, facility closure, post closure, perpetual care, resource recovery, and disposal.

(14) "Land disposal" means any placement of hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave.

(15) "Large quantity generator" means a hazardous waste generator who generates 2.2 pounds or more of acute hazardous waste or 2,200 pounds or more of hazardous waste in one month, as defined in the Rules for Hazardous Waste Management, Chapter 391-3-11, of the Board of Natural Resources.

(16) "Manifest" means a form or document used for identifying the quantity and composition, and the origin, routing and destination, of hazardous waste during its transportation from the point of generation, through any intermediate points, to the point of disposal, treatment, or storage.

(17) "Organization" means a legal entity, other than a government agency or authority, established or organized for any purpose, and such term includes a corporation, company, association, firm, partnership, joint stock company, foundation, institution, trust, society, union, or any other association of persons.

(18) "Person" means an individual, trust, firm, joint stock company, corporation (including a government corporation), partnership, association, municipality, commission, or political subdivision, or any agency, board, department, or bureau of this state or of any other state or of the federal government.

(19) "Serious bodily injury" means a bodily injury which involves a substantial risk of death, unconsciousness, extreme physical pain, protracted and obvious disfigurement, or protracted loss or impairment of the function of a bodily member, organ, or mental faculty.

(20) "Solid waste" means solid waste as defined by regulations promulgated by the administrator of the United States Environmental Protection Agency pursuant to the federal act which are in force and effect on February 1, 1991, codified as 40 C.F.R. Sections 261.1, 261.2(a)-(d), and 261.4(a).

(21) "Storage" means the containment or holding of hazardous waste, either on a temporary basis or for a period of years, in such a manner as not to constitute disposal of such hazardous waste.

(22) "Transport" means the movement of hazardous waste from the point of generation to any point of final disposition, storage, or disposal, including any intermediate point.

(23) "Treatment" means any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste or so as to render such waste nonhazardous, safe for transport, amenable for recovery, amenable for storage, or reduced in volume. Such term includes any activity or processing designed to change the physical form or chemical composition of hazardous waste so as to render it nonhazardous.

(24) "Waste reduction" means a practice, other than dewatering, dilution, or evaporation, by an environmental waste generator, including changes in production technology, materials, processes, operations or procedures or use of in-process, in-line, or closed loop recycling according to standard engineering practices, that reduces the environmental and health hazards associated with waste without diluting or concentrating the waste before release, handling, storage, transport, treatment, or disposal of the waste. The term does not include a practice applied to environmental waste after it is generated and exits a production or commercial operation. Waste reduction shall not in any way be inferred to promote, include, or require:

(A) Waste burning in industrial furnaces, boilers, or cement kilns;

(B) Transfer of an environmental waste from one environmental medium to another environmental medium (otherwise known as waste shifting);

(C) Conversion of a potential waste into another form for use in a production process or operation without serving any substantial productive function;

(D) Off-site waste recycling; or

(E) Any other method of end-of-pipe management of environmental wastes. (Ga. L. 1979, p. 1127, § 4; Ga. L. 1985, p. 266, §§ 1, 2; Ga. L. 1986, p. 10, § 12; Ga. L. 1986, p. 761, §§ 1, 2; Ga. L. 1987, p. 3, § 12; Ga. L. 1988, p. 727, § 1; Ga. L. 1990, p. 1427, § 1; Ga. L. 1991, p. 456, § 1; Ga. L. 1992, p. 2234, § 5.)

The 1990 amendment, effective July 1, 1990, added paragraphs (10.2) and (17).

The 1991 amendment, effective April 9, 1991, redesignated the paragraph designations, so that the designations consist of whole numbers and not numbers containing decimal points; inserted "and all appendices thereto," following "Table 302.4," in present subparagraph (2)(C); substituted present subparagraph (2)(F) for former subparagraph (1.1)(F), which read as follows: "Proposed list of chemicals and chemical categories, as set forth in 50 Fed. Reg. 21168-21179, June 4, 1987.";

and substituted "1991" for "1988" throughout present paragraphs (2) through (20).

The 1992 amendment, effective July 1, 1992, in the introductory paragraph, substituted "part" for "article".

Code Commission notes. — Pursuant to § 28-9-5, in 1990, a comma was inserted following "Chapter 391-3-11" in paragraph (10.2), following "operations" in the first sentence of the introductory language in paragraph (17), and following "include" in the third sentence of the introductory language in paragraph (17).

U.S. Code. — The federal Solid Waste Disposal Act, referred to in paragraph (6) of this Code section, was formerly codified at 42 U.S.C. § 3251 et seq. The federal Solid Waste Disposal Act was amended, reorganized, and expanded by the federal Resource Conservation and Recovery Act of 1976, referred to and cited in paragraph (6) of this Code section.

12-8-63. Administration of article by division; enforcement of article by director.

The division shall be the state agency to administer this article. The director shall be the official charged with the primary responsibility for the enforcement of this article. In exercising any authority or power granted by this article and in fulfilling his duties under this article, the director shall conform to and implement the policies outlined in this article. (Ga. L. 1979, p. 1127, § 2; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, in the last sentence, substituted "under this article" for "hereunder".

RESEARCH REFERENCES

Am. Jur. 2d. — 1 Am. Jur. 2d, Administrative Law, §§ 69-84, 123. 25 Am. Jur. 2d, Drains and Drainage Districts, §§ 2, 3. 61A Am. Jur. 2d, Pollution Control, § 247 et seq.

C.J.S. — 73 C.J.S., Public Administrative Law and Procedure, §§ 8 et seq., 49 et seq., 100.

12-8-64. Powers and duties of board as to hazardous waste.

ALR. — Vendor's obligation to disclose to purchaser of land presence of contamination from hazardous substances or wastes, 12 ALR5th 630.

In the performance of its duties, the board shall have and may exercise the power to:

(1) Adopt, promulgate, modify, amend, and repeal rules and regulations to implement and enforce the provisions of this article as the board may deem necessary to provide for the control and management of hazardous waste to protect the environment and the health of humans. Such rules and regulations may be applicable to the state as a whole or may vary from area to area, as may be appropriate to facilitate the accomplishment of the provisions, purposes, and policies of this article. The rules and regulations shall include, but shall not be limited to, the following:

(A) Rules and regulations governing and controlling standards applicable to hazardous waste generators, hazardous waste transporters, and owners or operators of hazardous waste treatment, storage, or disposal facilities. These rules and regulations may include measures to ensure that hazardous waste management practices are regulated, governed, and controlled in the public interest. Such measures may include, but shall not be limited to:

(i) The establishment of record-keeping procedures;

(ii) Requirements calling for the submission of reports to the director; and

(iii) The establishment of monitoring practices;

(B) Rules and regulations governing and controlling the treatment, storage, and disposal of hazardous waste;

(C) Rules and regulations specifying the terms, provisions, and conditions under which the director shall issue, modify, amend, revoke, or deny permits pursuant to this article;

(D) Rules and regulations governing and controlling hazardous waste management;

(E) Rules and regulations establishing procedures and requirements for the reporting of the generation of hazardous wastes and governing and controlling the activities of hazardous waste generators;

(F) Rules and regulations establishing standards and procedures for the operation and maintenance of hazardous waste facilities;

(G) Rules and regulations establishing the use of a manifest during the generation and handling of hazardous wastes;

(H) Rules and regulations establishing procedures to ensure public access to records and to ensure protection of trade secrets and confidential information, the disclosure of which to the director is required by this article or the rules and regulations adopted under this article;

(I) Rules and regulations establishing procedures and requirements for the use and disposition of hazardous waste or hazardous constituents;

(J) Rules and regulations deleting certain solid wastes from the definition of hazardous waste;

(K) Rules and regulations exempting from some or all regulation certain small quantities of hazardous waste;

(L) Rules and regulations exempting from some or all regulation certain hazardous wastes that are recyclable; and

(M) Rules and regulations designating certain solid wastes as designated hazardous wastes; and

(2) Take all necessary steps to ensure the effective enforcement of this article. (Ga. L. 1979, p. 1127, § 5; Ga. L. 1985, p. 266, § 3; Ga. L. 1988, p. 727, § 2; Ga. L. 1992, p. 2234, § 5.)

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

Administrative rules and regulations. — Official Compilation of Rules and Regulations of the State of Georgia Department of Natural Resources, Ch. 391-3-11.

RESEARCH REFERENCES

Am. Jur. 2d. — 1 Am. Jur. 2d, Administrative Law, §§ 88, 92-137.

C.J.S. — 73 C.J.S., Public Administrative Law and Procedure, § 87 et seq.

12-8-65. Powers and duties of director as to hazardous waste.

(a) The director shall have and may exercise the following powers and duties:

(1) To exercise general supervision over the administration and enforcement of this article and all rules and regulations, orders, or permits promulgated or issued hereunder;

(2) To encourage, participate in, or conduct studies, reviews, investigations, research, and demonstrations relating to hazardous waste management practices in this state as he deems advisable and necessary;

(3) To issue all permits contemplated by this article, stipulating in each permit the conditions or limitations under which such permit is issued, and to deny, revoke, modify, or amend such permits;

(4) To make investigations, analyses, and inspections to determine and ensure compliance with this article, the rules and regulations promulgated hereunder, and any permits or orders which the director may issue;

(5) To enter into such contracts as may be required or necessary to effectuate this article or the rules and regulations promulgated under this article;

(6) To prepare, develop, amend, modify, submit, and enforce any comprehensive plan or program sufficient to comply with this article or the federal act, or both, for the control, regulation, and monitoring of hazardous waste management practices in this state;

(7) To develop and implement plans to achieve goals and objectives set by any comprehensive plan or program;

(8) To conduct such public hearings as are required by this article or as he deems necessary for the proper administration of this article and to control and manage the conduct and procedure for such public hearings;

(9) To advise, consult, cooperate, and contract on hazardous waste management matters with other agencies of this state, political subdivisions thereof, and other designated organizations or entities, and, with the approval of the Governor, to negotiate and enter into agreements with the governments of other states and the United States and their several agencies, subdivisions, or designated organizations or entities, provided that nothing in this article shall authorize the division to own or operate a hazardous waste storage, treatment, or disposal facility;

(10) To collect and disseminate information and to provide for public notification in matters relating to hazardous waste management;

(11) To issue, amend, modify, or revoke orders as may be necessary to ensure and enforce compliance with this article and all rules or regulations promulgated hereunder;

(12) To institute, in the name of the division, proceedings of mandamus, injunction, or other proper administrative, civil, or criminal proceedings to enforce this article, the rules and regulations promulgated hereunder, or any orders or permits issued hereunder;

(13) To accept, receive, administer, or disburse grants from public or private sources for the purpose of the proper administration of this article or for the purpose of carrying out any of the duties, powers, or responsibilities hereunder;

(14) To grant variances in accordance with this article and the rules and regulations promulgated hereunder, provided that such variances are not inconsistent with the federal act and rules or regulations promulgated thereunder;

(15) To encourage voluntary cooperation by persons and affected groups to achieve the purposes of this article;

(16) To assure that the State of Georgia complies with the federal act and retains maximum control thereunder and receives all desired federal grants, aid, and other benefits;

(17) To require any person who is generating, transporting, treating, storing, or disposing of hazardous waste to notify the division in writing, within a reasonable number of days which the director shall specify, of the location and general description of such activity and identifying the hazardous waste handled, and any other information

which may be deemed relevant, under such conditions as the director may prescribe;

(18) To maintain an inventory of hazardous wastes within the state, including such information as location, identity, quantity, method of storage, rate of accumulation, disposal practices, and any other information which the director may deem necessary to administer and enforce this article;

(19) To exclude from regulation under this article the solid waste at any particular generating facility if it is determined that such solid waste does not pose a danger to human health or the environment;

(20) To establish hazardous waste management standards for the state, provided that they are in all cases not less stringent than those standards provided by the federal act;

(21) To take all necessary steps to ensure that the administration of this article is consistent with and equivalent to the provisions of the federal act and any standards, rules, or regulations promulgated thereunder toward the end that the State of Georgia shall have maximum control over hazardous waste management practices in this state; and

(22) To exercise all incidental powers necessary to carry out the purposes of this article.

(b) The powers and duties described in subsection (a) of this Code section may be exercised and performed by the director through such duly authorized agents and employees as he deems necessary and proper. (Ga. L. 1979, p. 1127, § 6; Ga. L. 1988, p. 727, § 3; Ga. L. 1992, p. 2234, § 5.)

Cross references. — Permits for disposal of radioactive wastes, § 31-13-7.

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

RESEARCH REFERENCES

Am. Jur. 2d. — 1 Am. Jur. 2d, Administrative Law, §§ 69-186. 63A Am. Jur. 2d, Public Officers and Employees, § 298 et seq.

C.J.S. — 67 C.J.S., Officers and Public Employees, §§ 190-210. 73 C.J.S., Public Administrative Law and Procedure, § 49 et seq.

12-8-65.1. Hazardous waste reduction plans; specific performance goals; biennial progress reports; rules and regulations.

(a) By not later than March 1, 1992, large quantity hazardous waste generators shall develop hazardous waste reduction plans and submit such plans to the director. At a minimum, the plans shall include:

(1) A written policy articulating upper management and corporate support for the generator's hazardous waste reduction plan and a commitment to implement plan goals;

(2) The scope and objectives of the plan, including the evaluation of technologies, procedures, and personnel training programs to ensure unnecessary hazardous waste is not generated and specific goals for hazardous waste reduction, based on what is technically and economically practical;

(3) Internal analysis of hazardous waste streams, with periodic hazardous waste reduction assessments, to review individual processes or facilities and other activities where hazardous waste may be generated and identify opportunities to reduce or eliminate hazardous waste generation. Such assessments shall evaluate data on the types, amount, and hazardous constituents of hazardous waste generated, where and why that hazardous waste was generated within the production process or other operations, and potential hazardous waste reduction and recycling techniques applicable to those hazardous wastes;

(4) Hazardous waste accounting systems that identify hazardous waste management costs and factor in liability, compliance, and oversight costs to the extent technically and economically practical;

(5) Employee awareness and training programs to involve employees in hazardous waste reduction planning and implementation to the maximum extent feasible;

(6) Institutionalization of the plan to ensure an ongoing effort as demonstrated by incorporation of the plan into management practice and procedures; and

(7) Implementation of technically and economically practical hazardous waste reduction options, including a plan for implementation.

(b) As part of each hazardous waste reduction plan developed under subsection (a) of this Code section, each large quantity hazardous waste generator shall establish specific performance goals for the reduction of hazardous waste. Wherever technically and economically practical, the specific performance goals established under this subsection shall be expressed in numeric terms. If the establishment of numeric performance goals is not practical, the performance goals shall include a clearly stated list of objectives designed to lead to the establishment of numeric goals as soon as practical. Each large quantity hazardous waste generator shall explain the rationale for each performance goal. The rationale for a particular performance goal shall address any impediments to hazardous waste reduction, including but not limited to the following:

(1) The availability of technically practical hazardous waste reduction methods, including any anticipated changes in the future;

(2) Previously implemented reductions of hazardous waste; and

(3) The economic practicability of available hazardous waste reduction methods, including any anticipated changes in the future.

(c) Examples of situations where hazardous waste reduction may not be economically practical as provided for in paragraph (3) of subsection (b) of this Code section include but are not limited to:

(1) For valid reasons of priority, a particular company may choose first to address other more serious hazardous waste reduction concerns;

(2) Necessary steps to reduce hazardous waste are likely to have significant adverse impacts on product quality; or

(3) Legal or existing contractual obligations interfere with the necessary steps that would lead to hazardous waste reduction.

(d) All large quantity hazardous waste generators shall complete biennially a hazardous waste reduction progress report. A biennial progress report shall:

(1) Analyze and quantify progress made, if any, in hazardous waste reduction, relative to each performance goal established under subsection (b) of this Code section; and

(2) Set forth amendments to the hazardous waste reduction plan and explain the need for the amendments.

(e) The board may adopt and promulgate such rules and regulations as may be necessary to further define and implement the provisions of this Code section and Code Section 12-8-65.2, provided such rules and regulations are supplemental to and not in conflict with this Code section and Code Section 12-8-65.2. (Code 1981, § 12-8-65.1, enacted by Ga. L. 1990, p. 1427, § 2; Ga. L. 1992, p. 2234, § 5.)

Effective date. — This Code section became effective July 1, 1990.

Code Commission notes. — Pursuant to § 28-9-5, in 1990, ". Such" was substituted for "; such" in the middle of paragraph (3) of subsection (a), and a comma was deleted following "programs" in paragraph (5) of subsection (a).

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

12-8-65.2. Updating plans and reports; technical assistance; information available to public.

(a) All large quantity hazardous waste generators shall complete and submit to the director a hazardous waste reduction plan on or before March 1, 1992. The plans shall be updated and progress reported on a biennial basis thereafter. The first updated biennial report shall be due

in 1994 and shall be submitted to the director as prescribed in rules or regulations adopted by the board.

(b) Subject to available funding, the Georgia Institute of Technology shall provide technical assistance, if requested, to hazardous waste generators in reducing the amount and toxicity of hazardous waste generated, in preparing hazardous waste reduction plans, and in preparing biennial progress reports.

(c) The director shall maintain a copy of each hazardous waste reduction plan and biennial progress report received. This information shall be available to the public at the director's or the division's office. (Code 1981, § 12-8-65.2, enacted by Ga. L. 1990, p. 1427, § 2; Ga. L. 1992, p. 2234, § 5.)

Effective date. — This Code section became effective July 1, 1990.

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

12-8-65.3. Plans and reports by out-of-state generators storing, treating, or disposing of hazardous waste in state.

(a) For the purposes of this Code section, "out-of-state generator" means any large quantity hazardous waste generator generating hazardous waste at a location outside the State of Georgia.

(b) As a condition of allowing any out-of-state generator to store, treat, or dispose of hazardous waste at a hazardous waste disposal facility located within the State of Georgia, such out-of-state generator shall prepare and submit to the director upon his request a hazardous waste reduction plan and biennial hazardous waste reduction progress reports in substantial compliance with the requirements of Code Sections 12-8-65.1 and 12-8-65.2.

(c) No hazardous waste disposal facility shall accept hazardous waste from an out-of-state generator unless the out-of-state generator presents to the owner or operator of the hazardous waste facility certification that the out-of-state generator is in compliance with the provisions of subsection (b) of this Code section. Such certification shall be made under oath or affirmation of the person making such certification that the contents of such certification are true and shall be made by a corporate officer, partner, or owner of such generator. It shall be unlawful to make a false statement on such certification and the making of a false statement shall be punishable as an act of false swearing under Code Section 16-10-71.

(d) The requirements of Code Sections 12-8-65.1 and 12-8-65.2 and of subsections (a), (b), and (c) of this Code section shall not apply to any hazardous waste generator which is a generator as a consequence of any remediation or cleanup programs conducted either voluntarily or

through legal actions under either the Resource Conservation and Recovery Act of 1976 (Public Law 94-580, 42 U.S.C. Section 6901, et seq.), as amended, or the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Public Law 96-510), as amended, and shall not apply to a commercial hazardous waste treatment, storage, or disposal facility upon certification to the director that because of the nature of its business operation or process such facility cannot meet the waste reduction requirement prescribed under Code Sections 12-8-65.1 and 12-8-65.2 and subsections (a), (b), and (c) of this Code section. Such certification shall be made under oath or affirmation of the person making such certification that the contents of such certification are true and shall be made by a corporate officer, partner, or owner of such facility. It shall be unlawful to make a false statement on such certification and the making of such false statement shall be punishable as an act of false swearing under Code Section 16-10-71. (Code 1981, § 12-8-65.3, enacted by Ga. L. 1990, p. 1427, § 2; Ga. L. 1992, p. 2234, § 5.)

Effective date. — This Code section became effective July 1, 1990.

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

12-8-65.4. Duplication of prior reporting requirements not required.

Nothing contained in Code Sections 12-8-65.1 through 12-8-65.3 or Code Section 12-8-66 shall require a duplication of reporting requirements under this article as it existed prior to July 1, 1990. (Code 1981, § 12-8-65.4, enacted by Ga. L. 1990, p. 1427, § 2; Ga. L. 1992, p. 2234, § 5.)

Effective date. — This Code section became effective July 1, 1990.

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

12-8-66. Permits for construction, installation, operation, or alteration of hazardous waste facilities.

(a) No person shall, and it shall be unlawful and a violation of this part to, construct, install, operate, or substantially alter a hazardous waste facility without first obtaining and possessing a hazardous waste facility permit from the director. An application for a permit shall be submitted in such manner and on such forms as the director may prescribe. A permit shall be issued to an applicant on evidence, satisfactory to the director, of compliance with this part and any standards, requirements, or rules and regulations effective pursuant to this part.

(b) The director may require that applications for such permits shall be accompanied by plans, data, specifications, engineering reports, designs, and such other information as the director deems necessary to make a determination of compliance with this part and the standards, requirements, or rules and regulations promulgated pursuant to this part.

(c) The director may amend, modify, suspend, or revoke any permit issued for cause, including, but not limited to, the following:

(1) Violation of any condition or provision of such permit or failure to comply with any final order of the director;

(2) Failure to comply with this part or any rules or regulations promulgated pursuant to this part;

(3) Obtaining a permit by misrepresentation or failure to disclose fully all relevant facts; or

(4) When the permitted activity poses a threat to the environment or to the health of humans.

(d) An application for a permit shall include a demonstration of financial responsibility, including, but not limited to, guarantees, liability insurance, the posting of bonds, or any combination of guarantees, liability insurance, or bonds in accordance with Code Section 12-8-68, which financial responsibility shall be related to the type and size of facility.

(e) Permits issued under this Code section shall contain such terms and conditions, including conditions requiring corrective action beyond the facility boundary, as are deemed necessary by the director to protect the environment and the health of humans, and the director may require such testing and construction supervision as said officer deems necessary to protect the environment and the health of humans. Any permit issued subsequent to November 8, 1984, shall contain conditions requiring corrective action for any releases into the environment of hazardous waste or hazardous constituents at the facility seeking a permit, regardless of the time at which waste was placed at such facility.

(f) In the event of denial, amendment, modification, suspension, or revocation of a permit, the director shall send written notice of such action to the permit holder or applicant and shall set forth in such notice the reason for the action.

(g) The issuance, denial, amendment, modification, suspension, or revocation of any permit by the director shall become final unless a petition for hearing in accordance with Code Section 12-8-73 is filed.

(h) Upon the first receipt of an application for a hazardous waste facility permit, the director, within 15 days, shall provide to the government of the county in which the facility is located or is proposed to be located, to each city government located wholly or partially within that county, and to the government of each county and city having territorial boundaries within two miles of the hazardous waste facility, or proposed hazardous waste facility a written notice indicating that an application has been received and describing the hazardous waste activities the applicant proposes to conduct. Within a 30 day period after first receipt of such application, the director shall also publish in at least one local newspaper of general circulation in the county a public notice that an application for a hazardous waste facility permit has been received. A public hearing shall be held if such is requested in writing within 30 days after publication of notification and is requested by 25 or more persons who claim to be affected by the pending permit application, by a governmental subdivision, or by an association having not fewer than 25 members. If requested, the public hearing shall be conducted at the county seat of the county in which the hazardous waste facility is proposed to be located. At least 45 days prior to the date of the public hearing, the director shall provide written notice to the various local governmental subdivisions and other interested parties in the locality in which the proposed facility may be located that a public hearing has been requested, which written notice shall also include the date, time, location, and purpose of the public hearing. The date, time, location, and purpose of such public hearing shall be advertised in the legal organ of the county in which the facility is proposed at least 45 days in advance of the date set for the hearing. Such public hearings shall be held for the purpose of receiving comments and suggestions concerning the location and requirements for the operation of a hazardous waste facility. The director shall consider fully all written and oral submissions regarding the proposed facility and the pending application.

(i) Any person who owns or operates a facility required to have a permit under this Code section, which facility was in existence on November 19, 1980, or is in existence on the effective date of any amendment to this part or any regulation promulgated pursuant to this part which renders the facility subject to the requirement to have a permit pursuant to this Code section shall be accorded interim status, which means that such person shall be treated as having been issued a permit until such time as final administrative disposition of the person's application has been made, if and to the extent the person:

(1) Has notified the director of the existence of such facility as required pursuant to paragraph (17) of subsection (a) of Code Section 12-8-65;

(2) Has filed an application for a permit as required pursuant to this Code section;

(3) Furnishes to the director information reasonably required or requested for processing such application;

(4) Does not treat, store, or dispose of hazardous waste not specified in the permit application, nor employ processes not specified in the permit application, nor exceed the design capacity specified in the permit application; and

(5) Complies with all standards applicable to interim status facilities as have been or may be promulgated by the board.

(j) In the case of any land disposal facility which had interim status prior to November 8, 1984, interim status shall terminate on November 8, 1985, unless the owner or operator of such facility:

(1) Applies for a final determination regarding the issuance of a permit pursuant to this Code section for such facility prior to November 8, 1985; and

(2) Certifies that such facility is in compliance with all applicable ground-water monitoring and financial responsibility requirements.

(k) In the case of any land disposal facility that has interim status due to any amendments to this part or any regulations promulgated pursuant to this part on or subsequent to November 8, 1984, which render the facility subject to the requirement to have a permit pursuant to this part, interim status shall terminate on the date 12 months after the date on which the facility first becomes subject to such permit requirement unless the owner or operator of such facility:

(1) Applies for a final determination regarding the issuance of a permit pursuant to this Code section for such facility before the date 12 months after the date on which the facility first becomes subject to such permit requirement; and

(2) Certifies that such facility is in compliance with all applicable ground-water monitoring and financial responsibility requirements.

(l) In the case of any hazardous waste incinerator which had interim status prior to November 8, 1984, interim status shall terminate on November 8, 1989, unless the owner or operator of such facility applies for a final determination regarding the issuance of a permit pursuant to this Code section for such facility prior to November 8, 1986.

(m) In the case of all hazardous waste facilities which had interim status prior to November 8, 1984, other than land disposal facilities and incinerators, interim status shall terminate on November 8, 1992, unless the owner or operator of such facility applies for a final determination regarding the issuance of a permit pursuant to this Code section for such facility prior to November 8, 1988.

(n) In the case of all hazardous waste facilities in existence on November 8, 1984, the director must make a decision to issue or deny a permit pursuant to this Code section by the following dates:

(1) By November 8, 1988, for all land disposal facilities;

(2) By November 8, 1989, for all incinerators; and

(3) By November 8, 1992, for all other hazardous waste facilities.

(o) The director shall not issue a permit allowing any owner or operator of a cement kiln to burn hazardous waste as fuel until the U.S. Environmental Protection Agency has completed developing its strategy for hazardous waste reduction and combustion which may affect the burning of hazardous wastes in cement kilns. (Ga. L. 1979, p. 1127, § 8; Ga. L. 1982, p. 3, § 12; Ga. L. 1985, p. 266, §§ 4, 5; Ga. L. 1986, p. 10, § 12; Ga. L. 1989, p. 240, § 1; Ga. L. 1990, p. 1427, § 3; Ga. L. 1992, p. 2234, § 5; Ga. L. 1993, p. 500, § 2; Ga. L. 1994, p. 483, § 1.)

The 1990 amendment, effective July 1, 1990, in subsection (h) substituted "to each city government located wholly or partially within that county, and to the government of each county and city having territorial boundaries within two miles of the hazardous waste facility or proposed hazardous waste facility," for "and shall provide to each city government within that county," in the first sentence and deleted "receipt or" preceding "publication" in the third sentence.

The 1992 amendment, effective July 1, 1992, in subsection (i), substituted "any amendment to this part or any regulation promulgated pursuant to this part which renders" for "statutory or regulatory changes pursuant to this article that render" in the introductory language; in subsection (k), substituted "amendments to this part or any regulations promulgated pursuant to this part" for "statutory or regulatory changes pursuant to this article" near the beginning and substituted "part" for "article" near the middle of the introductory language; and in subsection (m), inserted "which had interim status prior to November 8, 1984," near the beginning.

Code Commission notes. — Pursuant to § 28-9-5, in 1990, the paragraph (I) designation in subsection (h) was deleted and a comma was deleted preceding "a written notice" near the end of the first sentence in subsection (h).

The 1993 amendment, effective April 5, 1993, throughout subsections (a), (b), and (c), substituted "part" for "article"; and, in subsection (b), substituted "the director" for "he".

The 1994 amendment, effective March 29, 1994, added subsection (o).

JUDICIAL DECISIONS

Financial-responsibility requirements under this article and the regulations adopted thereunder meet the constitutional due process standard of bearing a rational relation to a proper and constitutionally permitted legislative purpose. Georgia Dep't of Natural Resources v. Union Timber Corp., 258 Ga. 873, 375 S.E.2d 856 (1989).

The director is not obligated to establish financial-responsibility requirements for individual hazardous-waste facilities. Indeed, if the director is obligated at all, he is to exercise his discretion in a manner consistent with the federal act and such criteria as the board shall establish. Georgia Dep't of Natural Resources v. Union Timber Corp., 258 Ga. 873, 375 S.E.2d 856 (1989).

Cited in George v. Department of Natural Resources, 250 Ga. 491, 299 S.E.2d 556 (1983); Board of Natural Resources v. Walker County, 200 Ga. App. 301, 407 S.E.2d 436 (1991).

RESEARCH REFERENCES

Am. Jur. 2d. — 51 Am. Jur. 2d, Licenses and Permits, §§ 4, 5, 14, 45-62, 139.

C.J.S. — 53 C.J.S., Licenses, § 5 et seq.

12-8-67. Hazardous waste in transit to be accompanied by manifest.

No hazardous waste shall be transported across, within, or through this state unless it is accompanied by a manifest properly issued, completed, and filled out in accordance with the rules and regulations promulgated by the board. The manifest shall accompany all hazardous waste from the point of generation through handling, storage, treatment, and disposal. A copy of the manifest shall be transmitted to the director as often as is required by the rules and regulations adopted by the board pursuant to this article. (Ga. L. 1979, p. 1127, § 9; Ga. L. 1992, p. 2234, § 5.)

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

RESEARCH REFERENCES

Am. Jur. 2d. — 15A Am. Jur. 2d, Commerce, §§ 58, 84, 85. 39 Am. Jur. 2d, Health, § 1.

C.J.S. — 39A C.J.S., Health and Environment, § 5.

12-8-68. Requirement of financial responsibility for persons operating or maintaining hazardous waste storage, treatment, or disposal facility; hazardous waste facility trust fund.

(a) No hazardous waste storage, treatment, or disposal facility shall be operated or maintained by any person unless adequate financial responsibility, by bonding or other methods approved by the director, has been demonstrated to the director to ensure the satisfactory maintenance, operation, closure, and postclosure care of the facility, any corrective action which may be required as a condition of a permit, and payment of any liabilities to third parties as set forth in the regulations adopted pursuant to this part.

(b) The director may require the demonstration of financial responsibility prior to issuing a permit for any hazardous waste storage, treatment, or disposal facility to assure the availability of funds to meet sufficiently the requirements for proper closure, maintenance, or postclosure care of the facility and the hazardous waste contained therein, to assure any corrective action required as a condition of such a permit, and to guarantee payment of any liabilities to third parties as set forth in regulations adopted pursuant to this part. The director is authorized to establish the financial responsibility requirements for permit applicants and classes of permit applicants, including the establishment of a range of monetary amounts.

(c) The board may adopt rules and regulations pursuant to this article establishing the criteria for approval, time periods for coverage, and

other terms and conditions for the demonstration of financial responsibility required by this article and for the implementation of financial responsibility instruments.

(d) If the director determines that a hazardous waste storage, treatment, or disposal facility has been abandoned, that the owner or operator thereof has become insolvent, or that for any other reason there is a demonstrated inability of the owner or operator to maintain, operate, or close the facility, to carry out postclosure care of the facility, or to carry out corrective action required as a condition of a permit, to the satisfaction of the director, the director may implement the applicable financial responsibility instruments. The proceeds from any applicable financial responsibility instruments shall be deposited in a special account designated as the hazardous waste facility trust fund. The director shall serve as trustee of any such hazardous waste facility trust fund and the funds deposited in any such fund shall be used only for closure, postclosure care, or corrective action required for the facility. The determination of whether there has been an abandonment, default, or other refusal or inability to perform and comply with closure, postclosure, or corrective action requirements shall be made by the director.

(e) An order or other action of the director under this Code section shall become final unless a petition for hearing in accordance with Code Section 12-8-73 is filed.

(f) In any case where the owner or operator is in bankruptcy, reorganization, or arrangement pursuant to the federal Bankruptcy Code or where, with reasonable diligence, jurisdiction in any state court or any federal court cannot be obtained over an owner or operator likely to be solvent at the time of judgment, any claim arising from conduct for which evidence of financial responsibility must be provided under this Code section may be asserted directly against the guarantor providing such evidence of financial responsibility. In the case of any action pursuant to this subsection, such guarantor shall be entitled to invoke all rights and defenses which would have been available to the owner or operator if any action had been brought against the owner or operator by the claimant and which will have been available to the guarantor if an action had been brought against the guarantor by the owner or operator.

(g) The total liability of any guarantor shall be limited to the aggregate amount which the guarantor has provided as evidence of financial responsibility to the owner or operator under this part. Nothing in this subsection shall be construed to limit any other state or federal statutory contractual or common law liability of a guarantor to its owner or operator including, but not limited to, the liability of such guarantor for bad faith either in negotiating or in failing to negotiate the settlement of any claim. Nothing in this subsection shall be construed to diminish the liability of any person under Section 107 or 111 of the federal Compre-

hensive Environmental Response, Compensation, and Liability Act of 1980 or other, applicable law. (Ga. L. 1979, p. 1127, § 10; Ga. L. 1985, p. 266, § 6; Ga. L. 1986, p. 761, § 3; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, substituted "part" for "article" at the end of subsection (a) and at the end of the first sentence of subsections (b) and (g); deleted former subsection (e), relating to the hazardous waste trust fund; and redesignated former subsections (f) through (h) as present subsections (e) through (g).

Code Commission notes. — Pursuant to § 28-9-5, in 1986, a comma was inserted following "Compensation" in the third sentence of subsection (h).

U.S. Code. — The federal Bankruptcy Code, referred to in subsection (g), is codified at 11 U.S.C. § 1 et seq. The federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, referred to in subsection (h), is codified throughout Titles 26, 42, and 49 U.S.C.

JUDICIAL DECISIONS

Constitutionality. — The financial-responsibility requirements under this article and the regulations adopted thereunder meet the constitutional due process standard of bearing a rational relation to a proper and constitutionally permitted legislative purpose. Georgia Dep't of Natural Resources v. Union Timber Corp., 258 Ga. 873, 375 S.E.2d 856 (1989).

Director not obligated to establish requirements for individual facilities. — The director is not obligated to establish financial-responsibility requirements for individual hazardous-waste facilities. Indeed, if the director is obligated at all, he is to exercise his discretion in a manner consistent with the federal act and such criteria as the board shall establish. Georgia Dep't of Natural Resources v. Union Timber Corp., 258 Ga. 873, 375 S.E.2d 856 (1989).

OPINIONS OF THE ATTORNEY GENERAL

Third party's action on corporate guarantee for subsidiary's liability. — A parent corporation's guarantee for its subsidiary's liability for sudden and nonsudden accidental occurrences at hazardous waste treatment, storage and disposal facilities would be fully valid and enforceable by third parties who have sustained injury or damage caused by such occurrences. 1986 Op. Att'y Gen. No. 86-35.

RESEARCH REFERENCES

Am. Jur. 2d. — 51 Am. Jur. 2d, Licenses and Permits, §§ 45, 49, 55.

C.J.S. — 53 C.J.S., Licenses, §§ 37 et seq., 61 et seq.

ALR. — Common-law strict liability in tort of prior landowner or lessee to subsequent owner for contamination of land with hazardous waste resulting from prior owner's or lessee's abnormally dangerous or ultrahazardous activity, 13 ALR5th 600.

12-8-69. Variances.

(a) Unless variances are prohibited by the federal act or the standards, rules, and regulations promulgated thereunder, the director may grant variances from the requirements of this article or the rules and regulations effective hereunder whenever the director finds that compliance with any provision of this article or any standard, rule, or regulation will result in an arbitrary and unreasonable taking of property or will result, in effect, in the closing and elimination of any lawful business, occupation, or activity without sufficient corresponding benefit or advantage to the public, provided that no variance shall be granted where the effect of a variance will permit the continuation of a condition which poses an undue present or potential threat to the environment or to the health of humans; provided, further, that any variance so granted shall not be construed so as to relieve any person from any liability imposed by law or rule and regulation.

(b) Variances may be granted for such periods of time and under such provisions and conditions as shall be specified by the director.

(c) As a condition precedent to the issuance of a variance, the director may require the filing of a bond in accordance with Code Section 12-8-68, sufficient to ensure compliance with the terms and conditions of the variance. The director may require that the bond shall remain in effect until all terms and conditions of the variance are met and compliance is achieved with this article and the rules and regulations promulgated under this article.

(d) Upon failure of a person to comply with the terms and conditions of any bond or any variance issued by the director, a variance may be amended, modified, suspended, or revoked, or the bond may be forfeited by the director or ordered to be modified or amended. The proceeds from any forfeited bond shall be deposited in either the hazardous waste facility trust fund in accordance with Code Section 12-8-68 or the hazardous waste trust fund in accordance with Code Section 12-8-91, as the director deems appropriate. (Ga. L. 1979, p. 1127, § 11; Ga. L. 1992, p. 2234, § 5; Ga. L. 1994, p. 483, § 2.)

The 1994 amendment, effective March 29, 1994, in subsection (b), substituted "may be granted" for "shall be granted" and deleted provisions relating to the periods and renewal of variances.

RESEARCH REFERENCES

Am. Jur. 2d. — 1 Am. Jur. 2d, Administrative Law, § 83. 2 Am. Jur. 2d, Administrative Law, § 191.

C.J.S. — 73 C.J.S., Public Administrative Law and Procedure, § 60.

12-8-70. Inspections and investigations.

(a) The director or the director's authorized representative, upon presentation of his credentials, shall have a right to enter upon, to, or through premises of persons subject to this article, or premises whereon a violation of the article or rules and regulations is reasonably believed to be occurring or is reasonably believed to be about to occur, to investigate, take samples, copy all records relating to hazardous wastes, and inspect for compliance with the requirements imposed under this article or the rules and regulations or to determine whether such a violation or threatened violation exists in accordance with the following purposes:

(1) For the purpose of determining whether any person subject to the requirements of this article is in compliance with any standard or requirement imposed pursuant to this article;

(2) For the purpose of investigating conditions relating to hazardous waste management or hazardous waste management practices where the director is in possession of information sufficient to form a reasonable belief that a violation of this article or the rules and regulations is occurring or is about to occur;

(3) For the purpose of determining whether there has been a violation of any of the provisions of this article, the rules and regulations promulgated hereunder, or any permit or order issued pursuant to this article and the rules and regulations; or

(4) For the purpose of determining whether a release of hazardous wastes, hazardous constituents, or hazardous substances is occurring or has occurred.

(b) In the event any person does not consent to an inspection or investigation, the director or his authorized representative may seek to obtain a warrant authorizing the inspection or investigation.

(c) Each such inspection or investigation shall be commenced and completed with reasonable promptness. If the director or his authorized representatives obtain any samples prior to leaving the premises, he or they shall give to the owner, operator, or agent in charge a receipt describing the sample obtained and, if requested, a portion of each such sample equal in volume or weight to the portion retained. If any analysis is made of such samples, a copy of the results of such analysis shall be furnished promptly to the owner, operator, or agent in charge.

(d) Any person whom the agency has reason to believe is contributing to or may have contributed to or may be responsible for a release of or the disposal of hazardous wastes, hazardous constituents, or hazardous substances or who is the owner of real property where a release or disposal has occurred or is suspected to have occurred, when requested

by the director, shall furnish to the director any information which that person may have or may reasonably obtain which is relevant to the release and has been requested by the director. (Ga. L. 1979, p. 1127, § 12; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, in subsection (a), substituted "the director's" for "his" near the beginning of the introductory paragraph, deleted "or" at the end of paragraph (2), substituted "; or" for the period at the end of paragraph (3), and added paragraph (4); and added subsection (d).

RESEARCH REFERENCES

Am. Jur. 2d. — 2 Am. Jur. 2d, Administrative Law, §§ 85-91.

12-8-71. Proceedings for enforcement.

(a) Whenever the director has reason to believe that a violation of any provision of this part, a violation of any rule or regulation of the board, or a violation of any order of the director has occurred, the director shall attempt to remedy the same by conference, conciliation, and persuasion. In the case of failure of such conference, conciliation, or persuasion to correct or remedy any violation, the director may issue an order directed to such violator or violators. The order shall specify the provisions of this part, the rules and regulations, or the order alleged to have been violated and may direct that necessary corrective action be taken within a reasonable time to be prescribed in the order.

(b) Whenever the director has reason to believe that there is or has been a release of hazardous waste or hazardous constituents into the environment, regardless of the time at which release of such hazardous waste or hazardous constituents occurred, and has reason to believe that such release poses a danger to health or the environment, the director shall attempt to obtain corrective action for such release by conference, conciliation, and persuasion. In the case of failure of such conference, conciliation, or persuasion to obtain corrective action, the director may issue an order directed to any person, including any past or present generator, past or present transporter, or past or present owner or operator of a hazardous waste treatment, storage, or disposal facility, who has contributed or who is contributing to such release. The order may direct that necessary corrective action be taken within a reasonable time to be prescribed in the order.

(c) Any order issued by the director under this Code section shall be signed by the director. Any such order shall become final unless the person or persons named therein request in writing a hearing pursuant to Code Section 12-8-73. (Ga. L. 1979, p. 1127, § 13; Ga. L. 1985, p. 266, § 7; Ga. L. 1988, p. 727, § 4; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, in subsection (a), substituted "part" for "article" in the first and third sentences.

RESEARCH REFERENCES

Am. Jur. 2d. — 1 Am. Jur. 2d, Administrative Law, §§ 142, 168.
C.J.S. — 73 C.J.S., Public Administrative Law and Procedure, §§ 100, 73A C.J.S., Public Administrative Law, § 115.

12-8-72. Application for injunctive relief.

Whenever, in the judgment of the director, any person has engaged in or is about to engage in any act or practice which constitutes or would constitute a violation of this article, the rules and regulations, or any order or permit conditions, he may apply to the superior court of the county in which the violative act or practice has been or is about to be engaged in, or in which jurisdiction is appropriate, for an order enjoining such act or practice or for an order requiring compliance with the article, the rules and regulations, or the order or permit condition. Upon a showing by the director that such person has engaged in or is about to engage in any such violative act or practice, a permanent or temporary injunction, restraining order, or other order shall be granted without the necessity of showing the lack of an adequate remedy at law. (Ga. L. 1979, p. 1127, § 14; Ga. L. 1982, p. 3, § 12; Ga. L. 1992, p. 2234, § 5.)

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

RESEARCH REFERENCES

Am. Jur. 2d. — 2 Am. Jur. 2d, Administrative Law, §§ 731-736.
C.J.S. — 73 C.J.S., Public Administrative Law and Procedure, § 45 et seq., 73A C.J.S., Public Administrative Law, § 272 et seq.

12-8-73. Hearings on contested matters; judicial review.

All hearings on and the review of contested matters, orders, or permits and all hearings on and the review of any other enforcement actions or orders under this article shall be provided and conducted in accordance with subsection (c) of Code Section 12-2-2. The hearing and review procedure herein provided is to the exclusion of all other means of hearing or review. (Ga. L. 1979, p. 1127, § 15; Ga. L. 1992, p. 2234, § 5.)

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

JUDICIAL DECISIONS

Cited in George v. Department of Natural Resources, 250 Ga. 491, 299 S.E.2d 556 (1983).

RESEARCH REFERENCES

Am. Jur. 2d. — 1 Am. Jur. 2d, Administrative Law, §§ 168-172. 2 Am. Jur. 2d, Administrative Law, §§ 340-426, 556, 559.

C.J.S. — 73A C.J.S., Public Administrative Law and Procedure, §§ 115, 116, 172 et seq.

12-8-74. Judgment in accordance with final orders.

Any order of the hearing officer issued after a hearing as provided in Code Section 12-8-73 or any order of the director issued pursuant to Code Section 12-8-71 or 12-8-96, either unappealed from as provided in those Code sections or affirmed or modified on any review or appeal pursuant to Code Section 12-8-73, and from which no further review is taken or allowed under Code Section 12-8-73, may be filed, as unappealed from or as affirmed or modified, if reviewed or appealed, by certified copy from the director in the superior court of the county wherein the person under order resides, or if such person is a corporation in the county wherein the corporation maintains its principal place of business, or in the county wherein the violation occurred or in which jurisdiction is appropriate, whereupon such superior court shall render judgment in accordance therewith and notify the parties. Such judgment shall have the same effect, and all proceedings in relation thereto shall thereafter be the same, as though such judgment had been rendered in an action duly heard and determined by such court. (Ga. L. 1979, p. 1127, § 16; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, in the first sentence, substituted "the hearing officer" for "a hearing officer", inserted "or 12-8-96", and substituted commas for parentheses following "may be filed" and "or appealed".

RESEARCH REFERENCES

Am. Jur. 2d. — 2 Am. Jur. 2d, Administrative Law, §§ 473-505.

C.J.S. — 73A C.J.S., Public Administrative Law and Procedure, § 143 et seq.

12-8-75. Powers of director in situations involving imminent and substantial endangerment to environment or to public health.

Notwithstanding any provision of this article to the contrary, the director, upon receipt of evidence that the past or present handling, storage, treatment, transportation, or disposal of any solid waste or hazardous waste is presenting or may present imminent and substantial endanger-

ment to the environment or to the health of humans, may bring an action as provided in Code Section 12-8-72 to restrain immediately any person, including any past or present generator, past or present transporter, or past or present owner or operator of a hazardous waste treatment, storage, or disposal facility, who has caused or is causing or has contributed or is contributing to such handling, storage, treatment, transportation, or disposal to stop such handling, storage, treatment, transportation, or disposal or to take such other action as may be necessary. If it is not practicable to assure prompt protection of the environment or the health of humans solely by commencement of such a civil action, the director, with the concurrence of the Governor, may issue such emergency orders as may be necessary to protect the environment or the health of humans who are or may be affected by such past or present handling, storage, treatment, transportation, or disposal. Notwithstanding Code Sections 12-8-71, 12-8-72, 12-8-73, 12-8-74, 12-8-81, and 12-8-96, such order shall be immediately effective for a period of not more than 48 hours unless the director brings an action under the first sentence of this Code section before the expiration of such period. Whenever the director brings such an action within such period, such order shall be effective for such period of time as may be authorized by the court pending litigation or thereafter. (Ga. L. 1979, p. 1127, § 18; Ga. L. 1982, p. 3, § 12; Ga. L. 1985, p. 266, § 8; Ga. L. 1992, p. 2234, § 5.)

Cross references. — Emergency powers of Governor generally, §§ 38-3-22, 38-3-51, 45-12-29 et seq.

The 1992 amendment, effective July 1, 1992, in the third sentence, substituted "12-8-81, and 12-8-96" for "and 12-8-81".

12-8-76. Legal assistance by Attorney General.

It shall be the duty of the Attorney General or his representative to represent the director in all actions in connection with this article. (Ga. L. 1979, p. 1127, § 22; Ga. L. 1992, p. 2234, § 5.)

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

RESEARCH REFERENCES

Am. Jur. 2d. — 7 Am. Jur. 2d, Attorney General, § 10.

C.J.S. — 7A C.J.S., Attorney General, § 7.

12-8-77. Contracts to provide solid waste handling, reclamation, or recycling services.

(a) Any provision of law to the contrary notwithstanding, in order to comply with this article, with the federal act, or with applicable state and federal rules, regulations, or guidelines, or in order to be eligible for grants-in-aid and other allotments, the State of Georgia, the division, and each municipal corporation and county in this state are authorized, at the discretion of its governing authority, to enter into valid and binding contracts with each other or with private persons, firms, associations, or corporations to provide solid waste handling, reclamation, and recycling services to such private persons, firms, associations, or corporations, or to each other.

(b) As used in this Code section, the terms "solid waste handling," "solid waste," "reclamation," and "recycling" shall be construed to have the meanings given them in Code Section 12-8-62 or in the rules and regulations effective under this article. (Ga. L. 1979, p. 1127, § 19; Ga. L. 1992, p. 2234, § 5.)

Cross references. — Authority of municipalities and counties to enter into contracts to provide industrial waste water treatment services, § 36-60-2.

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

RESEARCH REFERENCES

C.J.S. — 73 C.J.S., Public Administrative Law and Procedure, § 70.

12-8-78. Public access to information; protection of confidential information; access to confidential information by federal government and courts.

(a) Any records, reports, or information obtained from any person by the director under this part or the rules and regulations promulgated hereunder shall be available to the public for inspection and copying at the expense of the person requesting copies.

(b) Notwithstanding subsection (a) of this Code section, upon a showing satisfactory to the director by any person that any records, reports, or information, or any particular part thereof, to which the director has access under this article or the rules and regulations would, if made public, divulge information entitled to protection or confidentiality under law, the director shall consider such information or any particular portion thereof confidential in accordance with the purposes of the law under which confidentiality or protection is claimed, provided that such records, reports, documents, or information may be disclosed to officers,

employees, or authorized representatives of the United States government concerned with carrying out the terms of the federal act or when required by any court in any proceeding under the federal act or under this article. (Ga. L. 1979, p. 1127, § 20; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, in subsection (a), substituted "part" for "article".

RESEARCH REFERENCES

Am. Jur. 2d. — 2 Am. Jur. 2d, Administrative Law, § 232.

C.J.S. — 73 C.J.S., Public Administrative Law and Procedure, § 22.

12-8-79. Effect of other laws on permits issued under article and rules and regulations.

Subject to the provisions of the Constitution of Georgia, no other law of this state and no action, ordinance, regulation, or law of any county, municipality, or other political subdivision shall operate to prevent the location or operation of a hazardous waste facility holding a valid hazardous waste facility permit issued under this article and the rules and regulations promulgated hereunder, provided that nothing in this Code section shall prevent any county, municipality, or other political subdivision from challenging a facility's compliance with this article or any rule or regulation, order, or permit provision or condition adopted or issued under this article. (Ga. L. 1979, p. 1127, § 21; Ga. L. 1992, p. 2234, § 5.)

Editor's notes. — Ga. L. 1992, p. 2234, § 5, effective July 1, 1992, reenacted this Code section without change.

Law reviews. — For survey article on constitutional law, see 34 Mercer L. Rev. 53 (1982). For survey article on environment, natural resources, and land use, see 34 Mercer L. Rev. 145 (1982). For survey article on real property, see 34 Mercer L. Rev. 255 (1982).

JUDICIAL DECISIONS

Preemption feature of this article operates only in regard to facility already holding valid permit. Earth Mgt., Inc. v. Heard County, 248 Ga. 442, 283 S.E.2d 455 (1981).

12-8-80. Applicability of article.

Reserved. Repealed by Ga. L. 1992, p. 2234, § 5, effective July 1, 1992.

Editor's notes. — The former Code section was based on Ga. L. 1979, p. 1127, § 3.

12-8-81. Civil penalties; procedures for imposing penalties.

(a) Any person violating any provision of this article, the rules or regulations effective hereunder, or any permit condition or limitation established pursuant to this article or any person negligently or intentionally failing or refusing to comply with any final or emergency order of the director issued as provided in this article shall be liable for a civil penalty not to exceed $25,000.00 per day. Each day during which the violation or failure or refusal to comply continues shall be a separate violation.

(b) Whenever the director has reason to believe that any person has violated any provision of this article, any rule or regulation effective hereunder, or any permit condition or has negligently or intentionally failed or refused to comply with any final order or emergency order of the director, he may upon written request cause a hearing to be conducted before a hearing officer appointed by the board. Upon finding that such person has violated any provision of this article, any rule or regulation effective hereunder, or any permit condition or has negligently or intentionally failed or refused to comply with any final order or emergency order of the director, the hearing officer shall issue his decision imposing civil penalties as provided in this Code section. Such hearing and any administrative or judicial review thereof shall be conducted in accordance with Code Section 12-8-73.

(c) In rendering a decision under this Code section imposing civil penalties, the hearing officer shall consider all factors which are relevant, including, but not limited to, the following:

(1) The amount of civil penalty necessary to ensure immediate and continued compliance and the extent to which the violator may have profited by failing or delaying to comply;

(2) The character and degree of impact of the violation or failure on the natural resources of the state, especially any rare or unique natural phenomena;

(3) The conduct of the person incurring the civil penalty in promptly taking all feasible steps or procedures necessary or appropriate to comply with this article or to correct the violation or failure;

(4) Any prior violations of, or failures by, such person to comply with statutes, rules, regulations, orders, or permits administered, adopted, or issued by the director;

(5) The character and degree of injury to or interference with public health or safety which is caused or threatened to be caused by such violation or failure; and

(6) The character and degree of injury to or interference with reasonable use of property which is caused or threatened to be caused by such violation or failure. (Ga. L. 1979, p. 1127, § 17; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, deleted former subsection (d), relating to payment into the hazardous waste trust fund.

RESEARCH REFERENCES

Am. Jur. 2d. — 1 Am. Jur. 2d, Administrative Law, § 173.
C.J.S. — 36A C.J.S., Fines, § 2.

ALR. — Recovery of cumulative statutory penalties, 71 ALR2d 986.

12-8-82. Criminal penalty.

(a) Any person who:

(1) Knowingly transports or causes to be transported any hazardous waste as defined in this article to a facility which does not have a permit or interim status pursuant to Code Section 12-8-66, which does not have a variance pursuant to Code Section 12-8-69, or which is not subject to an order of the director which specifically authorized continued operation of such facility;

(2) Knowingly treats, stores, or disposes of any hazardous waste as defined in this article:

(A) Without a permit or interim status pursuant to Code Section 12-8-66, a variance pursuant to Code Section 12-8-69, or an order of the director allowing such treatment, storage, or disposal of hazardous waste;

(B) In knowing violation of any material condition or requirement of such permit, interim status, variance, or order; or

(C) In knowing violation of any material condition or requirement of any applicable regulations or standards promulgated in accordance with Code Section 12-8-64;

(3) Knowingly omits material information or makes any false material statement or representation in any application, label, manifest, record, report, permit, or other document filed, maintained, or used for purposes of compliance with this article or regulations promulgated in accordance with Code Section 12-8-64;

(4) Knowingly generates, stores, treats, transports, disposes of, exports, or otherwise handles any hazardous waste as defined in this article, whether such activity took place before or takes place after March 14, 1985, and who knowingly destroys, alters, conceals, or fails to file any record, application, manifest, report, or other document required to be maintained or filed for purposes of compliance with this article or regulations promulgated in accordance with Code Section 12-8-64; or

(5) Knowingly transports without a manifest or causes to be transported without a manifest, any hazardous waste required by this article or regulations promulgated in accordance with Code Section 12-8-64 to be accompanied by a manifest

shall, upon conviction, be subject to a fine of not more than $50,000.00 for each day of violation, or imprisonment for not less than one nor more than two years, or three years in the case of a violation of paragraph (1) or (2) of this subsection, or both. If the conviction is for a violation committed after a first conviction of such person under this subsection, the maximum punishment under the respective paragraphs shall be doubled with respect to both fine and imprisonment.

(b) Any person who knowingly transports, treats, stores, disposes of, or exports any hazardous waste as defined in this article in violation of paragraph (1), (2), (3), (4), or (5) of subsection (a) of this Code section and who knows at that time that by such action another person is placed in imminent danger of death or serious bodily injury shall, upon conviction, be subject to a fine of not more than $250,000.00 or imprisonment for not less than one nor more than 15 years, or both. A defendant that is an organization shall, upon conviction of violating this subsection, be subject to a fine of not more than $1 million.

(c) An organization may be convicted for the criminal acts set forth in subsections (a) and (b) of this Code section, if an agent of the organization performs the conduct which is an element of the crime while acting within the scope of such agent's office or employment and in behalf of the organization or if the commission of the criminal act set forth in subsection (a) or (b) of this Code section is authorized, requested, commanded, performed, or recklessly tolerated by the board of directors of the organization or by a managerial official who is acting within the scope of such official's employment on behalf of the organization. (Ga. L. 1979, p. 1127, § 7; Ga. L. 1982, p. 3, § 12; Ga. L. 1985, p. 266, § 10; Ga. L. 1986, p. 10, § 12; Ga. L. 1992, p. 2234, § 5; Ga. L. 1994, p. 1101, § 4.)

The 1994 amendment, effective April 13, 1994, in subsection (a), near the end of subparagraph (C) of paragraph (2) and paragraphs (3) through (5), deleted "and in force and effect on January 1, 1992" following "with Code Section 12-8-64".

RESEARCH REFERENCES

Am. Jur. 2d. — 21 Am. Jur. 2d, Criminal Law, §§ 14, 576, 577, 599-601.
C.J.S. — 22 C.J.S., Criminal Law, §§ 19, 21, 34-39. 22B C.J.S., Criminal Law, § 2002.

12-8-83. Use of material mixed with dioxin or other hazardous waste for dust suppression or road treatment prohibited.

Law reviews. — For note, "Regulating a Toxic Chemical: The Dioxin Controversy in Georgia," see 9 Ga. St. U.L. Rev 717 (1993).

The use of waste or used oil or other material which is contaminated or mixed with dioxin or any other hazardous waste as defined in this article, other than a waste identified as a hazardous waste solely on the basis of ignitibility, for dust suppression or road treatment is prohibited. (Code 1981, § 12-8-83, enacted by Ga. L. 1985, p. 266, § 11; Ga. L. 1992, p. 2234, § 5.)

The 1992 amendment, effective July 1, 1992, substituted "ignitibility" for "ignitability".

PART 2

HAZARDOUS SITE RESPONSE

Law reviews. — For article on the Georgia Hazardous Site Response Act, see 44 Mercer L. Rev. 1 (1992).
For note on 1992 enactment of this part, see 9 Ga. St. U.L Rev. 190 (1992). For note on 1993 amendment of this part, see 10 Ga. St. U.L. Rev. 55 (1993).

Effective date. — This part became effective July 1, 1992.

12-8-90. Short title.

This part shall be known and may be cited as the "Georgia Hazardous Site Response Act." (Code 1981, § 12-8-90, enacted by Ga. L. 1992, p. 2234, § 5.)

12-8-91. Declaration of policy and legislative intent.

(a) It is declared to be the public policy of the State of Georgia, in furtherance of its responsibility to protect the public health, safety, and well-being of its citizens and to protect and enhance the quality of its environment, to require corrective action for releases of hazardous wastes, hazardous constituents, and hazardous substances, without regard to when such releases may have occurred, into the environment that may pose a threat to human health or the environment and to provide incentives for the reduction of the amount of hazardous wastes generated or managed in the state. Additionally, the purpose of this part is to reduce the generation of hazardous wastes in this state and to encourage hazardous waste generators, prior to considering landfill disposal, to consider the following measures in descending order of preference:

(1) Reduce the amount of wastes generated through improvement in industrial processes;

(2) Isolate hazardous materials from mixtures in which they occur;

(3) Reuse and recycle wastes in accordance with state and federal requirements;

(4) Transfer wastes through clearing-houses so that they may be recycled in industrial processes;

(5) Detoxify or neutralize wastes into less harmful substances or destroy such wastes; and

(6) Store hazardous waste residues in aboveground facilities using encapsulation and monitoring.

(b) The General Assembly declares its intent to fund the execution of the public policy set forth in subsection (a) of this Code section by and through the division with the fees established and collected by the division pursuant to subsection (e) of Code Section 12-2-2, subsection (e) of Code Section 12-8-39, subsection (d) of Code Section 12-8-68, and Code Section 12-8-95.1. The General Assembly further declares its intent to ensure that the funding provided by fees on hazardous waste management activities and by owners and operators of solid waste disposal facilities pursuant to those Code sections and through the collection of civil penalties will not be diverted for any purpose other than the administration of this article by the division, the prevention of pollution, including reduction of hazardous wastes generated, and the effectuation of corrective action at sites that may threaten human health or the environment where hazardous wastes, hazardous constituents, or hazardous substances have been disposed of or released. Appropriation of funds to the department for inclusion in the hazardous waste trust fund continued in existence by subsection (a) of Code Section 12-8-95 shall be deemed consistent with this declaration of legislative intent. (Code 1981, § 12-8-91, enacted by Ga. L. 1992, p. 2234, § 5.)

12-8-92. Definitions.

Unless otherwise defined in this part, the definition of all terms included in Code Section 12-8-62 shall be applicable to this part. As used in this part, the term:

(1) "Corrective action contractor" means any person contracting with the division to perform any activities authorized to be paid from the hazardous waste trust fund.

(2) "Environment" means:

(A) The navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States under the Magnuson Fishery Conservation and Management Act; and

(B) Any other surface water, ground water, drinking water supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States.

(3) "Facility" means:

(A) Any building, structure, installation, equipment, pipe or pipeline, pipe into a sewer or publicly owned treatment works, well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft; or

(B) Any site or area where a hazardous waste, hazardous constituent, or hazardous substance has been deposited, stored, disposed of, placed, or has otherwise come to be located.

This term does not include any consumer product in consumer use but does include any vessel.

(4) "Hazardous substance" means any substance listed on the List of Hazardous Substances and Reportable Quantities, codified as 40 C.F.R., Part 302, Table 302.4, in force and effect on February 1, 1992, or any substance listed on the List of Extremely Hazardous Substances and Their Threshold Planning Quantities, codified as 40 C.F.R., Part 355, Appendix A, in force and effect on February 1, 1992.

(5) "Inventory" means the hazardous site inventory compiled and updated by the division pursuant to Code Section 12-8-97.

(6) "Onshore facility" means any facility of any kind including, but not limited to, motor vehicles and rolling stock located in, on, or under any land or nonnavigable waters within the United States.

(7) "Owner" or "operator" means:

(A) In the case of a vessel, any person owning, operating, or chartering by demise such vessel;

(B) In the case of an onshore facility or an offshore facility, any person owning or operating such facility; and

(C) In the case of any facility, title or control of which was conveyed due to bankruptcy, foreclosure, tax delinquency, abandonment, or similar means to a unit of state or local government, any person who owned, operated, or otherwise controlled activities at such facility immediately beforehand.

Such term does not include a person who holds indicia of ownership primarily to protect said person's security interest in the facility or who acts in good faith solely in a fiduciary capacity and who did not actively participate in the management, disposal, or release of hazardous wastes, hazardous constituents, or hazardous substances from the facility. Such term does not include a unit of state or local government which acquired ownership or control involuntarily through bank-

ruptcy, tax delinquency, abandonment, or other circumstances in which the government involuntarily acquires title by virtue of its function as sovereign; provided, however, that this exclusion shall not apply to any state or local government which has caused or contributed to the release of a hazardous waste, hazardous constituent, or hazardous substance from the facility.

(8) "Person" means an individual, trust, firm, joint-stock company, corporation, partnership, association, authority, county, municipality, commission, political subdivision of this state, or any agency, board, department, or bureau of any other state or of the federal government.

(9) "Person who has contributed or who is contributing to a release" means:

(A) The owner or operator of a facility;

(B) Any person who at the time of disposal of any hazardous waste, hazardous constituent, or hazardous substance owned or operated any facility at which such hazardous waste, hazardous constituent, or hazardous substance was disposed of;

(C) Any person who by contract, agreement, or otherwise arranged for disposal or treatment of or arranged with a transporter for transport for disposal or treatment of hazardous wastes, hazardous constituents, or hazardous substances owned or possessed by such person or by any other party or entity at any facility owned or operated by another party or entity and containing such hazardous wastes, hazardous constituents, or hazardous substances; and

(D) Any person who accepts or accepted any hazardous wastes, hazardous constituents, or hazardous substances for transport to disposal or treatment facilities or sites selected by such person, from or at which facility or site there is a release of a hazardous waste, a hazardous constituent, or a hazardous substance.

(10) "Pollution prevention" means:

(A) The elimination at the source of the use, generation, or release of hazardous constituents, hazardous substances, or hazardous wastes; or

(B) Reduction at the source in the quantity and toxicity of such substances.

(11) "Release" means any intentional or unintentional act or omission resulting in the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, including without limitation the abandonment or discarding of barrels, containers, and other closed receptacles, of any hazardous waste, hazardous constituent, or hazardous substance; provided, however, that such term shall not include any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons; emissions from the engine exhaust of any motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station; or the normal application of fertilizer.

(12) "Site" means that portion of the owner's contiguous property and any other owner's property affected by a release exceeding a reportable quantity.

(13) "Small quantity generator" means a hazardous waste generator who generates greater than 220 pounds but less than 2,200 pounds of hazardous waste in one month, as provided by rules promulgated by the board in accordance with this article. (Code 1981, § 12-8-92, enacted by Ga. L. 1992, p. 2234, § 5; Ga. L. 1993, p. 500, § 3; Ga. L. 1994, p. 483, § 3.)

The 1993 amendment, effective April 5, 1993, in paragraph (5), substituted "compiled and updated" for "published".

The 1994 amendment, effective March 29, 1994, in paragraph (13), substituted "2,200 pounds" for "2,220 pounds".

Code Commission notes. — Pursuant to Code Section 28-9-5, in 1994, near the end of paragraph (9)(D), "constituent" was substituted for "constitutent".

12-8-93. Powers and duties of board.

(a) In the performance of its duties, and in addition to the powers set forth in Code Section 12-8-64, the board shall have the power to adopt, promulgate, modify, amend, and repeal rules and regulations to implement and enforce the provisions of this part as the board may deem necessary to provide for corrective action for releases of hazardous wastes, hazardous constituents, and hazardous substances into the environment that pose a present or future danger to human health or the environment and to provide incentives for the reduction of the amount of hazardous wastes generated or managed in the state. Such rules and regulations may be applicable to the state as a whole or may vary from region to region, as may be appropriate to facilitate the accomplishment of the provisions, purposes, and policies of this part.

(b) The board's rules and regulations shall include, but shall not be limited to, the following:

(1) Rules and regulations governing the reporting of releases of hazardous wastes, hazardous constituents, and hazardous substances, including rules and regulations governing reportable quantities;

(2) Rules and regulations governing the investigation, cleanup, and corrective action at sites where hazardous wastes, hazardous constituents, or hazardous substances have been disposed of or released regardless of the date when such disposal or release occurred, including rules and regulations establishing cleanup standards;

(3) Rules and regulations governing procedures for placement of sites on and removal of sites from the hazardous site inventory required under the provisions of Code Section 12-8-97;

(4) Rules and regulations governing procedures and criteria for making a determination whether property requires corrective action pursuant to paragraph (8) of subsection (a) of Code Section 12-8-97; and

(5) Rules and regulations governing procedures for the filing in the deed records of the superior courts of additional affidavits concerning property for which an initial affidavit has been filed pursuant to Code Section 12-8-97. (Code 1981, § 12-8-93, enacted by Ga. L. 1992, p. 2234, § 5; Ga. L. 1993, p. 500, § 4.)

The 1993 amendment, effective April 5, 1993, in paragraph (3) of subsection (b), deleted "and" at the end; inserted present paragraph (4) of subsection (b); and redesignated former paragraph (4) as present paragraph (5) of subsection (b).

12-8-94. (For effective date, see note) Powers and duties of director.

(a) In addition to the powers and duties specified in Code Section 12-8-65, the director shall have and may exercise the following powers and duties:

(1) To make determinations, in accordance with procedures and criteria established by the board, as to whether property requires corrective action pursuant to the provisions of paragraph (8) of subsection (a) of Code Section 12-8-97;

(2) To ensure that corrective action is taken for releases of hazardous wastes, hazardous constituents, or hazardous substances into the environment that pose a present or future danger to human health or the environment;

(3) To collect fees for hazardous waste management activities and hazardous substance reporting;

(4) To administer the hazardous waste trust fund and expend the principal and interest of such trust fund; and

(5) To appoint a hazardous waste trust fund advisory committee and to consult with that committee in developing rules and regulations regarding criteria for compilation of the hazardous site inventory, site priorities, uses of the fund, cleanup standards, and deed notations. At a minimum, the director shall appoint to the committee four representatives from local government, four representatives from business and industry, and four representatives from other interested parties. Upon promulgation of rules and regulations in accordance with this part, the director shall no longer be required to consult with the committee; provided, however, that the director shall consult with the committee from time to time as necessary to adopt, promulgate, modify, amend, or repeal rules and regulations in accordance with this part.

(b) The powers and duties described in subsection (a) of this Code section may be exercised and performed by the director through such duly authorized agents and employees as the director deems necessary and proper. (Code 1981, § 12-8-94, enacted by Ga. L. 1992, p. 2234, § 5; Ga. L. 1993, p. 500, § 5; Ga. L. 1994, p. 483, § 4.)

Delayed effective date. — The second 1994 amendment, by Ga. L. 1994, p. 1101, provided in § 6, that the amendment to this section by that act "shall become effective only upon the effective date of a duly ratified amendment to the Constitution authorizing the state to incur indebtedness to fund activities associated with the investigation, detoxification, removal, and disposal of any hazardous wastes, hazardous constituents, or hazardous substances at certain sites." As of June 1994, no vote had been taken on the constitutional amendment, and the Code section set out in the supplement does not reflect the amendment by that act. For the version of this Code section in effect upon passage of such amendment, see the 1994 amendment note.

The 1993 amendment, effective April 5, 1993, in subsection (a), inserted present paragraph (1), and redesignated former paragraphs (1) through (4) as present paragraphs (2) through (5).

The 1994 amendments. — The first 1994 amendment, effective March 29, 1994, in paragraph (3) of subsection (a), added "and hazardous substance reporting". The second 1994 amendment, in subsection (a), deleted "and" from the end of paragraph (4), substituted "; and" for the period at the end of paragraph (5), and added a paragraph (6) which would read "To request the Georgia State Financing and Investment Commission for the issuance of public debt to fund corrective action pursuant to this part; provided, however, that any moneys recovered from persons found to be legally liable for such corrective action shall be used to reduce any such public debt incurred." For the effective date of the second 1994 amendment, see delayed effective date note.

12-8-95. Hazardous waste trust fund.

(a) There shall continue in existence the hazardous waste trust fund. The hazardous waste trust fund shall be funded in accordance with subsection (b) of Code Section 12-8-91. All moneys deposited in the fund shall be deemed expended and contractually obligated and shall not lapse to the general fund. The director shall serve as trustee of the hazardous waste trust fund.

(b) The moneys deposited in the hazardous waste trust fund may be expended by the director as follows:

(1) For activities associated with the investigation, detoxification, removal, and disposal of any hazardous wastes, hazardous constituents, or hazardous substances at sites where corrective action is necessary to mitigate a present or future danger to human health or the environment;

(2) For emergency actions the director considers necessary to protect public health, safety, or the environment whenever there is a release of hazardous wastes, hazardous constituents, or hazardous substances;

(3) For activities of the division associated with the administration of this part;

(4) In accordance with rules promulgated by the board, for financing of the state and local share of the costs associated with the investigation, remediation, and postclosure care and maintenance of sites placed on the National Priority List pursuant to the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, or sites placed on the hazardous site inventory pursuant to Code Section 12-8-97; provided, however, that if a county or municipal corporation has been or is the owner of or operator of such site, not less than $500,000.00 of such costs shall be paid from the hazardous waste trust fund;

(5) For activities administered by the director associated with pollution prevention, including reduction of hazardous wastes generated in the state;

(6) Provided that annual appropriations are made to the Department of Natural Resources in accordance with subsection (b) of Code Section 12-8-91, for transfer on an annual basis to the Georgia Hazardous Waste Management Authority in an amount equal to 10 percent of the previous year's payment into the state treasury by the division of fees and penalties pursuant to subsection (e) of Code Section 12-2-2, subsection (e) of Code Section 12-8-39, and Code Section 12-8-95.1. If in any year the fees cease to be collected due to the

unencumbered principal balance exceeding $25 million in the hazardous waste trust fund, a transfer of funds shall be made to the Georgia Hazardous Waste Management Authority from the principal of the hazardous waste trust fund equal to the average transfer for the three preceding years. Such transferred funds are to be administered by the chief administrative officer of the Georgia Hazardous Waste Management Authority to fund source reduction and project activities as set forth in Article 4 of this chapter and in accordance with the policies of the board.

(c) The director may require the demonstration of financial responsibility as a condition of an order requiring corrective action for the release of hazardous wastes, hazardous constituents, or hazardous substances.

(d) If the director determines that corrective action has not been carried out as required by a condition of an order of the director to the reasonable satisfaction of the director, the director may implement the applicable financial responsibility instruments. The proceeds from any applicable financial responsibility instruments shall be deposited in the hazardous waste trust fund.

(e) In any case where a person is in bankruptcy, reorganization, or other arrangement pursuant to the federal Bankruptcy Code or where, with reasonable diligence, jurisdiction in any state court or any federal court cannot be obtained over a person likely to be solvent at the time of judgment, any claim arising from conduct for which evidence of financial responsibility must be provided under this Code section may be asserted directly against the guarantor providing such evidence of financial responsibility. In the case of any action pursuant to this subsection, such guarantor shall be entitled to invoke all rights and defenses which would have been available to the person if any action had been brought against the owner or operator by the claimant and which would have been available to the guarantor if an action had been brought against the guarantor by the owner or operator.

(f) The total liability of any guarantor shall be limited to the aggregate amount which the guarantor has provided as evidence of financial responsibility to the owner or operator under this Code section. Nothing in this subsection shall be construed to limit any other state or federal statutory, contractual, or common-law liability of a guarantor to a person including, but not limited to, the liability of such guarantor for bad faith either in negotiating or in failing to negotiate the settlement of any claim. Nothing in this subsection shall be construed to diminish the liability of any person under Section 107 or 111 of the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, or any other applicable law. (Code 1981, § 12-8-95, enacted by Ga. L. 1992, p. 2234, § 5.)

12-8-95.1. Hazardous waste management fees and hazardous substance reporting fees.

(a) The division is authorized and directed to charge and collect the fees for hazardous waste management activities and hazardous substance reporting fees as provided in this subsection. As used in this Code section, the term "hazardous waste" shall not include any material excluded by 40 CFR Part 261 of the Code of Federal Regulations. Every large quantity generator and every small quantity generator shall pay the greater of $100.00 per calendar year or the total of the hazardous waste management fees, and every person who is required to report pursuant to Section 312 or 313 of Title III of the federal Superfund Amendments and Reauthorization Act of 1986 shall pay the annual hazardous substance reporting fees, imposed as follows:

(1) Every large quantity generator of hazardous waste shall pay an annual fee of $20.00 per ton for hazardous waste shipped off site for disposal or incineration, $16.00 per ton for hazardous waste shipped off site for treatment or storage, $2.00 per ton for hazardous waste shipped off site for recycling or reuse, and, beginning January 1, 1995, $9.00 per ton for hazardous waste shipped off site for treatment by being burned for energy recovery in accordance with rules and regulations promulgated pursuant to Part 1 of this article; provided, however, that no large quantity generator shall be liable for off-site hazardous waste management fees exceeding $75,000.00 in any calendar year. In no event shall any person be liable for an off-site hazardous waste management fee on any hazardous waste for which an off-site hazardous waste management fee has previously been paid;

(2) Every large quantity generator of hazardous waste shall pay an annual fee of $10.00 per ton for hazardous waste disposed of or incinerated on site, $4.00 per ton for hazardous waste treated or stored on site, $1.00 per ton for hazardous waste reused or recycled on site, and, beginning January 1, 1995, $2.50 per ton for hazardous waste treated on site by being burned for energy recovery in accordance with rules and regulations promulgated pursuant to Part 1 of this article; provided, however, that no large quantity generator shall be liable for on-site hazardous waste management fees for disposal or incineration, treatment or storage, recycling or reuse, or treatment by burning for energy recovery in any calendar year exceeding the following amounts and according to the following schedule:

(A) Twenty-five thousand dollars for such payments due on July 1, 1993, and on July 1, 1994;

(B) Fifty thousand dollars for such payments, excluding payments for the on-site treatment of waste water which is a hazardous waste, due on July 1, 1995, and on July 1, 1996;

(C) Seventy-five thousand dollars for such payments, excluding payments for the on-site treatment of waste water which is a hazardous waste, due on and after July 1, 1997;

(D) One thousand five hundred dollars for waste water which is a hazardous waste which is treated on site for payments due on July 1, 1995;

(E) Three thousand dollars for waste water which is a hazardous waste treated on site for payments due on July 1, 1996; and

(F) Seven thousand five hundred dollars for waste water which is a hazardous waste treated on site for payments due on and after July 1, 1997.

For the purposes of this paragraph, a generator who generates waste water which is a hazardous waste shall not be required to count such hazardous waste in determining its status as a large quantity generator, a small quantity generator, or a conditionally exempt small quantity generator. For the purposes of this paragraph, dilution of waste water that is a hazardous waste shall be considered treatment subject to the fees established by this paragraph. A large quantity generator which pays fees for the off-site management of hazardous waste under paragraph (1) of this subsection for a hazardous waste which was previously managed on site shall not pay the applicable on-site management fee for that hazardous waste;

(3) Every person who receives hazardous waste generated outside this state shall pay an annual fee of $20.00 per ton for hazardous waste disposed of or incinerated, $16.00 per ton for hazardous waste treated or stored, $2.00 per ton for hazardous waste that is recycled or reused, and, beginning January 1, 1995, $9.00 per ton for hazardous waste treated by being burned for energy recovery in accordance with rules and regulations promulgated pursuant to Part 1 of this article; provided, however, that no person shall be liable for importation fees exceeding $75,000.00 per out-of-state generator in any calendar year. In no case shall any person who receives hazardous waste from any person outside this state and who pays an importation fee on such waste pursuant to this paragraph be liable for the off-site hazardous waste management fees required by paragraph (1) of this subsection. Persons who receive hazardous waste generated outside this state are not required to pay the fees required by this paragraph for those wastes generated by conditionally exempt small quantity generators which are located outside this state. For the purposes of this paragraph, a "conditionally exempt small quantity generator" means a generator who generates 220 pounds or less of hazardous waste in one month, as provided by rules promulgated by the board in accordance with this article;

(4) Beginning July 1, 1994, each person who is required to report pursuant to Section 312 of Title III of the federal Superfund Amendments and Reauthorization Act of 1986 shall pay to the division an annual hazardous substance reporting fee of $500.00; and

(5) Beginning July 1, 1994, each person who is required to report pursuant to Section 313 of Title III of the federal Superfund Amendments and Reauthorization Act of 1986 shall pay to the division an annual hazardous substance reporting fee as follows:

(A) Five hundred dollars for each facility for which a report is filed for calendar year 1994;

(B) One thousand dollars for each facility for which a report is filed for calendar year 1995; and

(C) One thousand five hundred dollars for each facility for which a report is filed for calendar year 1996 and each calendar year thereafter.

(b) All hazardous waste and hazardous substance fees required by subsection (a) of this Code section shall be paid to the division for transfer into the state treasury to the credit of the general fund. The division shall collect such fees until the unencumbered principal balance of the hazardous waste trust fund equals or exceeds $25 million, at which time no hazardous waste or hazardous substance fees shall be levied until the balance in that fund is less than or equal to an unencumbered balance of $12.5 million, in which case the levy and collection of hazardous waste fees shall resume at the beginning of the next calendar year following the year in which such unencumbered balance occurs. The director shall provide written notice to all large quantity generators and hazardous waste treatment, storage, and disposal facilities and all persons who are required to report pursuant to Sections 312 and 313 of Title III of the federal Superfund Amendments and Reauthorization Act of 1986 at such time as the director receives notice that the unencumbered principal balance of the fund equals or exceeds $25 million or is equal to or less than $12.5 million.

(c) All hazardous waste fees levied under this Code section shall be based on the amounts of hazardous waste managed or imported within the preceding calendar year. Such fees for the period July 1, 1992, through December 31, 1992, shall be paid to the division not later than July 1, 1993. All subsequent hazardous waste fees shall be paid not later than the first day of July of each year for the preceding calendar year.

(d) All hazardous substance fees levied under this Code section shall be based on the hazardous substances reported for the preceding calendar year. All hazardous substance fees shall be paid not later than the first day of July of each year for the preceding calendar year.

(e) Persons who make payments of fees levied by this Code section later than 30 days after the due date specified in subsection (c) of this Code section shall pay a penalty of 15 percent of the balance due and shall pay interest on the unpaid balance at the rate imposed by law for delinquent taxes due to the state. Delinquent fees may be collected in a civil action instituted in the name of the director. In addition to the 15 percent penalty and the interest that may be collected along with the delinquent fees as provided in this subsection, the director shall be entitled to collect all costs, including administrative costs, and legal expenses incurred by the state in connection with its collection efforts.

(f) Hazardous waste which is generated by any of the following means is exempted from the fees required by this Code section:

(1) Corrective action required by an order, permit, or approved closure plan issued pursuant to Part 1 of this article;

(2) Voluntary corrective action required by any person in accordance with applicable laws and regulations; and

(3) Response actions required under the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.

(g) The following persons shall not be required to pay the hazardous substance reporting fees required by this Code section:

(1) Persons who report pursuant to Section 312 or 313 of Title III of the federal Superfund Amendments and Reauthorization Act of 1986 only for substances not designated as regulated substances pursuant to rules and regulations of the board; and

(2) Persons who report pursuant to Section 312 or 313 of Title III of the federal Superfund Amendments and Reauthorization Act of 1986 only for petroleum fuels, lubricants, and hydraulic fluids and components thereof that are designated as regulated substances pursuant to rules and regulations of the board.

(h) Unless fee requirements established in this Code section are reimposed by the General Assembly, no such fees shall be levied after July 1, 2003. (Code 1981, § 12-8-95.1, enacted by Ga. L. 1992, p. 2234, § 5; Ga. L. 1993, p. 500, § 6; Ga. L. 1994, p. 483, § 5.)

The 1993 amendment, effective April 5, 1993, in paragraph (2) of subsection (a), added the final sentence; and, in paragraph (3) of subsection (a), added the last two sentences.

The 1994 amendment, effective March 29, 1994, rewrote this Code section.

12-8-96. Corrective action upon release of hazardous wastes, hazardous constituents, or hazardous substances; notice; administrative consent order.

(a) Whenever the director has reason to believe that there is or has been a release of hazardous wastes, hazardous constituents, or hazardous substances into the environment, regardless of the time at which release of such hazardous wastes, hazardous constituents, or hazardous substances occurred, and has reason to believe that such release poses a danger to health or the environment, the director shall make a reasonable effort to identify each person who has contributed or who is contributing to such a release. The director shall then notify each such person in writing of the opportunity to perform voluntarily corrective action in accordance with an administrative consent order entered into with the director within such period of time as may be specified by the director in written correspondence to the person. If the person fails or refuses to enter into an administrative consent order with the director within the period of time specified by the director, the director may issue an order directed to any such person. The order may direct that necessary corrective action be taken within a reasonable time to be prescribed in the order.

(b) If a person fails to comply with such an order or if all necessary corrective action cannot be obtained from the responsible person or persons, the director may undertake corrective action utilizing funds from the hazardous waste trust fund.

(c) The division or its corrective action contractors may enter upon the property of any person, at such time and in such manner as deemed necessary by the director, to effectuate the necessary corrective action to protect human health and the environment.

(d) The State of Georgia and the hazardous waste trust fund are relieved from all liability for loss of business, damages, and taking of property associated with the corrective action. (Code 1981, § 12-8-96, enacted by Ga. L. 1992, p. 2234, § 5.)

12-8-96.1. Liability for cleanup costs; punitive damages; action for recovery of costs and damages; claims for contribution.

(a) Each and every person who contributed to a release of a hazardous waste, a hazardous constituent, or a hazardous substance shall be jointly, severally, and strictly liable to the State of Georgia for the reasonable costs of activities associated with the cleanup of environmental hazards, including legal expenses incurred by the state pursuant to subsection (a) of Code Section 12-8-96, as a result of the failure of such person to comply with an order issued by the director. The person may, in addition, be liable for punitive damages in an amount at least equal to the costs incurred by the state and not more than three times the costs incurred by the state for activities associated with the cleanup of environmental hazards. Costs and damages incurred by the state may be recovered in a civil action instituted in the name of the director. All costs recovered by the state pursuant to this Code section shall be deposited into the hazardous waste trust fund.

(b) Any action for the recovery of costs and for punitive damages shall be commenced within six years of the date on which all costs have been incurred.

(c) No person shall be liable for costs or damages pursuant to this Code section if he can show by a preponderance of the evidence that the release of a hazardous waste, a hazardous constituent, or a hazardous substance was caused solely by:

(1) An act of God;

(2) An act of war;

(3) An act or omission of a third party other than an employee or agent of the person or other than one whose act or omission occurs in connection with a contractual relationship, existing directly or indirectly, with the person, if the person establishes by a preponderance of the evidence that:

(A) He had no relationship with the third party nor exercised any control over activities of the third party; and

(B) He took precautions against foreseeable acts or omissions of any such third party and the consequences that could foreseeably result from such acts or omissions; or

(4) Any combination of paragraph (1), (2), or (3) of this subsection.

(d) (1) For purposes of paragraph (3) of subsection (c) of this Code section, a contractual relationship may be conclusively established by, but not limited to, land contracts, deeds, or other instruments transferring title or possession, unless the real property on which the disposal or release of hazardous wastes, hazardous constituents, or hazardous substances has occurred or is occurring was acquired by the person after the disposal or release of the hazardous wastes, hazardous constituents, or hazardous substances and one or more of the following circumstances are established by a preponderance of the evidence:

(A) At the time the person acquired the site, the person did not know and had no reason to know that any hazardous waste, hazardous constituent, or hazardous substance had been disposed of or released at the site;

(B) The person is a government entity which acquired the site by escheat, through any other involuntary transfer or acquisition, or through the exercise of eminent domain by purchase or condemnation; or

(C) The person acquired the site by inheritance or bequest

and that one or more of the circumstances described in paragraph (1), (2), or (3) of subsection (c) of this Code section are applicable.

(2) To establish that the person had no reason to know as provided in subparagraph (A) of paragraph (1) of this subsection, the person must have undertaken, at the time of acquisition, all appropriate inquiries into the previous ownership and uses of the property consistent with good commercial or customary practice in an effort to minimize liability. For purposes of the preceding sentence, the finder of fact shall take into account any specialized knowledge or experience on the part of the person, the relationship of the purchase price to the value of the property if uncontaminated, commonly known or reasonably ascertainable information about the property, the obviousness of the presence or likely presence of contamination at the property, and the ability to detect such contamination by appropriate inspection.

(3) Nothing in this subsection shall diminish the liability of any previous owner of such property who would otherwise be liable under this part. Notwithstanding this paragraph, if a person obtained actual knowledge of the disposal or release of a hazardous waste, hazardous constituent, or hazardous substance at the site when the person owned the real property and then subsequently transferred ownership of the property to another person without disclosing such knowledge, the person so transferring the property shall be treated as liable under subsection (a) of this Code section, and no defense under subsection (c) of this Code section shall be available to such person. Nothing in this subsection shall affect the liability under this part of a person who, by any act or omission, causes or contributes to the disposal or release of a hazardous waste, a hazardous constituent, or a hazardous substance which is the subject of the action relating to the site.

(e) During or following the undertaking of any corrective action, any person may seek contribution from any other person who has contributed or is contributing to any release of a hazardous waste, a hazardous constituent, or a hazardous substance. Such claims for contribution shall be governed by the law of this state. In resolving contribution claims, the court may allocate costs among liable parties using such equitable factors as the court determines to be appropriate. In any action filed by the director for the recovery of costs and damages pursuant to this Code section, any third-party claim for contribution may, upon the motion of the director, be severed and maintained as a separate action.

(f) A person who has voluntarily agreed to perform corrective action pursuant to an administrative consent order with the director shall not be liable for claims for contribution regarding matters addressed in the administrative consent order. Such administrative consent order does not discharge any other person who has contributed or is contributing to a release of hazardous wastes, hazardous constituents, or hazardous substances unless the terms of the administrative consent order so provide, and the other persons remain liable for any corrective action deemed necessary by the director but not agreed to in the administrative consent order. (Code 1981, § 12-8-96.1, enacted by Ga. L. 1992, p. 2234, § 5; Ga. L. 1993, p 500, § 7.)

The 1993 amendment, effective April 5, 1993, in the second sentence in subsection (a), substituted "The person may" for "The person shall"; and, in subsection (e), added the final sentence.

Code Commission notes. — Pursuant to Code Section 28-9-5, in 1994, near the middle of paragraph (1) of subsection (d), "constituents" was substituted for "constitutents" at the first occurrence of that term.

12-8-96.2. Limitation of liability of corrective action contractors.

(a) No corrective action contractor engaged in activities associated with the cleanup of environmental hazards created by others shall be liable for any damages arising from the release of a hazardous waste, hazardous constituent, or hazardous substance resulting from such activity in an amount greater than $1 million to any one person or $3 million to all persons for a single occurrence. The limitation of liability of this Code section shall not:

(1) Affect any right of indemnification which such person has, or may acquire by contract, against any other person who is liable for creating an environmental hazard; or

(2) Apply to persons who intentionally, wantonly, or willfully violate federal or state regulations in the cleanup process.

(b) For purposes of Code Section 12-8-96.1 and this Code section, the phrase "activities associated with the cleanup of environmental hazards" shall mean activities including investigation, evaluation, planning, design, engineering, removal, construction, and ancillary services which are carried out to abate or cleanup a hazardous waste, hazardous constituent, or hazardous substance.

(c) Nothing contained in this Code section shall be construed to be a waiver of the sovereign immunity of this state or of any agency or political subdivision of this state. (Code 1981, § 12-8-96.2, enacted by Ga. L. 1992, p. 2234, § 5.)

12-8-97. Hazardous site inventory.

(a) Beginning on July 1, 1994, the division shall compile and update as necessary an inventory of all known or suspected sites where hazardous wastes, hazardous constituents, or hazardous substances have been disposed of or released in quantities deemed reportable by rules or regulations of the board. At least annually, beginning July 1, 1994, the division shall send a copy of the inventory with the sites listed by county to the clerk of each superior court of the state, who shall place and maintain the most current copy of the inventory in the room or rooms in which the deed records of the county are kept. This inventory shall be called the hazardous site inventory. The inventory shall include:

(1) The name of the property or another description identifying the site;

(2) The location of the site;

(3) The name of the owner of the site at the time of the site's inclusion in the inventory;

(4) A general description of the type and quantity of hazardous wastes, hazardous constituents, or hazardous substances known or suspected to be at the site;

(5) A general description of possible or known threats to human health or the environment posed by the site;

(6) The status of any cleanup activities conducted by any person;

(7) A relative priority for cleanup;

(8) If a site is determined, in accordance with rules and regulations promulgated by the board, to require corrective action, a designation that corrective action is needed and a summary of needed actions;

(9) If a site is considered not capable of posing or is no longer posing an environmental or human health hazard, a designation that no further action is required; and

(10) The status of any actions contesting a determination that corrective action is needed.

The division shall also publish annually a report of the fees collected and the funds appropriated to the hazardous waste trust fund and an accounting of all disbursements from such trust fund.

(b) After July 1, 1993, the property owner of any site listed on the inventory which is designated as having a known release and which is designated as needing corrective action shall include the following notice in any deed, mortgage, deed to secure debt, lease, rental agreement, or other instrument given or caused to be given by the property owner which creates an interest in or grants a use of the property:

"This property has been listed on the state's hazardous site inventory and has been designated as needing corrective action due to the presence of hazardous wastes, hazardous constituents, or hazardous substances regulated under state law. Contact the property owner or the Georgia Environmental Protection Division for further information concerning this property. This notice is provided in compliance with the Georgia Hazardous Site Response Act."

(c) After July 1, 1993, each property owner who owns a site listed on the inventory which is designated as having a known release and which is designated as needing corrective action shall cause to be prepared an affidavit of such fact in recordable form as set forth in subsection (c) of Code Section 44-2-20 and shall file such affidavit with the clerk of the superior court of each county in which the real property or any part thereof lies. Such affidavit shall be recorded in the clerk's deed records pursuant to Code Section 44-2-20. Such affidavit shall include a statement that the property has been listed on the state's hazardous site inventory and has been designated as needing corrective action due to the presence of hazardous wastes, hazardous constituents, or hazardous substances regulated under state law. Such affidavit shall be filed with the clerk within 45 days after receipt of notice by the property owner that the director has designated the property as needing corrective action; provided, however, that neither the affidavit required by this subsection or the notice required by subsection (b) of this Code section shall be required until any contest under subsection (f) of this Code section has been resolved adversely to the property owner.

(d) After July 1, 1993, each property owner who owns real property upon which hazardous wastes, hazardous constituents, or hazardous substances have been disposed of or released in amounts exceeding reportable quantities shall, within 30 days of receipt of knowledge by the property owner of the release or disposal, notify the division in writing on such forms as may be provided by the director. This notification shall include the location, type, quantity, and date of such disposal or release, if known, and a summary of actions taken to investigate, clean up, or remediate the site. Such notification shall include a quadrangle map prepared in accordance with the National Ocean Survey/National Geodetic Survey or a Georgia Coordinate System pursuant to Article 2 of Chapter 4 of Title 44 that clearly indicates the location of the disposal or release; provided, however, that any property owner that has notified the United States Environmental Protection Agency under Section 103(c) of the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, may satisfy this notification requirement by submitting a copy of the 103(c) notice together with such quadrangle map.

(e) The provisions of this Code section shall not be applicable to emissions regulated under Article 1 of Chapter 9 of this title, "The Georgia Air Quality Act," point source discharges regulated under Article 2 of Chapter 5 of this title, the "Georgia Water Quality Control Act," or sites regulated solely by Chapter 13 of this title, the "Georgia Underground Storage Tank Act," or substances regulated under Chapter 12 of this title, the "Georgia Asbestos Safety Act."

(f) The director shall provide a property owner with written notice of any determination to designate property as needing corrective action, including a statement concerning the requirements of subsections (b) and (c) of this Code section. The requirements of subsections (b) and (c) of this Code section shall be stayed by the filing of a petition for a hearing in accordance with Code Section 12-8-73 within 30 days of the issuance of the director's written notice of the director's determination to designate property as needing corrective action. (Code 1981, § 12-8-97, enacted by Ga. L. 1992, p. 2234, § 5; Ga. L. 1993, p. 91, § 12; Ga. L. 1993, p. 500, § 8.)

The 1993 amendments. — The first 1993 amendment, effective March 22, 1993, part of an Act to correct errors and omissions in the Code, in subsection (e), inserted "Article 1 of" and substituted "'The Georgia Air Quality Act,'" for "the 'Georgia Air Quality Act of 1978,'". The second 1993 amendment, effective April 5, 1993, rewrote this Code section.

Code Commission notes. — Pursuant to Code Section 28-9-5, in 1993, "clean up" was substituted for "cleanup" in the second sentence in subsection (d).