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RESOURCE COSERVATION RECOVERY ACT SUBPART X PERMIT APPLICATION FOR OPEN BURNING FACILITIES SECTIONS A - J VOLUME 1 OF 2 NSWC INDIAN HEAD MD

4/1/1996

BROWN AND ROOT ENVIRONMENTAL

RCRA Subpart X
Permit Application for
Open Burning Facilities

for

Indian Head Division
Naval Surface Warfare Center

Indian Head, Maryland

Sections A-J
Volume 1 of 2

Northern Division
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298
Contract Task Order 0056

April 1996

Brown & Root Environmental

A Division of Halliburton NUS Corporation

RESPONSES TO INDIAN HEAD COMMENTS

OESO COMMENTS ON SECOND DRAFT RCRA SUBPART X PERMIT APPLICATION

GENERAL COMMENTS

1. Apparently SOPs are being submitted as part of the permit application in Appendices D-2 and D-3. The submission of SOPs as part of the permit may have been suggested in the past to save the applicant from writing something for certain sections in the permit. The purpose was to save time and effort.

Unfortunately, recent experience has shown disadvantages to doing this. The biggest problems are:

(1) The regulatory agencies hire contractors to review and critique permit applications. Most of these contractors don't have explosives processing experience. They pore over page after page of the SOP, nitpicking it for minor inconsistencies and errors. These usually end up as part of an NOD.

(2) If the SOP is part of the permit, each time the SOP is updated, the permit should be changed to keep it current.

As a result of these problems, it is recommended that SOPs don't be submitted as part of the Subpart X permit applications.

SOPs have been deleted from the Permit Application. The sections, where appropriate, have been revised to include a summary of the SOP.

2. We suggest making the facility description characteristics, such as acreage and location, consistent throughout the different sections of the permit application. For example;

a) Section B-1 has IHDIVNAVSURFWARCEN located 30 miles south of Washington, while sections D-3-1a, G-1, and I-1a have it 25 miles south.

The Permit Application has been revised to 25 miles south.

b) Section G-1 describes IHDIVNAVSURFWARCEN as 3500 acres, while in Section I-1a it is 3000 acres.

Section I-1a has been revised to read 3500 acres.

SPECIFIC COMMENTS

Page	Paragraph	Comment
B-1	3	**Capitalize "Propellant Plant" because it is part of the name.** "Propellant plant" changed to "Propellant Plant"
B-8	2	**Couldn't find Figure B-7 (extent of flooding)**

	#2	The figure is now provided in the application.
B-11 B-14	3 6	**only one "manned gate" now instead of two** The text is revised to read ""through a security checkpoint at a manned gate."
B-11	3	**exclusion zone is more accurately on "creek" instead of on "river"** The text is revised to read "boaters or swimmers are within the exclusion zone on the creek" **In section B - 3b, Floodplain Standards, recommend wording which states residues rather than explosives and propellants will be removed from treatment areas in threat of flooding. There should be no untreated " explosives and propellants" at the treatment areas to be removed since it is not a storage area.** **Also change the wording "hazardous waste" to "treatment residues". We don't know that treatment residues are actually hazardous waste.** The text has been revised in accordance with these comments.
B-12	5	**Change "hazardous waste" to "treatment residues'** The text has been revised to "treatment residue" in order to eliminate the referral to "hazardous waste".
B-13 B-13 B-14	1 1.d 1	**Change "... explosives, propellants, and ..." to "...Explosives and propellants residues, and .."** The text no longer refers to "explosives, propellants".
C-7		**The first two paragraphs of the "Solvent Tank" section seem to be in conflict. The first para states there will be no residue, but the second para talks about an ash residue.** Text has been revised to clarify the treatment residues in the solvent tank
C-7	9	**Appendix C-3 is a compatibility grouping; C-4 is the chemical composition** The reference has been revised to "Appendix C-4".
C-7		**The two last paragraphs on this page are more general than solvent tank related. Perhaps moving these paragraphs to C-1g (2) or C-2a(1) might read better.** These paragraphs have been moved to Section C-1g(2)(a).

C-10 6 **Should read "...results of impact, friction, and vacuum stability plus..."**

The text has been revised to read "impact, friction, and vacuum stability".

C-12 **Last sentence states that if hazardous, they will be taken to the wastewater treatment unit. I don't think HW can be taken to the Federally Owned Treatment Works (FOTW) for Treatment unless the Treatment works is under RCRA. Perhaps what is meant here is that this is taken to a treatment unit such as a carbon column for Treatment, which would be OK.**

The text has been revised to read "If hazardous, they are taken to an appropriate treatment unit (e.g. carbon column) for treatment".

C-14 **Since Appendix C-3 is not referenced anywhere, it might be appropriate to mention it somewhere in C-2; "Appendix C-3 is the compatibility groupings of explosively contaminated waste solvents."**

The first paragraph of Section C-2 revised to include "Appendix C-3 lists the compatibility groupings of explosive contaminated waste solvents".

D-3 6 **confusing sentence; "The special burn vessel .." The large burn pans don't have a requirement to be open during precipitation.**

The text has been revised to read "The special burn vessel is approximately the same capacity and shape as a 5-gallon can and constructed of carbon steel. This vessel is used to treat small quantities (a few grams to 2 pounds) of reactive wastes which are so sensitive that they cannot be safely stored and must be immediately treated regardless of weather conditions. While the special burn vessel is in use, no other treatment would be taking place at the SATTP.

D-6 2 **Suggest adding to the last sentence of that paragraph; "Any deterioration will result in cessation of burning operations in the defective equipment."**

The text has been revised to read "Any deterioration will result in cessation of burning operations in the defective equipment.".

D-6 5 **Remove "hog out" when talking about pans. All pans utilize a cover of some sort. (two places)**

The text has been revised to read "During non-operational periods the use of tarps and pan covers on pans prevents precipitation from accumulating in the burn pans. Each pan cover is equipped with handles to allow operations personnel to move it easily on and off the pan.".

D-9 3
D-10 8 **This is a biggy. The submission of SOPs as part permit was done in the past because it was felt that it would save the permit preparer time by not having to prepare a write-up for certain**

		sections. Recent experience has shown this may not be in the best interest of the applicant. **1) EPA hires contractors to review applications. These contractors pore over every page of the SOP even through most don't know the operation. They nitpick the document looking for inconsistencies and minor error. These usually end up as part of the NOD.** **2) If the SOP is part of the permit, each time the SOP changes, The permit should be changed to keep it current.** **Recommend not submitting the SOP as part of the permit application.** SOPs have been removed from the permit applicaiton. Additional text has been added to summarize information from the deleted SOPs.
E-3-8 E-3-18	4 2	**POLU is stated as estimating products of incomplete combustion. It depends on one's definition of "products of incomplete combustion'. I think this is misleading because it is not recognized for having this capability.** The POLU model generally does not estimate products of incomplete combustion. Therefore, references to "products of incomplete combustion" have been changed to "products of combustion."
E-3-17 E-3-30 E-3-30	3 1 4	**Appendix C-3 is compatibility data. The chemical data is in Appendix C-4.** The correct appendix is now referenced.
E-3-44 E-3-56	4 Table E-3-22	**Dibutylphthalate and ethyl centralite are usually not referred to as solvents, especially, ethyl centralite. Suggest calling these two "materials" instead of "solvents".** Dibutylphthalate and ethyl centralite are now referred to as materials.
E-4-13 E-4-17	Table E-4-1 Table E-4-2	**Suggest analyzing for diesel/fuel oil, especially at the CRTTP which has no containment, since it is used as a burning aid.** Table E-4-1 contains the detection monitoring program. In general, detection monitoring programs should sample analyze the minimum number of pollutants which are indicators of releases of hazardous constituents. The primary hazardous constituents of concern are metals and energetics. Analyses for direct/fueled oil would add to the cost of detection monitoring. If the commentor intended their comment to apply primarily to CRTTP, the comment is no longer relevant since the CRTTP has been deleted from the application.
E-4-23	1	**Figures E-4-6 and E-4-7 were missing.** These figures are now in the application.

F-2	1	**No longer a guard 24-hours a day at Gate 1. Suggest removing this paragraph.** Reference to a 24-hour guard at Gate 1 has been removed.
F-12	5th bullet	**Suggest removing "Section 11-3.2.10" from sentences. OP-5 is continually being updated and paragraphs and sections change.** The text revised to read "Thermal treatment will not be conducted during electrical storms as per NAVSEA OP-5.
G-6		**Check and verify the last sentence on this page. The fire department at one time was not required to be on scene during treatment.** The fire department is required to be on scene during treatment.
J-9	3	**This paragraph is somewhat confusing in that it mentions six buildings but only shows two in parentheses. Suggest modifying to make numbers agree.** The paragraph has been modified.
J-9	5	**This paragraph is somewhat confusing in that it calls the same treatment area by two different names; SATTP and Cast Plant Burn Point. Clarify by adding to second sentence "Also referred to as the Cast Plant Burn Point, it is used..."** The text has been revised to read "The SATTP ,also referred to as the Cast Plant Burn Point, is one of three thermal treatment OB areas located at the installation. This area is...".
J-9	7	**This paragraph is somewhat confusing in that it calls the same treatment area by two different names; ATTP and Safety Burn Point, which operated .... The ATTP is located ..."** The text has been revised to read "The ATTP is a formerly used Thermal Treatment OB area, also referred to as the Safety Burn Point, which operated...".
J-10	5	**This paragraph states that hazardous waste is discharged to the sewage treatment plant. I don't think HW can be taken to a Federally Owned Treatment Works (FOTW) unless the works are covered under RCRA. This should be checked out to ensure we are legal.** This paragraph has been revised to be more general.
J-11	4	**This paragraph uses "waste oil" and "fuel" to mean the same thing. Suggest making it consistent by changing "fuel" to "waste oil".** The text has been revised to read "The waste oil is taken to Building 938...".

J-12	2	**Methylcellulose should not be referred to as an explosive. Suggest removing the second sentence of that paragraph.** The text was revised to read "The units manage wastewater from the production of nitroguanidine. The plant and these units are presently inactive".
J-16	7	**The paragraph states that we are using non-conductive rubber bags to collect explosive scrap. Are we really using those, or conductive plastic bags?** The text has been revised to say conductive plastic bags are used.
	C-1.1	**This paragraph states there are four classes of propellants, yet show 5 bullets. Suggest placing the last bullet under the double-base one since that is what ball propellant is.** The last bulleted item has been moved to the end of the second bulleted item.

TYPOS

Pages	Paragraph	
C-3	last	**"Talos" instead of "Talor"** Text revised to read "Talos grain sections".
C-14	5	**".. information ont he Scrap Sheet..."** Text revised to read "..information on the Scrap Sheet...".
D-9	3	**"Acceptable" instead of "Acceptable"** Text revised to read "..Master List of Acceptable Materials...".
E-2-21	3	**"New or reconstructed" instead of "New of reconstructed"** The text has been revised
E-3-62	1	**Remove "an" in "The average duration of an OB events ..."** The text has been revised
E-3-62	7	**"locate" instead of "located"** The text has been revised
E-3-64	3	**"an" instead of "and" . "... personnel to create an exclusion ..."** The text has been revised
E-3-82	4	**Add "percent" after the number 10. "as low as 10 percent after the ..." (The number 10 looks awfully low but maybe it is so)** The text has been revised
E-3-85	last	**"locate" instead of "located"** The text has been revised
G-1	4	**"reactive wastes" instead of "reactives wastes'"** Text revised to read "These reactive wastes...".
G-3	1	**"Building 28" instead of building D-8"** Text revised to read "Building D-28".
G-4	4 second bullet	**"or" instead of "nor"** Text revised to read "...is made whether or not to implement...".
G-10	3	**"waters" instead of "wasters"** Text revised to read "Contain the spill or prevent spill run-off from reaching surface or ground waters.".
J-5	Table J-2	**"Lines" instead of "Lies"** Table revised to read "Abandoned Drain Lines...".
J-14	6	**I believe "Building 299" in this paragraph (two places) should be "Building 296"** Text revised to read Building 296 in both places.

J-19	2	**"in" instead of "is". "...approximately 1 acre in size ..."** Text revised to read "...approximately 1 acre in size...".
J-19	7	**Last sentence in this paragraph sounds confusing. Suggest rewording as follows: "Inspection showed no visible ..."** Text revised to read "Inspection showed no viable signs of waste management activity in the area.".
J-21	2	**"length" instead of "strength". "... 1,000-foot length of shoreline..."** Text revised to read "...a 1,000-foot length of shoreline...".

REVIEW OF SECOND DRAFT RCRA SUBPART X PERMIT APPLICATION
I. BRUCE DALTON

Pages	Paragraph	
B-1		**The slum pan is now actually 3 structurally separate pans.** The text has been revised to note that the slump pan is 3 structurally separate pans.
B-5		**The thrust block is used for more than just JATOs. Two smaller igniter vessels are on SAATTP instead of one.** The text has been revised to read "...burn pan, four unlined pans, one solvent treatment vessel, two igniter treatment vessels, on large clay pad (for treatment of grains and motors too large to fit any of the burn pans), and a device known as a thrust block.".
C-3		**Black powder would not be treated in the slum pan. Further, it is rarely treated and therefore, is not a typical waste. BKNO 3 is treated in the 1.3 pan.** Black powder has been deleted from Pan 6 - Slum Pan. BKNO3 has been moved from under Pan 7 to Pans 1, 2, 3, 4, and 5.
C-4		**The igniter vessel is permitted to treat up to 20 Smokey Sams at a time. This is 20 pounds of explosive per treatment and not 3 to 5.** The text has been revised to read "This unit is used to treat small waste items such as cartridge actuated devices and small rocket motors which are typically enclosed within metal cases. The vessel serves to contain the waste items in the event that they are propelled during open burning. The quantity of reactive waste that can be treated in the igniter vessel is determined on a case by case basis considering operational and safety factors. For example, up to 20 Smokey Sam rocket motors, with one pound of propellant each, can be burned at a time. The vessel is also limited by the maximum volume of waste items it can contain. Excelsior (wood shavings) wet with fuel oil and interspersed with the waste items is used to initiate and sustain combustion during open burning. The igniter vessel is used to treat the following wastes.".
C-9		**All materials sent to the SATTP would not be DOO3. Some would only contain D003 materials.** All hazardous wastes treated by OB must be D003. RCRA regulations prohibit OB of hazardous wastes unless D003. RCRA regulations would not apply to the treatment of non-hazardous wastes by OB (although Maryland air regulations on OB would apply). The following sentence has been modified as follows, all hazardous wastes treated in this manner must be hazardous prior to OB due to the RCRA Reactivity Code D003.".

C-10

DSC will determine if the material is energetic not to differentiate between 1.1 and 1.3.

The sentence has been revised to read "A hazard sensitivity test called the Differential Scanning Colorimetry Test is used to determine if the waste material is energetic".

C-14

Typo (see marked up copy)

The text has been revised to read "...information on the Scrap Sheet...".

D-3

"Irregardless" is non-standard word. "Regardless" is the preferred word.

The text is revised to read "...treated regardless of ...".

D-6

Paragraph D-8b(3) (a) is constructed awkwardly. Metal covers are used on hogout pans and tarps are used on other pans. This meaning is somewhat lost as written.

Reference to hog out has been deleted. The text has been revised to read "During non-operational periods the use of tarps and pan covers on pans prevents precipitation from accumulating in the burn pans. Each pan cover is equipped with handles to allow operations personnel to move it easily on and off the pan".

D-10

Typo

The text is revised to read "...but contain other hazardous constituents,...".

E-3-2

How did we arrive at a max wind speed of 20 mph? We can treat at wind speed up to 30 mph.

The maximum wind speed of 20 mph was determined based on discussions with NAVSURFWARCEN and a review of NAVSEA requirements.

E-3-22

What is an OB frozen temperature?

The OB frozen temperature is obtained from a POLU model. The POLU model predicts that the composition of the combustion products will change with temperature until a "freeze" temperature is reached. At this freeze temperature the combustion products no longer change with temperature. This is known as the frozen temperature. Frozen temperature is between 1500 and 1800 degrees for a typical explosive.

E-3-36

I believe the annual calculation formula is in error.

The annual calculation formula has been corrected. This was a typographical error only. The actual calculations were correct.

E-3-30/42/	**On these pages we refer to metals in, metals out several different ways. The clearest to me is "metals-in/metals-out" but the bottom line is to be consistent.**
	Consistent terminology is now used.
E-3-44	**(summary) We have many other AP containing propellants.**
	"Representative" AP-containing projectiles were evaluated. The other AP-containing projectiles should be within the range of waste composition and emission evaluated for the representative AP-containing projectiles.
E-3-44	**Why was TNT used in the slum pan emission factors? NG, TMETN and several other nitrate esters would comprise a larger percentage of the nitrated slum materials.**
	TNT was used based on the information available to B&R Environmental at the time the air pathway assessment was conducted.
E-3-64	**Both of these scenarios would be difficult to live with. If we must live with one of these scenarios, WE should select and not MDE. Do we have to live with one of these scenarios?**
	The two scenarios are presented for evaluation by NAVSURFWARCEN. The Activity should choose one for presentation in the application. Both scenarios were designed to demonstrate that "human health and the environment are not adversely affect."
E-3-91	**Some places we refer to it as CATTP and some places as CRTTP. Be consistent.**
	The Coffee Road facility has been deleted from the application.
E-3-91	**How did we determine that the contamination level by weight at the slum pan is only a few pounds?**
	This estimate was provided to BR&E by Indian Head personnel knowledgable about the process that generates the slum pan waste material. No actual testing has been conducted to confirm this estimate.,
F-1	**Does security have 5 boats?**
	Text revised to read security has three boats.
F-2	**Top paragraph is obsolete.**
	The paragraph has been removed.
F-2	**The health and safety office is not located in building 714.**

The text is revised to read "Building 482".

F-11 **Fire resistant underclothes <u>or</u> burn suits are required.**

The text has been revised to read "...fire resistive long underclothes or burn suits,...".

F-12 **The reference for no thermal treatments during electrical storms is 6-4.1.**

Based upon other comments, this section reference is continually being updated and paragraphs and sections changed. Therefore the reference has been deleted. The text has been revised to read "Thermal treatment will not be conducted during electrical storms".

G-3 **Fred Cox's office is in building D-28.**

Building D-8 has been revised to D-28.

G-8 **All wastes possess the RCRA characteristic of reactivity. Should this say All wastes possess the RCRA characteristic of reactivity or are contaminated with materials that possess the RCRA characteristic of reactivity?**

The intent of this sentence is to state that all hazardous wastes treated are RCRA reactive.

G-13 **Two way radios are not always available at the SATTP.**

The text has been revised to read "Two-way radios (including hand held sets), are occasionally available for emergency communications."

G-13 **How does a fire extinguisher control spills?**

This sentence has been deleted.

Appendix D-4 **Step 3 is not current.**

******

The text has been revised to read "Write a one-time procedure for treating the material - send to 041 and 096 - await concurrence from both areas before treating the material"

*****

General comment: **From my perspective, this a very detailed application. Is there some convention or understanding regarding what information is provided to show that we have control of the process and what information becomes part of the rules we have to follow? Do we have to update our permit when the SOP changes? when personnel on the ERT change? When the HCB changes? When the master list changes? When the design of the pans change?**

Part B Applications are detailed. All of the information supplied in the application becomes part of the RCRA Part B Permit when issued. Whether a permit would be updated when a SOP is changed depends upon the issuing agency and the permit conditions negotiated with the agency. SOPs have been deleted from the application. The permit will have to be modified (minor mod) when designated emergency coordinators or alternates change. ERT changes will not result in the need to modify the permit.

The permit application has been written so that no permit modifications are required when the Master List changes. The one exception is when changes to the Master List result in the addition of RCRA codes not listed in the Part A. Pan design changes may be considered a permit modification. HCB changes are not likely to be considered a permit modification.

Recommended Changes for the IHDIV
Subpart X Permit Application
Michael A. Bonanno, 0951B, X6747
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041

General Comments

(1) Remove all references to Caffee Road Thermal Treatment Point (CRTTP). Save text referring to CRTTP in a separate file and submit this file along with the revised file for SATTP to the Government. Remove and save Figures B-5

All references to Caffee Road Thermal Treatment Point (CRTTP) have been removed.

(2) Remove Standard Operating Procedures (SOP) from appendices X and Y. Insert summarized SOP for SATTP.

Standard Operating Procedures (SOPs) have been removed from Appendices X and Y.
As appropriate information from the SOPs has been summarized in the text of the application.

(3) Insure uniformity of contingency plans.

The comment appears to have been directed by the commentor toward Indian Head staff. Therefore, no changes were required in the application as the result of this comment.

(4) Use updated documents:
- Master List
- Contingency plan
- Mutual aid agreements

(5) Emergency burns (pg. C-8): who is EPA (or MDE) point of contact?

At the time the application was prepared contacting the Director of the EPA was a requirement. Pending changes to the emergency provisions section of the munition's rule, this provision may longer be a requirement. Section C-1g(3) will be revised to reflect the emerging emergency provisions requirements. The text will be revised to replace "Director of EPA" and "Director" with "Waste Management Division Manager".

(6) Page C-8, Section C-1g(4), "Additions to the Master List" Only discusses environmental performance standards for air emissions. Will standards for surface/subsurface water and soils have to be addressed in order to add an item to the Master List? This section states that the air pathway assessment must be updated if a new waste presents a greater potential to pollute than what is already on the master list. Would we be required to apply for a permit modification to change the air pathway assessment?

The objective of the three pathway assessments (air, surface, and subsurface) is to develop performance standards that are protective of human health and the environment. For any particular waste constituent or treatment emission, the most stringent limit would apply considering all three pathways. The final environmental performance standard would be one set limit. These waste composition limits would be established at the lower of (1) SOP limits or (2) the maximum quantities that could be treated without adversely affecting the environment.

Since the highest limit would be set at the maximum quantity that would adversely affect the environment, it would not be possible to add chemicals with a greater potential to pollute.

Maryland has established criteria for certain air toxics. Air toxics emitted by the open burning (OB) of materials on the current Master List (1992) were addressed. In the event a new waste material emits an air toxic not already considered, it would be necessary to establish a treatment limit, by the process outlined in the air pathway assessment.

The permit application has been structured in that the procedure for evaluating new waste material is self-implementing and would not result in a requirement to modify the permit application. The only situation where a new waste material would result in a need to modify the permit would be where the waste carries a RCRA code not already included in the Part A.

(7) page C-9, Section C-1g(5), remove this section; the issue of "Larger Quantities of Wastes" should be addressed in section E-3.

The text deleted from C-1g(5) and moved to Section E-3.

(8) Appendix C-8, Mil-Std Sampling and Testing. The utility of this appendix is questionable. These tests are typically not performed to characterize wastes. The waste analysis plan will only be used to determine if an unknown waste is energetic and its relative sensitivity or if treatment residues contain energetics. If unknowns or residues are not energetic, they would be addressed as non-reactive hazardous wastes in the existing Part B permit.

Sentence in text revised to read "A hazard sensitivity test called the Differential Scanning Colorimetry Test is used to determine if the waste material is energetic." Appendix C-8, Mil-Std Sampling and Testing has been deleted.

Text Insertions for Subpart X Application for Indian Head Division

(1) Page B-1, Section B-1

The following text revision has been made per the comment.

The IHDIVNAVSURFWARCEN (the Activity) is located approximately 25 miles south-southwest of Washington, DC. in west-central Charles County, Maryland. The Activity is situated adjacent to the town of Indian Head, Maryland at the southern terminus of Maryland Route 210. It occupies a pair of peninsulas on the eastern shore of the Potomac River as shown on the map in Figure B-1. The northern peninsula occupies 1,961 acres and the southern peninsula occupies 1,171 acres. the peninsulas are separated by the Mattawoman Creek.

The OB explosive hazardous waste treatment facility located on the northern peninsula is the subject of this permit application. A tenant activity, the Naval Explosive Ordnance Disposal Technology Division (NAVEODTECDIV, also referred to as the Stump Neck Annex), occupies the southern peninsula. NAVEODTECDIV also operates an OB, explosive hazardous waste treatment facility which shall be addressed in a separate permit application.

(2) Page B-5, Section B-1b

The following text revision has been made per the comment.

Small rocket motors (such as jet-assisted take-off (JATO) rocket motors) are attached to the thrust block in order to prevent them from moving while they undergo treatment.

(3) Page B-12, Section B-3b

The following text revision has been made per the comment.

Regulation-40 CFR 264.18(b) (i and ii), 270.14 (b) (11) (iii), and COMAR 26.13.06.01 require that this permit application address the consequences of the location of SATTP within a floodplain. In the event of a 100-year flood much of SATTP would be covered by water. The predicted elevation above mean sea level of 100-year flood waters are 8.2 feet for the Potomac River and 8.1 feet for the Mattawoman Creek. Therefore, there is some potential for residues from the treatment process to come into contact with flood waters. Several factors, however, will mitigate the effects of flooding:

* Treatment activities are not conducted during rainy weather or if there is the imminent threat of rain. The treatment units are covered with tarps or lids when not in use to prevent the accumulation of rainwater. If rainwater does accumulate in the treatment units it is collected, analyzed and managed in a manner appropriate for its waste type.

* The Potomac River and Mattawoman Creek provide a large buffer volume for rain and flood waters. As a result, water levels rise slowly and flash flooding is rare. Sufficient time periods and warnings would be available to react to imminent flooding conditions.

* Obviously, treatment activities would not be conducted in the event of floods or imminent threat of flood. Sufficient warning is usually available prior to a flood to take actions to move thermal treatment equipment out of the flood plain. Thus the possibility of flushing treatment residues from the equipment is avoided. Flood warnings are available from a variety of weather reporting services.

It is concluded from these factors that there is a very low potential for hazardous wastes to be present at SATTP in the event of a flood or rainy weather. Therefore, it is highly unlikely that hazardous wastes would come into contact with flood waters. The thermal treatment equipment would be removed from the site in the event of imminent flooding. Therefore treatment residues present in the equipment would also not come into contact with flood waters. The equipment is covered with tarps or lids when not in use which mitigate the accumulation of rain water. Residues present within the treatment equipment are periodically removed, contained and managed appropriately to prevent excess acclamations.

The only other source of contaminants which can potentially enter surface waters in the event of flooding are those which may be present in soils at SATTP. During a flood there is some potential for loose top soil to be swept into the surface waters and eventually become downstream sediment. If on-site soil is contaminated, there is some potential for contaminants to leach out and enter surface waters during a flood. Characterization of soils at the site has not been performed as of the submission of this permit application. However, a plan for the sampling and analyzing soils is described in section XXXX. If soil contamination is found, computer models can be used to determine potential impacts on groundwater, surface water, and sediments as a result of flooding.

(4) Page B-14, Section B-4

The following text revision has been made per the comment.

The entire eastern boundary of the Activity, which is shared with the town of Indian Head, is enclosed by an eight foot fence topped with three strands of barbed wire. All traffic entering the Activity must pass through the main gate which is situated at the terminus of Maryland Route

210. This gate is manned with a security guard from the hours of 3 PM through 2 AM weekdays and continuously manned from Friday evening through Monday morning and during holidays. The main gate is not manned from 2 AM through 3 PM. People entering the main gate, while it is manned, must present an employee identification badge or a visitor's pass. Visitor's passes are obtained from a pass office located immediately outside of the main gate.

Upon passing through the main gate, traffic enters the unrestricted area. This is a relatively small area in which non hazardous activities occur. Office buildings, military housing, maintenance and recreational facilities are located within the unrestricted area. While the main gate is unmanned access to the unrestricted area is not controlled.

The bulk of the land area at the Activity is located within the restricted area. The restricted area is separated from the unrestricted area and the town of Indian Head by an eight foot high fence topped with three strands of barbed wire. Al hazardous activities, including the SATTP, are located in the restricted area. Hazardous activities are defined as those involving explosives or other industrial operation. All explosive hazardous wastes treated at SATTP originate from on-site sources. Therefore, these wastes are only transported within the restricted area.

All traffic entering the restricted area must pass through a second gate manned with a security guard 24 hours a day. This gate is situated at the intersection of Patterson and Farnum Roads. People entering the restricted area gate must present an employee identification badge or a visitor's pass. The maximum legal gross weight for any vehicle entering the Activity is 79,800 pounds. On-site roadways were designed and constructed to be structurally capable of supporting this weight. Intersections within the restricted area were designed and constructed with ample visibility and sufficient vehicle turning distances.

The following factors prevent traffic from entering SATTP: (1) the site is located at the end of Strauss Avenue and there is no through traffic, (2) access to the site is restricted to government vehicles delivering wastes of transporting site personnel, (3) a gate, warning sign and flashing lights are located at the entrance to the site and (4) site personnel, who are present at the site during operating hours, monitor traffic. A range of 20 to 30 trips per week occur at the on-site roadways at SATTP. By contrast, traffic on Strauss Avenue within the unrestricted area averages 3,600 vehicles per day (2-way volume).

People and vehicles entering the restricted area may not carry matches, lighters or other flame producing devices. Flame producing devices which must enter the restricted are (e.g., welding equipment) must receive a safety permit. Tobacco smoking occurs in the restricted area only in designated areas which have electronic ignition devices.

Many roadways and areas in the restricted area, including SATTP, are limited to government vehicles only. Explosive hazardous wastes may only be carried in Government vehicles which are equipped with placards, indicating that the contents are explosive, a fire extinguisher and a flame arrestor on the tailpipe. When carrying explosives, government vehicles must operate four-way flashing emergency lights and head lights. These vehicles are inspected for explosive safety on a regular basis. The routes that vehicles carrying explosives travel are selected to avoid traffic congestion and concentrations of personnel. The drivers of government vehicles which carry explosives must obtain a government license, receive training on explosive handling and transpiration and must wear safety equipment (flame resistant coveralls or lab coat and hat, conductive shoes and safety glasses) when transporting explosives.

The speed limit on the Activity is 25 miles per hour or slower in specially marked areas. the roadways are monitored by an internal police force which enforces local traffic regulations. Traffic control signs are posted throughout Activity roadways.

All vehicles must yield the right-of-way to vehicles carrying explosives, including those carrying explosive wastes, on Activity roadways. The yielding vehicles must immediately pull to the right side of the road and stop until the vehicle carrying explosives passes. When traveling in the same direction, vehicles may not pass or come within a unsafe distance of vehicles carrying explosives.

There are no impacts on surrounding public roadways from the operations of SATTP. All wastes are transported via on-site roadways within the restricted area of the Activity.

(5) Page C-1, Section C-1a

The following text revision has been made per the comment.

The residues (essentially ash) resulting from open burning (OB) waste treatment are collected from the OB units periodically. Representative samples of the residues are taken and analyzed for hazardous waste characteristics. If the residue demonstrates the reactive hazardous waste characteristic it is treated by OB. If the residue demonstrates other hazardous waste characteristics (e.g., TCLP characteristic) they are accumulated in containers at a less-than-90-day hazardous waste accumulation site. The residues are later transferred to an on-site hazardous waste storage facility. The storage facility is permitted under the Activity's RCRA Part B permit.

(6) Page C-2, Section C-lg

The following text revision has been made per the comment.

Pyrotechnics are chemicals or mixtures of chemicals which, when ignited, undergo an energetic chemical reaction at a controlled rate intended to produce, on demand and in various combinations, specific time delays or quantities of heat, noise, smoke, gas, light, or infrared radiation. Pyrotechnic formulations vary widely because of the variety of functions they perform. Some pyrotechnics burn at relatively slow rates, however, others undergo rapid deflagration and appear to react mush like high explosives.

Although some of the reactive wastes are designed to detonate or are capable of detonating, all treatment processes performed at SATTP occur by open burning.

(7) Page C-4, Igniter Vessel

The following text revision has been made per the comment.

This unit is used to treat small waste items such as cartridge actuated devices and small rocket motors which are typically enclosed within metal cases. The vessel serves to contain the waste items in the event that they are propelled during open burning. The quantity of reactive waste that can be treated in the Igniter vessel is determined on a case by case basis considering operational and safety factors.

For example, up to 20 Smokey Sam rocket motors, with one pound of propellant each, can be burned at a time. The vessel is also limited by the maximum volume of waste items it can contain. Excelsior (wood shavings) wet with fuel oil and interspersed with the waste items is used to initiate and sustain combustion during open burning. The igniter vessel is used to treat the following wastes:

(8) Page C-5, Clay Pad

The following text revision has been made per the comment.

The large rocket motors are ignited remotely with the use of an ignition train consisting of an electric match or squib wrapped within a fuel oil soaked rag. When ignited, the match in turn ignites the rag which provides a sustained flame for ignition of the rocket motor.

(9) Page C-7, Treatment Residues

The following text revision has been made per the comment.

Residues are generated from the open burning of reactive wastes in the treatment units. The residues are typically in the form of dry ash, however, on occasion, large pieces of unburned explosives remain in the units. If unburned explosives are clearly identified in the residues, they are either left in the pan or moved to the hog-out pans for future treatment.

Dry ash which does not visibly contain explosives is still assumed to be reactive hazardous waste due to the possible presence of small quantities of unburned explosives. The ash is removed from the unit using a nonmetallic shovel and placed in a 55-gallon, U.S. DOT 17E steel drum. The drum is labeled with the following information: (a) the words "Hazardous Waste", (b) an accumulation start date, (c) the origin of the ash and (d) a statement that a sample the ash is being analyzed to determine whether it is a hazardous waste. Ash originating from the treatment of Class 1.1 explosives is segregated from ash originating from Class 1.3 explosives. The drums are sealed and transported to Building 721 for storage until the analysis results are known. A typical ash analysis is shown in Appendix C-5.

If the analysis demonstrates that the ash is reactive waste, then it is returned to SATTP and placed in the hog-out pans for treatment. Fuel oil is added to the hog-out pan to sustain ash combustion during treatment. If the analysis demonstrates that the ash is not reactive waste, then it is tested for the hazardous waste toxicity characteristic (TC) due to the possible presence of metals. If TC metals are present in concentrations greater than or equal to the specified limits, then the residue is managed as hazardous waste by the Property Disposal Officer (PDO). If TC metals are not detected or are present below specified limits, the residue is managed as a non hazardous solid waste by the PDO.

Typically, significant quantities of residue do not accumulate in the solvent tank. If residue accumulation is detected, however, residue treatment is performed within the tank. Residues are not removed because of the difficulty of accessing the tank interior. Treatment is performed by burning a fuel oil and excelsior mixture within the tank.

Typically, ash residue is dry and free of liquids. The OB units and ash storage containers are protected form rain water intrusion. On occasion, however, water may be mixed with ash within an OB unit. When this occurs, free liquid is separated from the ash placed in a container. The liquid is then sampled and analyzed for TC metals. If TC metals are present in concentrations greater than or equal to the specified limits, then the residue is managed as hazardous waste by the Property Disposal Officer (PDO). It TC metals are not detected or are present below specified limits, the liquid is managed as a non hazardous solid waste by the PDO.

Metal components remaining after reactive waste treatment, such as metal casings from the ignitor vessel or rocket motor cases from the thrust block, are placed in containers and transported to a facility known as the Solid Waste Recycler (SWR). The SWR is essentially a furnace in which the treated components are heated to a high temperature to insure that they are free of explosive material and that they can e handled safely. This step is necessary before metals components can be classified as safe to handle and sold to private parties for recycling.

(10) Last two paragraphs on page C-7 are out of place. Suggest they be moved to page C-2, paragraph C-1g(1) (a).

(11) page C-8, Section C-1g (4)

The following text revision has been made per the comment.

As noted in section C-1 (g) (a), only wastes listed on the "Master List of Materials Acceptable for Treatment at SATTP" (or simple the "Master List", shown in Appendix C-2) may be treated at SATTP. occasionally, new reactive hazardous wastes or new configurations of listed reactive hazardous wastes are generated which are not on the Master List. In order to treat a new waste or a new waste configuration at SATTP, the generator shall either request permission for a "one-time-burn" or request approval to add the waste to the Master List. If the waste will only be generated and treated once, then a one-time-burn is requested. If the waste will be generated and treated in large quantities or over a long period of time, than it shall be added to the Master List. In either case, essentially the same procedures are used. These procedures are shown in Appendix D-4 and summarized as follows:

* A request sheet, shown in figure C-1, is filled out and submitted by the generator. It contains the following information about he waste: name, use, configuration, physical state, formulation, quantity, frequency of treatment, hazard sensitivity data, special safety requirements, explosive classification, and an attached material safety data sheet (MSDS).

* The operations engineer shall write a procedure to treat the waste that shall include: (1) measures to prevent propulsion of waste, as in the case of rocket motor grains, (2) which treatment unit shall be used, (3) configuration of waste within the unit, (4) method of ignition, (5) required explosive and personnel limits and (6) required personal protective equipment.

In addition to operational criteria discussed above, an assessment shall be made to determine the treatment conditions required for new wastes in order to meet environmental performance standards described in Section E. Environmental performance standards for safety, surface pathway (surface water and soils) and subsurface pathway (subsurface soils and groundwater) are met, for example, through implementation of standard operating procedures and a groundwater monitoring program. These performance standards shall be in effect regardless of whether new for existing wastes are treated at SATTP. In practice, the assessment of whether treating a new waste will meet environmental performance standards will be limited to an air pathway environmental assessment which is described in detail in Section E-3. The basic steps in an air pathway assessment are summarized as follows:

* The type and quantity of combustion products resulting from treatment of the subject waste are predicted using the POLU-11 computer model. Where this model is not applicable, other prediction methods shall be used. The results of the model (or alternate prediction method) are reported in units of weight of combustion product generated per unit weight of waste burned (i.e., lb/lb).

* The maximum quantity of waste which may be treated in a single event is determined based upon: (1) the weight of combustion products generated per unit weight of waste treated, (2) the dispersion of those combustion products from SATTP (as predicted by standard U.S. Environmental Protection Agency (EPA) air pollutant dispersion models, such as ISCST2 and INPUFF) and (3) applicable federal and state standards for ambient concentrations of air pollutants for a given time period 91-hour, 8-hours and annual).

* The air pathway, environmental performance analysis described in Section E-3 is based upon a worst case analysis of the wastes on the master list. If the assessment of the new waste yields a more stringent limitation than that derived from the listed waste, then Section E-3 shall be modified to reflect the more stringent air pathway performance standards.

(12) page C-9, C-2 Waste Analysis Plan (WAP)

C-2a Characterized Wastes

The following text revision has been made per the comment.

Safety regulations require that all explosive materials must be thoroughly characterized for chemical and physical properties and explosive hazard sensitivity prior to being processed or otherwise used at the Activity. Material safety data sheets (MSDS), test reports, process documentation, and government and/or commercial technical literature on explosive materials serve as documentation for the characteristics of these materials. In addition, Activity personnel possess extensive knowledge of the explosive materials which they used. Interim or final Department of Defense (DOD)hazard classifications (Class/Division of either 1.1 (mass explosion) or 1.3 (mass fire) are also typically established for most explosive materials used at the Activity.

As a result of the documentation described above, reactive hazardous waste generated from the use of explosive materials are well characterized from existing information and process knowledge. Typically, there is no need to perform waste characterization tests on reactive hazardous wastes or materials contaminated with reactive hazardous wastes prior to treatment. As noted in section C-1 (g) (a), only wastes listed on the "Master List of Materials Acceptable for Treatment at SATTP" (or simple the "Master List", shown in Appendix C-2) may be treated at SATTP. Wastes listed on the Master List have been assigned an explosive hazard classification and meet the criteria for reactive hazardous wastes. Therefore, wastes listed on the Master List are not subject to the WAP because they have been previously characterized.

Hazardous waste codes (in addition to D003) which apply to reactive hazardous wastes treated at SATTP are listed in Appendix C-6. These other codes apply because the reactive hazardous wastes contain toxicity characteristic metals or U-listed chemicals.

C-2b Wastes Which Have Not Been Characterized

The following text revision has been made per the comment.

The waste analysis plan (WAP) for wastes with ;unknown properties is described in this section. this WAP is used to: (1) determine if a waste is a reactive hazardous waste as defined by 40 Code of federal Regulations (CFR) 261 and Code of Maryland Regulations (COMAR) 26.13.02, (2) determine the explosive hazard classification, as defined by Department of Defense (DOD) regulations, of reactive hazardous wastes, (3) determine if the residues from the open burning treatment process are reactive hazardous wastes, and (4) determine if the residues are toxicity characteristic hazardous waste, in the event they are not reactive.

Explosive properties are characterized, in part, by a series of hazard sensitivity tests which are performed by the manufacturer of the explosive material. These tests can also be performed on-site, if necessary, at Activity laboratories. The hazard classification of an explosive material is based, in part, upon the results of hazard sensitivity testing. An explosive material hazard classification and thus the classification of the reactive waste derived from it, allow the SATTP engineer and operators to establish the quantity of waste that may be treated and to identify the appropriate treatment unit and treatment techniques to employ. In addition, reactive hazardous wastes with different hazard classifications are segregated and treated in separate units.

If a waste is determined not to be a reactive hazardous waste, it cannot be treated at SATTP. Further testing is performed to determine whether the waste is a non-reactive hazardous waste. The procedures which are followed to characterize non-reactive hazardous wastes are described in the Activity's Controlled Hazardous Substance (CHS, i.e., hazardous waste as per RCRA) Facility Permit issued by the Maryland Department of the environment. The CHS Facility Permit is the equivalent of a RCRA, Part B permit. The WAP described herein only concerns reactive hazardous waste and the residues from its treatment.

C-2c Hazard Sensitivity Tests

The following text revision has been made per the comment.

The purpose of hazard sensitivity testing is to determine the relative hazards associated with the handling and processing of hazardous materials. The data is meaningful only when it is compared to other materials which have been characterized on the same apparatus. The rudimentary hazard sensitivity tests which are performed to determine the relative sensitivity of an explosive material are: impact, sliding friction, and electrostatic discharge. A fourth test, differential scanning calorimetry (DSC), is performed to determine whether energetic materials are present in a sample of unknown material or treatment residues. A brief description of each test is discussed below.

The impact sensitivity test determines the maximum impact energy which will not initiate an explosive material. In this test small samples of the explosive material are exposed to the impact energy of a standard falling weight. The height from which the weight is dropped is varied until the maximum height at which 20 consecutive negative results (i.e., no reaction occurs) are obtained with at least one positive result (i.e., a reaction of some kind) at the next higher height.

The sliding friction test determines the maximum frictional energy which can be applied to an explosive material without causing some type of decomposition reaction. In this test, a sample of an explosive material is placed between a block and a stationary wheel. Pressure is applied to the wheel by a hydraulic ram. A weighted pendulum is then swung from a predetermined position so that it strikes the end of the block causing it to move. The pressure applied to the wheel is varied until the lowest pressure level at which 20 consecutive negative results (i.e., no reaction occurs) are obtained with at least one positive result at the next higher pressure level.

The electrostatic discharge test determines the sensitivity of an explosive material to ignition by the discharge of electrical energy. In this test, electrical energy, which is stored in a charged capacitor, is discharged into a sample of an explosive material. The electrical energy discharged from the capacitor is varied until the lowest energy level at which 20 consecutive negative results (i.e., no reaction occurs) are obtained with at least one positive result at the next higher energy level.

The DSC test determines whether an exothermic reaction (i.e., a reaction characterized by the evolution of heat) occurs when a sample (about 1 to 7 mg) of the subject material is heated at a constant rate. In this test, a sample of the subject material is hermetically sealed within a small aluminum container. The container is then placed within the DSC instrument cell and heated at a rate of 10 degrees C per minute from 20 degrees C to 550 degrees C. The cell is purged with nitrogen gas to vent any gases released from the sample container during the test. The heat flow from the sample is measured and plotted versus temperature. Any exothermic reactions are noted. An exothermic reaction indicates the presence of an energetic material. Energetic materials typically exhibit a characteristic exotherm(s) at a specific temperature or range of temperatures. If no reaction or an endothermic reaction (i.e., a reaction characterized by the

(x) page D-1, Section D-8 Misc. Units

The following text revision has been made per the comment.

IHDIVNAVSURFWARCEN conducts thermal treatment of reactive hazardous wastes (D003) and materials contaminated with reactive hazardous wastes which are generated from the production and other use of propellants, explosives and pyrotechnics (PEP). Thermal treatment occurs by open burning (OB) at a facility known as the Strauss Avenue Thermal Treatment Point (SATTP). SATTP is located at the southern end of the Activity at the terminus of Strauss Avenue. It consists of a 1,110-foot long peninsula that extends into Mattawoman Creek.

Figure B-4 shows a schematic of SATTP and indicates the location of the Main Point (MP), at the end of the peninsula, and the Auxiliary Point (AP), on the eastern side of the peninsula. The bulk of reactive hazardous wastes are treated at the MP in units known as burn pans. Explosive hazardous wastes in the form of rocket motors, explosive contaminated solvents, water-wet propellant processing waste, explosive contaminated residual ash and waste explosive contained with metal components are treated at the AP.

The frequency and quantity of reactive hazardous waste treated at SATTP varies from year to year and is partially dependent upon the rate of production at the Activity ordnance plants. In general, as the rate of production increases the rate of reactive hazardous waste generation and thus the rate of waste treatment increases and vice versa. Currently, treatment of reactive wastes occurs on a daily basis with up to 9000 pounds of waste treated per event.

Only reactive hazardous wastes and materials contaminated with reactive hazardous wastes listed on the "Master List of Materials Acceptable for Treatment at SATTP" (or simply the :"Master List", shown in Appendix C-2) may be treated at SATTP. Wastes listed on the Master List have been assigned an explosive hazard classification and meet the criteria for reactive hazardous wastes.

Reactive hazardous wastes treated at SATTP can be classified into the following six categories:

(1) Waste propellant, including single-base, double-based, triple-base, composite, composite double-base, fluorocarbon, and nitramine propellants;

(2) Waste explosives, including explosive raw materials, such as RDX, nitrocellulose, HMX, or lead azide and explosive formulations, such as: plastic bonded explosive (PBX), stabilized nitrate esters, or solvated nitrated esters;

(3) Waste oxidizers contaminated with organics, including contaminated ammonium perchlorate (AP), ammonium nitrate (AN), lithium perchlorate (LP), and potassium perchlorate (KP);

(6) Wastes contaminated with explosives, which include wastes

Notes:
(1) Page B-13; ERC or OSOT?
(2) Contingency plan has changed again
(3) Flood section, pg B-12 jibes with contingency plan?
(4) Should we rename SATTP master list from "Master List of Materials..." to "Master List of Wastes..."
(5) current form, figure C-1, page C-6?
(6) Bldg. 721 accumulation site?
(7) Will mentioning SWR raise flags with regulators?

SUBPART X REVIEW OB/OD COMMENTS FROM TOM SYMALLA, CODE 0952G

PAGE	SECT	PARA	COMMENTS
B-14	B-3b	Last 4 sent.	**Is someone at IHDIV currently generating models to predict the impacts of contaminated soil?** The model proposed for predictions impacts of contaminated soil is the Multimedia Environmental Pollutant Assessment System. (MEPAS). This model has been accepted by regulatory agencies for other Subpart X Permit Applications for OB/OD units. The model requires site-specific contamination information. A Work Plan has been developed and reviewed by Maryland for obtaining soil, groundwater, and sediment data. When the work plan is implemented and the data evaluated, the MEPAS modeling will be conducted.
C-4	C-Ig(1) (a) (2)	Ign. Vess.	**Cartridges is listed twice under "The igniter vessel is used to treat the following:"** The second reference to "Cartridge" deleted from list.
C-12	C-2b (2) (b)	1 para. 2 sent.	**Is the last sentence true? Are hazardous liquids taken to the wastewater treatment unit for treatment? As far as I know, we are not allowed to do this.** Text revised to read "If hazardous, they are taken to an appropriate treatment unit (e.g. carbon column) for treatment".
C-14	C-2f	2 para. 6 sent.	**Change to "If the information on the ..."** Text has been revised to read "..information on the Scrap Sheet...".
D-1	D-8	2 para. 2 sent.	**Change to "... IHDIVNAVSURFWARCEN according to the nature..."** Text has been revised. Reference is no longer included.
D-5	Table D-1		**Does the clay pad have an explosive limit?** There is no limit reference in the current Indian Head SOP. The maximum limit would be the Point limit.

D-7	**D-8b (3)(a)**	**2 para.**	**Is the following true? "Any accumulated precipitation would not be a reactive waste."** The sentence has been deleted. **Additionally, I do not believe that explosive contaminated water is treated in installation wastewater treatment units.** Text revised to read "If analyses determine that the water is contaminated with explosive constituents, it will be treated at appropriate treatment units."
D-7	**D-8b (4) (a)**	**2 para. 1 sent.**	**Change to "The area in the immediate"** Text revised to read "The area in the immediate...".
D-7	**D-8b(4) (b)**	**1 para.**	**Is the material burned at CRTTP classified as reactive? Do trace amounts of propellant/explosives classify all scrap metal in a pile as reactive? I do not believe that it is.** B&R Environmental agrees that the materials treated at the CRTTP do not fit the RCRA D003 classification. In accordance with Indian Head directions all text regarding CRTTP has been deleted.
E-2-21	**E-2**	**Sent. after Point 2**	**Change to "Newly reconstructed installations..."** The change was not made. The quotation was from Maryland regulations.
E-3-1	**F-3-1a**	**2 para. 2 sent.**	**Change to "... related materials that contain reactive wastes..."** The change has been made.

E-3-17	E-3-3b	2 para.	**Does the EPA or MDE require the station to evaluate all items treated at SATTP, or will they accept the 10 percent of units that have been evaluated?** Ten percent of the items were evaluated in detail in order to keep the level-of-effort to a manageable level. The items were chosen for detailed evaluation based on their chemical composition and treatment quantities. Chemical composition was considered by first grouping the items into classes which would be expected to emit similar POCs. Items were then chosen to represent classes considering not only chemistry but also quantities. The items chosen represented all chemical classes and 95 percent of the quantities of items treated by weight. USEPA or MDE has the option of accepting characterization of emissions from "representation" items or requiring full characterization. This would be a negotiation issue.
E-3-44	E-3-12i	1 para. Last sent.	**Where does the 6,680 pound/day maximum limit for items containing lead come from?** The treatment limits were determined by a back calculation process. First the ambient air standard for a particular air pollutant was determined. Second the ambient air standard was divided by the air dispersion factor to determine the maximum quantity of the pollutant that could be emitted without resulting in exceedances of the standard. Third the weight of the write containing the largest concentration of lead was calculated, which could be treated without releading the contaminant in excess of the standard. The last step was conducted by first determining lb/lb emission factor for the pollutant(s) and then taking the highest emission factor and dividing it into the calculated "allowable" emission quantity of the pollutant(s).
E-3-82	E-3-16b	1 para. 4 sent.	**As low as 10 what? Percent?** 10 percent ammonium perchlorate.
E-3-85	E-3-16e	Last para.	**Change to "... in order to locate the ..."** The change has been made.

E-4-9	E-4-4	4 para. 1 sent.	**What is the following sentence saying? "... the boundary includes the vertical surface located at the hydraulically down gradient limit of the existing waste management units that extends into the uppermost aquifer."** The cited language comes from 40CFR264.95 where the point-of-compliance is defined. The point is at the boundary of the facility. It can be visualized as follows. A fence at the boundary, which extends straight down into the ground. The point at which the fence would intersect with the uppermost aquifer is the groundwater point-of-compliance. At the point the boundary is considered to be the edge of the water.
F-2	F-1a (2) (b)	1 para.	**The entrance to the unrestricted side (Gate 1) is no longer manned 24-hours a day.** This paragraph has been deleted.
F-9	F-3a (3)	2 para.	**The Hazardous Materials Emergency Response Team is now called the On Scene Operations Team (OSOT). Please change throughout.** Hazardous Materials Emergency Respoinse Team changed to the On Scene Operations Team (OSOT).
G-3	G-2	Alt No. 1	**Frank Hannah is listed as Alternated No. 1. This may not be true anymore. Possible, Dave Fuchs is Alternate No. 1.** Alternate No. 1 changed to Dave Fuchs. Address and home telephone number also updated.
G-3	G-3	1 para.	**The implementation of contingency plans should state that the Fire Protection Division should be called FIRST, not supervisor. Please change throughout.** The text was revised to read "...immediately notify the Fire Protection Division who will notify...".

I-5	I-1f (2)	1 para. Last sent.	**The sentence states that "All treatment residuals are either a recyclable metallic scrap or a nonhazardous ash." How do we know that this ash is nonhazardous? I could very well be TCLP hazardous waste.** **Reference was to Caffee Road. Caffee Road has been deleted from the permit, therefore no action is required at this time.** The text has been changed to indicate the treatment residuals are either a recyclable metal scrap or an ash which on occasion may be TC hazardous.
I-11	I-1p (4)		**This section describes the methods to perform decontamination. I hope that the state will be clear about our cleanup intentions. The cleanup method described in this application may not be the method that is ultimately chosen. Closure of the TTPs will require Remedial Actions, which would include Engineering Evaluation and Cost Analysis for the TTPS. This analysis may lead the station to chose a cleanup alternative that is different from the one described in this application.** **If a cleanup alternative that is different from the one described in this application is chosen, the application will have to be revised to reflect this decision. Section I-1g describes closure plan amendments.** The closure method contained in the application should reflect the cleanup alternative currently analyzed to meet RCRA closure requirements. Since closure is not anticipated to occur until decades into the future a detailed engineering and cost analysis is not warranted at this time. The activity has the ability to amend the closure plan at any time in the future, or when a date certain for closure is determined.

Appendix C-2		**This copy of the Master List is unapproved. When submitted to the state, the list should be approved.** At the time of submittal IHDIVNAVSURFWARCEN should insert the "approved" master list into the application. It should be noted that there later versions of the master list may contain chemicals not addressed in the current application. **The Roster for the HMERT (now OSOT) will have to be updated in the Mutual Aid Fire Fighting Assistance Agreement.** The HMERT has been revised to read OSOT. **Additionally, on the last page of this same agreement, the Explosive Ordnance Disposal Technology Center (EODTC) is now the Explosive Ordnance Disposal Technology Division (EODTD).** The EODTC is now referred to as the EODTD.
Appendix I-1	**Fig. I-2-1**	**Why are all background samples lined up on the southern shore of the SATTP? Have these been selected in this arrangement for a particular reason?** **The location of the background samples was chosen to provide a representative sample of the treatment areas without the possibility of contamination from reactive material. Therefore, it was decided to chose a location along the shoreline that is similar in soil structure to the treatment areas and there is no history of treatment activities.** The background samples were chosen from the nearest area judged to be unaffected by SATTP activities.
Appendix I-1	**Fig. I-2-2**	**Why are there no background samples for CRTTP?** **Comment is in regards to Caffee Road. Caffee Road has been deleted from the permit, therefore no action is required at this time.** All reference to CRRTP have been deleted.
Appendix I-2		**Why was 1.0 chosen for the rinsate standard of 2,4-DNT, TNT, RDX, HMX?** **???? Do not see this reference in text.**

The standards in Appendix I 1-2 were obtained from Ohio Environmental Protection Agency Closure Guidance dated May 28, 1991.

REVIEW OF SECOND DRAFT RCRA SUBPART X PERMIT APPLICATION MISCELLANEOUS COMMENTS

B. N/C

B-1 The sentence "The Navy Explosive Ordnance Disposal Technology Center installation consists of approximately 2,500 acres" in the first paragraph seems to be unrelated to the paragraph and serves no purpose.
The paragraph has been replaced with the following text. The sentence of concern has been deleted.

The IHDIVNAVSURFWARCEN (the Activity) is located approximately 25 miles south-southwest of Washington, DC. in west-central Charles County, Maryland. The Activity is situated adjacent to the town of Indian Head, Maryland at the southern terminus of Maryland Route 210. It occupies a pair of peninsulas on the eastern shore of the Potomac River as shown on the map in Figure B-1. The northern peninsula occupies 1,961 acres and the southern peninsula occupies 1,171 acres. the peninsulas are separated by the Mattawoman Creek.

The OB explosive hazardous waste treatment facility located on the northern peninsula is the subject of this permit application. A tenant activity, the Naval Explosive Ordnance Disposal Technology Division (NAVEODTECDIV, also referred to as the Stump Neck Annex), occupies the southern peninsula. NAVEODTECDIV operates an OB/OD hazardous waste treatment facility addressed in a separate permit application.

B-1a. N/C

B-1b. References to the main point configuration need to be consistent throughout the permit. The configuration of the main point described mostly throughout the permit is shown on page B-6 with seven burn pans (pans 1,2,3,4, and 5 for 1.3 burning, pan 6 as the slum pan, and pan 7 for 1.1 burning), one special burn pan, and a clay pad. Although this is not the current configuration, it may be what we want in the permit. We currently do not have a special burn pan or container, however, it was proposed at one time as a unit to get rid of small quantities or to perform test treatments with. This would also prevent damage to the large pans in the event of an incident. Also, the clay pad is totally washed away but still included in the SOP as a way of treating larger motors which cannot fit in the pans. Paragraph B1-b mentions "one unlined burn pan" on the main point. No treatments are done on the main point in unlined pans so this statement should be deleted.
The configuration shown for the main point (and for the auxiliary point) was obtained from drawings supplied in the SOP. The special burn pan or container was added at the direction of the Activity. At the time the application was initially prepared the clay pad was one of the facilities to be included in the application. The location of the units described in the application was used in the air dispersion modeling. If the units are actually located somewhere else on the points there may be some impact on the validity of the air dispersion modeling results. The reference to unlined burn pans has been removed.

B-1c. N/C

B-2. Second paragraph: The purpose and relation of the last sentence to the previous sentences is unclear.
The structure of the paragraph has been revised in order to provide a better understanding of the . The sentence "The topography of the OB sites is fairly regular." has been deleted.

B2:
1. N/C
2. N/C
3. N/C

4. N/C
5. N/C
6. N/C
7. N/C
8. **First sentence: The main gate is no longer manned 24 hrs per day.**
   The text has been revised to read ""through a security checkpoint at a manned gates."
9. N/C
10. N/C
11. N/C
12. N/C

B-3
B-3a. N/C
B-3b N/C
B-4 N/C

SECTION C. WASTE CHARACTERISTICS
C. N/C
C-1 N/C
C-1a N/C
C-1b N/C
C-1c N/C
C-1d N/C
C-1e N/C
C-1f N/C
C-1g N/C
C-1g (1) N/C
C-1g (1) (a) N/C

C-1g (1) (a) (1) CLAY PAD Should read "TALOS sections" not "Talor sections".
The text has been revised to read "Talos grain sections".

C-1g (1) (a) (2) N/C
C-1g (1) (b) N/C
C-1g (2) N/C
C-1g (2) (a) N/C

C-1g (2) (b) Where will we store drums of ash awaiting analysis after 721 is taken over by Dept 90/94?
The text has been revised to read "...drums are sealed and transported to a 90 day storage area...".

C-1g (3) N/C

C-1g (4) The POLU model is now up to revision 13.
At the time of the application preparation, POLU model 11 was utilized. In order to utilized the POLU 13 model it would be necessary to repeat the emissions estimation modeling exercise. This is not currently within the scope of the CTO.

C-1g (5) The first paragraph is confusing and unclear in what it is trying to say.
This section has been removed from Section C and inserted into Section E-3 where it is more appropriate and therefore more understandable.

C-2 N/C

C-2a **N/C**

C-2a (1) **Hazard classification depends on many tests of which DSC is only one.**
The sentence has been revised to read "A hazard sensitivity test called the Differential Scanning Colorimetry. This test is used to determine if the waste material is energetic".

C-2a (2)	**N/C**
C-2b	**N/C**
C-2b (1)	**N/C**
C-2b (2)	**N/C**
C-2b (2) (a)	**N/C**
C-2b (2) (b)	**N/C**
C-2c	**N/C**
C-2c (1)	**N/C**
C-2c(2)`	**N/C**
C-2c (3)	**N/C**
C-2d	**N/C**
C-2d (1)	**N/C**
C-2d (2)	**N/C**
C-2d (2) (a)	**N/C**
C-2d (2) (b)	**N/C**
C-2e	**N/C**

C-2f The activity no longer uses Special Job Procedures (SJPs), they are now called Standard Operating Procedures (SOPs)
All reference to "Special Job Procedures (SJPs)" will be revised to "Standard Operating Procedures (SOPs)".

C-2g	**N/C**
C-2g (1)	**N/C**
C-2g (2)	**N/C**
C-2g (2) (a)	**N/C**
C-2g (2) (b)	**N/C**
C-2g (2) (c)	**N/C**
C-2g (2) (d)	**N/C**
C-2g (3)	**N/C**
C-2g (3) (a)	**N/C**
C-2g (3) (b)	**N/C**
C-2g (3) (c)	**N/C**
C-2g (4)	**N/C**
C-2g (5)	**N/C**
C-2g (6)	**N/C**
C-2g (7)	**N/C**
C-3	**N/C**

SECTION D. PROCESS INFORMATION

D.	**N/C**
D-1	**N/C**
D-2	**N/C**
D-3	**N/C**
D-4	**N/C**
D-5	**N/C**
D-6	**N/C**
D-7	**N/C**

D-8 **For the designated use of the SATTP, what does "rework materials return and propellants" mean?**
The text has been revised. This reference no longer exists.

D-8a N/C
D-8a (1) N/C
D-8a (1) (a) N/C
D-8a (1) (b) N/C

D-8a (2) **1.3 pan dimensions are 20 feet long by 8 feet wide by 14 inches deep.**
The text has been revised to read "...8 feet wide x 14 inches deep".

D-8a (2) (a) **Hog-out Pans: First sentence should read "Moist solid constituents from motor propellant hog-out and re-burns . . . ".**
The text has been revised to read "..motor propellant hog-out and reburns...".

D-8a (2) (b) N/C
D-8b N/C
D-8b (1) N/C

D-8b (1) (a) **Last sentence in paragraph should read ". . . cessation of burning operations until repaired."**
The test has been revised to read "Any deterioration will result in cessation of burning operations in the defective equipment".

D-8b (2) N/C
D-8b (2) (a) N/C
D-8b (2) (b) N/C
D-8b (3) N/C
D-8b (3) (a) N/C
D-8b (3) (b) N/C
D-8b (4) N/C

D-8b (4) (a) **Second paragraph, first sentence: the word "is" should be "in".**
The text has been revised to read "The area in the immediate...".

D-8b (4) (b) N/C
D-8c N/C

D-8c (1) **Add "30 Minutes after no flames are visible, if treating grains".**
Specific details on waiting periods has been deleted.

Change "Partial Misfire - 4 hours after ignition attempt" to "Partial Misfire - 2 hours after ignition attempt".
The details on waiting periods have been removed from this section.

D-8c (2) N/C
D-8d N/C
D-8d (1) N/C
D-8d (2) N/C
D-8e N/C
D-8e (1) N/C

D-8e (2) **First sentence "up to 4-24 hours" is redundant, change to "up to 24 hours" or "for 4 to 24 hours".**
This comment relates to Caffee Road. All references to Caffee Road have been deleted from the permit.

D-8f **N/C**
D-8g **N/C**
D-8g (1) **N/C**

D-8g (2) **Step 1., last sentence: Change word "deliver" to "delivery".**
This comment relates to Caffee Road. All references to Caffee Road have been deleted from the permit.

D-8h **N/C**

D-8i **Add to last paragraph: IHDIVNAVSURFWARCEN along with the International Technology Corporation, IT, is now actively developing a concept for a Confined Burn Facility which is intended to replace the SATTP. This concept will be tested on a sub-pilot scale within the next two years. If successful, pilot scale testing will take place which can lead to a Military Construction Project projected for completion at the turn of the century. Remove or modify last sentence of last paragraph to smoothly accept above addition.**
The text has been revised to include this new information.

D-8j **N/C**
D-8j (1) **N/C**
D-8j (2) **N/C**
D-8j (3) **N/C**
D-8j (4) **N/C**
D-8j (5) **N/C**
D-8j (6) **N/C**
D-8j (7) **N/C**
D-8j (8) **N/C**
D-8j (9) **N/C**
D-8j (10) **N/C**
D-8j (11) **N/C**

Section E-1 OVERVIEW OF ENVIRONMENTAL PERFORMANCE STANDARDS E-1 N/C

Section E-2 HUMAN HEALTH AND ENVIRONMENTAL HAZARDS

E-2 **N/C**

E-2-1 **Under 2. Maryland Toxic Air Pollutants, second paragraph, second sentence: Should read "New <u>or</u> reconstructed . . ." instead of "New of reconstructed . . .".**
The text has been revised.

E-2-2 **N/C**
E-2-3 **N/C**
E-2-4 **N/C**
E-2-4a **N/C**
E-2-4b **N/C**
E-2-4c **N/C**

E-2-4d It is not understood where the .99 factor in the hazard quotient calculation, the 64 mg/kg factor in the RDX incremental cancer risk calculation, and the 1 mg/kg factor in the DNT incremental cancer risk calculation came from. They are not explained. A note to table E-3-6 explains the .99 factor for the hq, but this is later in the report and very hard to find.
The .99 factor is the target hazard quotient. This factor is now explained in the example calculation.

Section E-3 AIR PATHWAY ASSESSMENT

E-3 N/C
E-3-1 N/C

E-3-1a The abbreviations used in this paragraph for the Strauss Avenue Auxiliary Thermal Treatment point (SATTP) and that used throughout the remainder of the report for the Strauss Avenue Thermal Treatment Point (SATTP) are the same. This is confusing. Should change the abbreviations as follows: Strauss Avenue Thermal Treatment Point (SATTP); Strauss Avenue Main Thermal Treatment Point (SAMTTP); and Strauss Avenue Auxiliary Thermal Treatment Point (SAATTP).
Abbreviations used to reference the Strauss Avenue Thermal Treatment Point and the Strauss Avenue Auxiliary Thermal Treatment Point are now different.

E-3-1b N/C
E-3-1c N/C
E-3-1d N/C
E-3-1e N/C
E-3-2 N/C
E-3-2a N/C
E-3-2a (1) N/C
E-3-2a (2) N/C
E-3-2b N/C
E-3-2c N/C
E-3-3 N/C
E-3-3a N/C

E-3-3b HCL is also emitted whenever AP based composite propellants are burned.
It is acknowledged that HCl is emitted whenever AP based propellants are burned. Section E-3-3b addresses the general case of the propellants which comprise the bulk of the materials treated at SATTP. The emissions of HCl from AP based rocket motor propellants are addressed in the more specific discussion on rocket motor emissions in Section E-3-14i.

E-3-3c N/C
E-3-3d N/C
E-3-4 N/C
E-3-4a N/C
E-3-4b N/C
E-3-5 N/C
E-3-6 N/C
E-3-7 N/C
E-3-8 N/C
E-3-9 N/C
E-3-10 N/C
E-3-11 N/C
E-3-12 N/C
E-3-12a N/C
E-3-12b N/C

E-2-12c **N/C**

E-2-12d The mixing height of 3000 m in Table E-3-10 is not explained in the text.
Mixing height can be described as the depth of the atmosphere through which atmospheric pollutants are typically mixed by the dispersion process. This description of mixing height now appears in the text.

E-2-12e **N/C**
E-2-12f **N/C**
E-2-12g **N/C**
E-3-12h **N/C**
E-3-12i **N/C**
E-3-13 **N/C**
E-3-13a **N/C**
E-3-13b **N/C**
E-3-13c **N/C**
E-3-13d **N/C**

E-3-13e **Second paragraph: word "located" should be "locate".**
The change has been made.

E-3-13f **N/C**
E-3-13g **N/C**
E-3-13h **N/C**
E-3-13i **N/C**

E-3-14 **Last sentence: Word "discussion": should be discussed".**
The change has been made.

E-3-14a **N/C**
E-3-14b **N/C**
E-3-14c **N/C**
E-3-14e **N/C**
E-3-14f **N/C**
E-3-14g **N/C**
E-3-14h **N/C**

E-3-14i **JATO BLOCK: According to these calculations only 8 SR121 motors may be treated at once to keep HCL emissions below that allowed. Has the SOP been changed to agree with this? The SOP used to say 9 motors. This also means that detailed characterization of the other motors strapped to the JATO block should be a priority. IGNITER VESSEL: 1st paragraph, third sentence: Word "pan" should be "vessel".**
The emissions estimation methods and air dispersion modeling techniques used to determine the SR121 limits have not been reviewed or approved by the state. It may be premature at this point to revise SOPs to address the modeled impacts. However it is recommended that the Activity evaluate the emission from other AP containing motors to determine if the permit might result in lower allowable treatment limits. Pan has been changed to vessel.

E-3-15 **N/C**
E-3-15a **N/C**
E-3-15b **N/C**
E-3-15c **N/C**
E-3-15d **N/C**
E-3-15e **N/C**
E-3-15f **N/C**

E-3-15g	**N/C**
E-3-15h	**N/C**
E-3-15i	**N/C**
E-3-16	**N/C**
E-3-16a	**N/C**
E-3-16b	**N/C**

E-3-16c Last sentence: Word "conduct" should be "conducted".
The change has been made.

E-3-16d Table E-3-41: Mixing height is now 5000 m with no explanations.
This mixing height was used in error in the ISC2 modeling for the Slum Pans and the Unlined Pans. The correct mixing height for these modeling demonstrations should be 3,000 meters. The ISC2 model has been rerun with the correct mixing height of 3,000 meters. This change in mixing height did not change the calculated worst case 1-hour dispersion factor for these treatment units.

E-3-16e	**N/C**
E-3-16f	**N/C**
E-3-16g	**N/C**
E-3-16h	**N/C**
E-3-16i	**N/C**
E-3-17	**N/C**

E-3-18 Has the SOP been written to take this into account?
The SOP has not been rewritten to take into account the results of the air pathway assessment. B&R Environmental recommends, until the state has reviewed and approved the results of the air pathway assessment, that the Activity not revise the SOPs.

Section E-4 GROUNDWATER MONITORING

E-4-1	**N/C**
E-4-1a	**N/C**
E-4-1b	**N/C**
E-4-1c	**N/C**
E-4-2	**N/C**
E-4-2a	**N/C**
E-4-2b	**N/C**
E-4-2c	**N/C**
E-4-2d	**N/C**
E-4-3	**N/C**
E-4-3a	**N/C**
E-4-3b	**N/C**
E-4-3c	**N/C**
E-4-3c (1)	**N/C**
E-4-3d	**N/C**
E-4-3d (1)	**N/C**
E-4-3d (2)	**N/C**
E-4-3d (2) (a)	**N/C**
E-4-3d (2) (b)	**N/C**
E-4-4	**N/C**
E-4-5	**N/C**
E-4-6	**N/C**
E-4-6a	**N/C**
E-4-6b	**N/C**

E-4-6c **N/C**
E-4-6d **N/C**
E-4-7 **N/C**
E-4-7a **N/C**
E-4-7b **N/C**
E-4-7b (1) **N/C**
E-4-7b (1) (a) **N/C**
E-4-7b (1) (b) **N/C**
E-4-7c **N/C**
E-4-7d **N/C**
E-4-7d (1) **N/C**
E-4-7d (1) (a) **N/C**
E-4-7d (1) (b) **N/C**
E-4-7d (1) (c) **N/C**
E-4-7d (2) **N/C**
E-4-7d (2) (a) **N/C**
E-4-7d (2) (a) Well Development: section E-4-7d (1) (b) states "The use of drilling fluids is prohibited during soil boring activities", since the wells will use the soil boring holes, it seems that drilling fluids are also prohibited here. It should say that.
This addition has been made.

E-4-7d (2) (b) **N/C**
E-4-7d (2) (c) **N/C**
E-4-7d (2) (d **N/C**
E-4-7d (2) (e) **N/C**
E-4-7d (2) (f) **N/C**
E-4-7d (2) (g) **N/C**
E-4-7d (2) (h) **N/C**
E-4-7d (2) (i) **N/C**
E-4-7d (2) (j) **N/C**
E-4-7d (2) (k) **N/C**
E-4-7d (2) (l) **N/C**
E-4-7d (2) (m) **N/C**
E-4-7d (2) (n) **N/C**

E-4-7d (2) (o) First bullet, 2nd sentence: Phrase ". . . and note the item of the COC record. "Should be ". . . and note the time of the COC on the COC record."
This change has been made.

E-4-7d (2) (p) **N/C**

E-4-7d (2) (q) First sentence: Phrase "throughout the site closure" is not understood. Re-phrase.
Text revised to read "Records to be maintained include boring logs,...".

E-4-7d (2) (r) Does not indicate whether mixing of different liquids from different sources in the 55 gallon drums is allowed. May want to keep segregated to minimize disposal or treatment quantities if a problem is discovered.
Text revised to read "All development and purge liquids will be collected, containerized, and stored on-site in DOT-approved (Specification 17-C), 55-gallon drums. If visual observation or field monitoring instruments indicate that the liquid may be hazardous, it will be segregated from the other liquids."

E-4-7d (3) **N/C**
E-4-7d (3) (a) **N/C**

E-4-7d (3) (b) **N/C**

E-4-7d (3) (c) **2nd paragraph, 2nd sentence from end: Phrase ". . . TTPs constituents . . ." should be ". . . TTP's constituents . . ."**
Text revised to read "TTP's constituents".

E-4-7d (3) (d) **N/C**
E-4-7e **N/C**
E-4-8 **N/C**
E-4-9 **N/C**

Section E-7 **Environmental Performance Standards Summary E-7 N/C**

Section F **Procedures to Prevent Hazards**

F-1 **N/C**
F-1a **N/C**

F-1a (1) **2nd paragraph, 2nd sentence: Is there still a 45 member security staff?**
The precise number of security staff is no longer mentioned.

Strauss Avenue, 3rd sentence: Word 'room' should be replaced by word "building" to avoid confusion between any room in bldg. 880 and any building on the base which is LAN connected.
The text has been revised to read "However, any building connected...".

F-1a (2) **N/C**
F-1a (2) (a) **N/C**

F-1a (2) (b) **The entrance to the station (Gate 1) is no longer guarded 24 hrs/day.**
This paragraph was deleted.

2nd paragraph, last bullet: Change to "Transmit radio signals in permitted areas only".
The text was revised to read "Transmit radio signals in permitted areas only".

F-1a (2) (b) (1) **N/C**
F-1a (2) (b) (2) **N/C**
F-1a (3) **N/C**

F-1a (3) (a) **1st sentence: Word "chain" should be "road".**
The text was revised to read "A sign mounted on a wooden horse in the middle of the road reads:...".

F-1a (3) (b) **N/C**
F-1b **N/C**
F-2 **N/C**
F-2a **N/C**
F-2a (1) **N/C**
F-2a (2) **N/C**
F-2b **N/C**
F-2b (1) **N/C**
F-2b (2) **N/C**
F-2b (3) **N/C**
F-2b (4) **N/C**
F-2b (5) **N/C**
F-2b (6) **N/C**

F-2b (7) **N/C**

F-2b (8) <u>**Solvent Vessel Inspections**</u>**, last bullet: 1st sentence is contradictory - " . . . periodically . . . before and after every . . .".**
The text was revised to read "... the solvent vessel is monitored before and after every treatment".

F-3 **N/C**
F-3a **N/C**
F-3a (1) **N/C**
F-3a (2) **N/C**
F-3a (3) **N/C**
F-3a (4) **N/C**
F-4 **N/C**

F-4a **1st sentence: Word "Standing" should be Standard".**
The text was revised to read "... procedures set forth in the Standard Operating Procedures for...".

F-b **N/C**
F-4c **N/C**
F-4d **N/C**
F-43 **N/C**
F-5 **N/C**
F-5 **N/C**

F-5a **Why is only electrical storm guidance quoted from OP-5 when all mentioned guidelines are contained in OP-5?**
The text was revised. Reference to OP-5 has been entirely eliminated.

F-5b **Does everyone entering the SATTP actually log in at building 714? This seems quite awkward.**
Yes, everyone logs in at building 714.

Section G. **CONTINGENCY PLAN**
G. **N/C**
G-1 **N/C**
G-2 **N/C**
G-3 **N/C**
G-4 **N/C**
G-4a **N/C**
G-4b **N/C**
G-4b (1) **N/C**
G-4b (2) **N/C**
G-4c **N/C**
G-4c (1) **N/C**
G-4c (2) **N/C**

G-4d **5th paragraph, 6th bullet: ". . . are allowed." where? Should specially state where they are allowed to go.**
The text was revised to read "Only authorized personnel with proper protective equipment are allowed within the control site".

<u>**Fires**</u>**,** **3rd paragraph, 2nd sentence: phrase 'water will be pumped from the Mattawoman Creek." should read "additional water will be pumped from the Mattawoman Creek.".**

The text was revised to read "In the event of a major fire, additional water will be pumped from the Mattawoman Creek".

G-4e	**N/C**
G-4f	**N/C**
G-4g	**N/C**
G-4h	**N/C**
G-4i	**N/C**
G-5	**N/C**
G-5a	**N/C**
G-5b	**N/C**
G-5c	**N/C**
G-5d	**N/C**
G-5e	**N/C**
G-5f	**N/C**
G-5g	**N/C**
G-6	**N/C**
G-7	**N/C**
G-8	**N/C**
G-9	**N/C**

Section H Personnel Training

H.	**N/C**
H-1	**N/C**
H-1a	**N/C**
H-1a (1)	**N/C**
H-1a (2)	**N/C**
H-1a (3)	**N/C**
H-1a (4)	**N/C**
H-1a (5)	**N/C**

H-1a (6) There are two facilities, each of which are operated by separate organizations. - SATTP operations do not come under the Property Disposal Manager and Staff, assuming this means the PDO, but under the Cast Operations Branch - this paragraph needs adjustment to explain this difference.
The title of the section was revised to read "Cast Operations Branch Manager and Staff".

H-1b 4th paragraph, nos 1. and 4.: Initiation and Ignition can mean the same thing - what are the meanings here?
List updated to mirror revised Hazard Control Briefing. Text reads
"1. Facility Preparation
2. Scrap Delivery
3. Material Placement
4. Ignition
5. Material Treatment
6. Burn Pan Patching".

H-1c	**N/C**
H-1d	**N/C**
H-1e	**N/C**
H-2	**N/C**
H-2a	**N/C**

Section I CLOSURE AND POST CLOSURE PLANS

I.	**N/C**

I-1 **N/C**
I-1a **N/C**
I-1b **N/C**
I-1b (1) **N/C**
I-1b (2) **N/C**
I-1c **N/C**
I-1d **N/C**

I-1e **Second sentence: ". . . with either the Main Point being closed separately." should be " . . . with either the Main Point or the Auxiliary Point being closed separately."**
The text was revised to read "...with either the Main Point or the Auxiliary Point being closed separately".

I-1F **N/C**

I-1f (1) **JATO Block: see comment for paragraph E-3-14i above.**
The information listed is from the SOP change number 27, page 8, Process Explosive and Personnel Limits. The limits are based on the amount of the material allowed to be at the treatment point at anyone time, and not necessarily on the amount allowed to be treated at one time.

I-1f (2) **N/C**
I-1g **N/C**
I-1h **N/C**
I-1h (1) **N/C**
I-1h (2) **N/C**
I-1h (3) **N/C**
I-1h (3) (a) **N/C**

I-1h (3) (b) **The well monitoring system is not "existing", it is only planned at this point. This situation should be worked into this paragraph.**
The text has been revised to read "If all hazardous waste or hazardous constituents cannot be removed from one of the TTPs during closure, the monitoring well network, as described in Section E-4, will be maintained. This monitoring well network will be modified, if necessary, based on the TTP. or portion thereof, requiring capping.

I-1i **N/C**
I-1j **N/C**
I-1k **N/C**
I-1l **N/C**
I-1m **N/C**
I-1n **N/C**
I-1o **N/C**
I-1p **N/C**
I-1p (1) **N/C**
I-1p (2) **N/C**
I-1p (3) **N/C**
I-1p (4) **N/C**
I-1p (5) **N/C**
I-1p (6) **N/C**
I-1q **N/C**
I-2 **N/C**
I-2a **N/C**
I-2b **N/C**
I-3 **N/C**

I-4	N/C
I-5	N/C
I-6	N/C
I-7	N/C
I-8	N/C
I-9	N/C

Section J **SOLID WASTE MANAGEMENT UNITS**
J. **N/C**

J-1 **Table J-2; Area A-11: Is ". . . Drain Lies. . ." supposed to be ". . . Drain Lines. . ."**
The table was revised to say "Drain Lines"

Drainage System Oil Water Separator and Oil Storage Tank (Extrusion Plant): The first sentence should read" . . . referred to as The Press Line (Buildings 560 through 566). . .". Also, the Industrial Wastewater Treatment, Phase II project (P-106) has installed three new separators to replace the unit described. Two of the new separators handle the explosively contaminated waters and one of the new units handles the non-explosively contaminated waters from the press line. Presently all four separators are operating until the original can be closed.
The text was revised to read "This site is the location of six buildings, referred to as the Press Line (Building 560 through 566), constructed in 1943. In 1981, an oil/water separator was installed. The oil/water separator is constructed of concrete and is partially below grade. It measures approximately 10 feet long x 6 feet wide x 6 feet deep. Three new separators have been installed. Two of the separators handle explosively contaminated waters and one handles non-explosively contaminated water from the press line.

Auxiliary Thermal Treatment Point (ATTP): To prevent confusion with the Strauss Avenue Auxiliary Thermal Treatment Point (SAATTP) and to be consistent with the write up in this paragraph the title should be "Safety Burn Point" or visa versa. Also, all references to the "Cast Plant Burn Point" should be replaced by "Strauss Avenue Thermal Treatment Point" (this paragraph as well as Strauss Avenue Thermal Treatment Point (SATTP) and other places in this section - the names of sites need to be consistent throughout this application).
The text was revised to Safety Burn Point.

Temporary Accumulation Dumpsters for explosive Scrap: IHDIV no longer uses dumpsters for this purpose. Plastic garbage cans are used instead. The scrap propellant is actually placed into conductive Velostat® bags or wrapped up in velostat sheets and then placed into the garbage cans. The change was made in response to the burn point incident a few years ago in which the cause of the fire was traced to the dumpsters and tools used. Additionally, the activity is building a structure to house these garbage cans near building 1731. Also, the water used to keep the scrap moist for explosive safety purposes is collected and treated via carbon column separation at facilities built during P-106, Phase I (the extrusion plant has some of these carbon facilities as does the NG plant, although only Extrusion treats waste water from water wet scrap). I believe the spent carbon is burned in the power plant - talk to Dip Sen for details (2210R). The information is this section seems to be dated and should be rechecked for accuracy. J-2 Many of these concerns may no longer exist - should be rechecked also.
Information regarding this SWMU remains the same. However, the unit now is inactive.

Appendix C-1 CHEMICAL COMPOSITIONS OF PROPELLANTS, EXPLOSIVES, AND PYROTECHNICS N/C

Appendix C-2 MASTER LIST OF MATERIALS ACCEPTABLE FOR TREATMENT AT THE STRAUSS AVENUE THERMAL TREATMENT POINT (SATTP) The master list is now at revision 7 and will be revised again due to the constant flow of new requests for treatment.

The updated Master List has been included in the permit application.

Appendix C-3 COMPATIBILITY GROUPINGS OF EXPLOSIVELY CONTAMINATED WASTE SOLVENTS N/C

Appendix C-4 CHEMICAL COMPOSITION OF ENERGETICS IN ITEMS THAT MAY BE TREATED BY OB AT IHDIVNAVSURFWARCEN This list is apparently only compares to revision 3 of the master list.
This appendix is a representative list of the items treated. The text has been revised to reflect this information.

Appendix C-5 REPRESENTATIVE ASH ANALYSES RESULTS N/C

Appendix C-6 HAZARDOUS WASTE CODES N/C

Appendix C-7 DIFFERENTIAL SCANNING CALORIMETRY (DSC) TEST N/C

Appendix C-8 MIL-STD-286C MILITARY STANDARD PROPELLANTS. SOLID: SAMPLING AND TESTING N/C

Appendix C-9 CONTAINER SAMPLING PROCEDURES N/C

Appendix C-10 "SCRAP" FORMS These forms are no longer used. We currently use a three part form which will soon be replaced by computer printouts showing which portion of the explosive hazardous waste inventory is being moved to the SATTP
Text revised to indicate that information regarding the explosive hazardous waste inventory will be entered onto computer generated Scrap Forms. The Scrap Form appendix has been removed from the permit application.

Appendix D-1 INDIAN HEAD DRAWINGS Are these up to date?
Drawings have been revised to incorporate comments. Indian Head to provide current photographs.

Appendix D-2 through D-3 are missing or do not exist.
The appendices for Section D have been updated and include Appendix D-1 (Indian Head Drawings) and Appendix 2 (Summary of Evolving Treatment Technologies for Reactive Energetic Containing Wastes).

Appendix D-4 STEPS FOR TREATING A MATERIAL NOT ON THE MASTER LIST N/C

Appendix D-5 SUMMARY OF EVOLVING TREATMENT TECHNOLOGIES FOR REACTIVE ENERGETIC CONTAINING WASTES

Appendix E-2-1 TAILED CALCULATIONS OF REFERENCE CONCENTRATIONS N/C

Appendix E-3-1 TREATMENT ITEM LOCATION TABLE What does this mean?
This table lists the unit where the item is treated.

Appendix E-4-1 FIELD INVESTIGATION FORMS N/C

Appendix E-4-2 APPENDIX IX COMPOUNDS Information appears to be missing from package.
This appendix has been deleted. The information was redundant with the tables in the text.

Appendix G-1 MUTUAL AID FIREFIGHTING ASSISTANCE AGREEMENT AND MUTUAL POLICE ASSISTANCE AGREEMENT N/C
Appendix G-1 has been replaced with current Mutual Aid Agreement.

Appendix G-2 HAZ-MAT INCIDENT REGISTRY CHECKLIST N/C

Appendix G-3 HAZARDOUS MATERIALS EMERGENCY RESPONSE INDIAN HEAD DIVISION NAVAL SURFACE WARFARE CENTER N/C

Appendix H-1 LESSON PLANS STRAUSS AVENUE THERMAL TREATMENT POINT These lesson plans are not up to date.
Appendix H-1 has been replaced with current lesson plans.

Appendix H-2 HAZARD CONTROL BRIEFING SOP 198-098 This hazard control briefing is not up to date.
Appendix H-2 has been replaced with current Hazard Control Briefing.

Appendix H-3 EXAMPLES OF CERTIFICATION EXAMINATIONS AND QUIZZES These certification examinations and quizzes are not up to date.
Appendix H-3 has been replaced with current certification exam.

Appendix I-1 RISK ESTIMATION AND DEVELOPMENT OF SOIL CLEANUP LEVELS N/C

Appendix I-2 SAMPLING AND ANALYSIS PLAN FOR CLOSURE N/C

DRAFT FINAL RESOURCE CONSERVATION AND RECOVERY ACT
SUBPART X PERMIT APPLICATION FOR
OPEN BURNING FACILITIES
INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

SECTIONS A THROUGH J
VOLUME 1 OF 2

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Northern Division
Environmental Branch Code 18
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, Pennsylvania 19113-2090

Submitted by:
Brown & Root Environmental
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0056

APRIL 1996

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TABLE OF CONTENTS

SECTION		PAGE
A.	SUBPART X PERMIT APPLICATION (TO BE PROVIDED)	
B.	**FACILITY DESCRIPTION**	**B-1**
B-1	GENERAL DESCRIPTION [40 CFR 270.14(b)(1) and COMAR 26.13.07.03]	B-1
B-2	STRAUSS AVENUE THERMAL TREATMENT POINT (SATTP)	B-5
B-3	TOPOGRAPHIC MAP [40 CFR 270.14(b)(10(and COMAR 26.13.07.02D(35)]	B-8
B-4	SEISMIC AND FLOODPLAIN ISSUES (40 CFR 264.18(a); 40 CFR 264.18(b)(k)&(ii); 40 CFR 270.14(b)(11)(i)&(iii); COMAR 26.13.06.01]	B-14
B-4a	Seismic Standards	B-14
B-4b	Floodplain Standards	B-15
B-5	TRAFFIC INFORMATION [40 CFR 270.14(b)(10)]	B-17
B-6	DOCUMENTATION OF COMPLIANCE WITH MANIFEST SYSTEM, RECORDKEEPING, AND REPORTING REQUIREMENTS (40 CFR 264.70 and COMAR 26.13.05.05]	B-19
B-6a	Manifest System [40 CFR 264.71 and COMAR 26.13.05.05B]	B-20
B-6a(1)	Generator Manifest Handling Requirements [40 CFR 264.71(c) and COMAR 26.13.05.05B(3)]	B-20
B-6a(2)	Treatment Facility Manifest Handling Requirements [40 CFR 264.71(a), 264.71(b)]	B-22
C.	**WASTE CHARACTERISTICS [40 CFR 270.14(b)(2), 264.13(a), and COMAR 26.13.05.02D, 26.13.07.02D16 AND 17]**	**C-1**
C-1	CHEMICAL AND PHYSICAL ANALYSES [40 CFR 270.14(b)(2), 264.13(a), and COMAR 26.13.05.02D]	C-1
C-1a	Containerized Waste [40 CFR 270.15 and COMAR 26.13.05.09]	C-1
C-1b	Waste in Tanks [40 CFR 270.16 and COMAR 26.13.05.10]	C-1
C-1c	Waste in Piles [40 CFR 270.18 and COMAR 26.13.05.12]	C-1
C-1d	Landfilled Wastes [40 CFR 270.21 and COMAR 26.13.05.14]	C-2
C-1e	Wastes Incinerated and Wastes Used in Performance Tests [40 CFR 270.19 and COMAR 26.13.05.15]	C-2
C-1f	Wastes to be Land Treated [40 CFR 270.20 and COMAR 26.13.05.13]	C-2
C-1g	Wastes in Miscellaneous Treatment Units [40 CFR 270.23 and COMAR 26.13.05.17 and 26.13.05.18]	C-2
C-1g(1)	Unit-specific Wastes	C-3
C-1g(1)(a)	Main Point	C-3
C-1g(1)(b)	Auxiliary Point	C-5
C-1g(2)	Chemical Compositions	C-7
C-1g(2)(a)	Wastes Treated	C-7
C-1g(2)(b)	Treatment Residues	C-8
C-1g(3)	Unusual Cases/Emergencies	C-10
C-1g(4)	Additions to the Master List	C-10
C-2	WASTE ANALYSIS PLAN [40 CFR 270.14(b)(3), 264.13(b), 264.13(c), 268.7, and COMAR 26.13.05.02D]	C-12
C-2a	Characterized Wastes	C-13
C-2b	Wastes Which Have Not Been Characterized	C-14
C-2c	Hazard Sensitivity Tests	C-15
C-2d	Frequency of Analyses [40 CFR 264.13(b)(4) and COMAR 26.13.05.02D(2)]	C-16
C-2d(1)	Wastes Treated	C-16
C-2d(2)	Treatment Residues	C-16
C-2d(2)(a)	Solids	C-16
C-2d(2)(b)	Liquids	C-17

TABLE OF CONTENTS (Continued)

SECTION			PAGE
	C-2e	Additional Requirements for Waste Generated Off-Site [40 CFR 264.13(c) and COMAR 26.13.05.02D(2)]	C-17
	C-2f	Additional Requirements for Ignitable, Reactive or Incompatible Wastes [40 CFR 264.13(b)(6), 264.17, and COMAR 26.13.05.02H]	C-18
	C-2g	Waste Analysis Requirements Pertaining to Land Disposal Restrictions [40 CFR 270.14(b)(3), 264.13, 268.7, 268.8, 268.30, 268.31, 268.32, 268.33, 268.34, 268.41, 268.42, 268.43, 26.50, Part 268 - Appendix I and COMAR and 40 CFR 268.35]	C-19
	C-2g(1)	Waste Characterization [40 CFR 264.13(a)(1), 268.7 and COMAR]	C-19
	C-2g(2)	Notification and Certification Requirements [40 CFR 268.7]	C-19
	C-2g(2)(a)	Retention of Generator Notices and Certifications [40 CFR 268.7(a)]	C-19
	C-2g(2)(b)	Notification and Certification for Wastes to be Further Managed [40 CFR 268.7(b)(6) and COMAR]	C-19
	C-2g(2)(c)	Notification and Certification for Soft Hammer Wastes Not Subject to California List Prohibitions	C-21
	C-2g(2)(d)	Additional Notification and Certification Requirements for Treatment Facilities [40 CFR 268.7(b)(4), (5), and (8)]	C-21
	C-2g(3)	Additional Requirements Pertaining to Storage of Restricts Wastes [40 CFR 268.50]	C-22
	C-2g(3)(a)	Restricted Wastes Stored in Containers [40 CFR 268.50(a)(2)(i)]	C-22
	C-2g(3)(b)	Restricted Wastes Stored in Tanks [40 CFR 268.50(a)(2)(ii)]	C-22
	C-2g(3)(c)	Storage of Liquid PCB Wastes [40 CFR 268.50(f)]	C-22
	C-2g(4)	Additional Requirements for Treatment Facilities [40 CFR 264.13(a)(1), 268l.7(b)]	C-23
	C-2g(5)	Additional Requirements for Land Disposal Facilities [40 CFR 268.43, 268.7(b)(3)]	C-23
	C-2g(6)	Exemptions from and Extensions to Land Disposal Restrictions [40 CFR 268.41, 268.7(b)(1), Part 268 - Appendix I]	C-23
	C-2g(7)	Requirements for Land Disposal Facilities with an Approved Exemption or Extension	C-23
	C-3	Quality Assurance (QA) [40 CFR 261 - Appendix 3]	C-23
D.	**PROCESS INFORMATION**		**D-1**
	D-1	CONTAINERS [40 CFR 270.15 and COMAR 26.13.05.09]	D-1
	D-2	TANK SYSTEMS [40 CFR 270.16 and COMAR 26.13.05.10]	D-1
	D-3	SURFACE IMPOUNDMENTS [40 CFR 270.17 and COMAR 26.13.05.11]	D-1
	D-4	WASTE PILES [40 CFR 270.18 and COMAR 26.13.05.12]	D-1
	D-5	INCINERATORS [40 CFR 270.19 and COMAR 26.13.05.15]	D-1
	D-6	LANDFILLS [40 CFR 270.21 and COMAR 26.13.05.14]	D-1
	D-7	LAND TREATMENT [40 CFR 270.20 and COMAR 26.13.05.13]	D-1
	D-8	MISCELLANEOUS UNITS [40 CFR 270.23 and COMAR 26.13.05.17]	D-2
	D-8a	Description of Miscellaneous Units [40 CFR 270.23]	D-3
	D-8a(1)	Description of Reactive Hazardous Wastes [40 CFR 270.23(a) and COMAR 26.13.05.17F]	D-3
	D-8a(2)	Treatment Unit Description [40 CFR 270.23(a) and COMAR 26.13.05.17B(2)]	D-3
	D-8a(2)(a)	SATTP - Main Point	D-3
	D-8a(2)(b)	SATTP - Auxiliary Thermal Treatment Point (ATTP)	D-4
	D-8b	Procedures to Protect the Environment	D-6
	D-8b(1)	Integrity of Burn Pans	D-6
	D-8b(2)	Deterioration or Malfunction Procedures	D-6
	D-8b(3)	Prevention of Accumulated Precipitation Within Burn Pans	D-8
	D-8b(4)	Control of Ejected Waste During Burning	D-8

TABLE OF CONTENTS (Continued)

SECTION		PAGE
D-8c	Protection of Human Health and Safety	D-9
D-8d	Ash/Residue Management	D-9
D-8e	Fire Hazard Minimization	D-9
D-8f	Effectiveness of Treatment	D-10
D-8g	Operating Procedures	D-10
D-8h	Waste Characterization [40 CFR 264.601(a)(1), 264.601(b)(1), and 264.601(c)(1) and COMAR 26.13.D5.02D]	D-12
D-8i	Demonstration of No Existing Alternate Technologies or Waste Management Options Other Than OB That Provide Adequate Protection of Human Health and the Environment	D-12
D-8j	Facility Operating Record [40 CFR 264.73 and COMAR 26.13.05.05D]	D-13
D-8j(1)	Waste Description/Quantities/Treatment [40 CFR 264.73(b)(1) and COMAR 26.13.05D(2)(a)]	D-14
D-8j(2)	Waste Location Information [40 CFR 264.73(b)(2) and COMAR 26.13.05.05D(2)(b)]	D-14
D-8j(3)	Waste Analysis Records [40 CFR 264.73(b)(3) and COMAR 26.13.05.05D(2)(c)]	D-14
D-8j(4)	Contingency Plan Incidents [40 CFR 264.73(b)(4) and COMAR 26.13.05.05D(2)(d)]	D-14
D-8j(5)	Inspection Record [40 CFR 264.73(b)(5) and COMAR 26.13.05.05D(2)(e)]	D-14
D-8j(6)	Corrective Action and Monitoring Analysis Results [40 CFR 264.73(b)(6) and COMAR 26.13.05.05D(2)(h)]	D-15
D-8j(7)	Notices to Generators [40 CFR 264.73(b)(7) and COMAR 26.13.05.05D(2)(f)].	D-15
D-8j(8)	Closure Cost Estimates [40 CFR 264.73(b)(8) and COMAR 26.13.05.05D(2)(g)]	D-15
D-8j(9)	Waste Minimization Certification 940 CFR 264.73(b)(9) and COMAR 26.13.05.05D(2)(i)]	D-15
D-8j(10)	Reports [40 CFR 264.73(b)(10) and COMAR 26.13.05.05H]	D-15
D-8j(11)	Additional Reports [40 CFR 264.73(b)(10) and COMAR 26.13.05.05H)	D-16
E.	**OVERVIEW OF ENVIRONMENTAL PERFORMANCE STANDARDS [CFR 270.23 AND COMAR 27.13.07.02E(8)]**	**E-1**
E-2	**HUMAN HEALTH AND ENVIRONMENTAL CRITERIA**	**E-2-1**
E-2-1	AIR QUALITY CRITERIA	E-2-19
E-2-2	RCRA ACTION LEVELS	E-2-21
E-2-3	WATER QUALITY CRITERIA	E-2-22
E-2-4	REFERENCE CONCENTRATIONS FOR ENERGETIC COMPOUNDS	E-2-23
E-2-4a	Intake Estimation Methods	E-2-24
E-2-4b	Exposure Parameter Assumptions	E-2-26
E-2-4c	Dose-Response Parameters	E-2-26
E-2-4d	Reference Concentrations	E-2-28
E.3	**AIR PATHWAY ASSESSMENT**	**E-3-1**
E-3-1	ENVIRONMENTAL SETTING	E-3-1
E-3-1a	Facility Description	E-3-1
E-3-1b	Topography	E-3-2
E-3-1c	Land Use Classification	E-3-2
E-3-1d	Meteorology/Climatology	E-3-4
E-3-1e	Existing Air Quality	E-3-6

TABLE OF CONTENTS (Continued)

SECTION **PAGE**

E-3-2	STANDARDS AND HEALTH CRITERIA	E-3-6
E-3-2a	Federal Standards	E-3-14
E-3-2b	Maryland Standards	E-3-14
E-3-2c	RCRA Action Levels	E-3-15
E-3-2d	Reference Concentrations for Energetic Compounds	E-3-16
E-3-3	AIR PATHWAY ASSESSMENT PROTOCOL	E-3-17
E-3-3a	OB Treatment Scenarios	E-3-18
E-3-3b	OB Emission Products	E-3-18
E-3-3c	POLU-11 Combustion Products Modeling	E-3-20
E-3-4	DISPERSION MODELING	E-3-22
E-3-4a	Modeling Protocol	E-3-23
E-3-4b	Air Quality Models	E-3-23
E-3-5	AIR DISPERSION MODEL INPUT PARAMETERS	E-3-25
E-3-6	RECEPTOR LOCATIONS	E-3-26
E-3-7	METEOROLOGICAL DATA	E-3-26
E-3-8	OB SOURCE RELEASE SCENARIOS	E-3-27
E-3-9	AIR QUALITY MODEL CALCULATIONS	E-3-28
E-3-10	ENVIRONMENTAL PERFORMANCE STANDARDS	E-3-28
E-3-11	OB MODELING DEMONSTRATIONS AND ENVIRONMENTAL PERFORMANCE STANDARDS	E-3-30
E-3-12	SATTP MAIN POINT SHORT-TERM RELEASE EVENTS - 1.1 AND 1.3 PANS	E-3-31
E-3-12a	Health Criteria - 1.1 and 1.3 Pans	E-3-34
E-3-12b	Emission Factors - 1.1 and 1.3 Pans	E-3-34
E-3-12c	Dispersion Modeling - 1.1 and 1.3 Pans	E-3-37
E-3-12d	Emission Parameters - 1.1 and 1.3 Pans	E-3-37
E-3-12e	Receptor Locations - 1.1 and 1.3 Pans	E-3-41
E-3-12f	Meteorological Data - 1.1 and 1.3 Pans	E-3-41
E-3-12g	Dispersion Modeling Methodology - 1.1 and 1.3 Pans	E-3-41
E-3-12h	Modeling Results - 1.1 and 1.3 Pans	E-3-42
E-3-12i	Environmental Performance Standards - 1.1 and 1.3 Pans	E-3-42
E-3-13	SAMTTP LONG TERM RELEASE EVENTS - SLUM PAN	E-3-52
E-3-13a	Health Criteria - Slum Pan	E-3-55
E-3-13b	Emission Factors - Slum Pan	E-3-55
E-3-13c	Dispersion Modeling - Slum Pan	E-3-57
E-3-13d	Emission Parameters - Slum Pan	E-3-57
E-3-13e	Receptor Locations - Slum Pan	E-3-59
E-3-13f	Meteorological Data - Slum Pan	E-3-59
E-3-13g	ISC2 Modeling Methodology - Slum Pan	E-3-59
E-3-13h	Dispersion Modeling Results - Slum Pan	E-3-60
E-3-13i	Environmental Performance Standards - Slum Pan	E-3-60
E-3-14	SAATTP SHORT-TERM RELEASE EVENTS - SOLVENT VESSEL, THRUST BLOCK, AND IGNITER VESSEL	E-3-64
E-3-14a	Health Criteria - Solvent Vessel, Thrust Block and Igniter Vessel	E-3-64
E-3-14b	Emission Factor - Solvent Vessel, Thrust Block and Igniter Vessel	E-3-64
E-3-14c	Dispersion Modeling - Solvent Vessel, Thrust Block and Igniter Vessel	E-3-73
E-3-14d	Emission Parameters - Solvent Vessel, Thrust Block, and Igniter Vessel	E-3-73
E-3-14e	Receptor Locations - Solvent Vessel, Thrust Block and Igniter Vessel	E-3-75
E-3-14f	Meteorological Data - Solvent Vessel, Thrust Block and Igniter Vessel	E-3-75
E-3-14g	Dispersion Modeling Methodology - Solvent Vessel, Thrust Block and Igniter Vessel	E-3-75

TABLE OF CONTENTS (Continued)

SECTION		PAGE
E-3-14h	Modeling Results - Solvent Vessel, Thrust Block and Igniter Vessel	E-3-76
E-3-14i	Environmental Performance Standards - Solvent Vessel, Thrust Block and Igniter Vessel	E-3-77
E-3-15	SAATTP SHORT TERM RELEASE EVENTS - CLAY PAD	E-3-86
E-3-15a	Health Criteria - Clay Pad	E-3-89
E-3-15b	Emission Factors - Clay Pad	E-3-89
E-3-15c	Dispersion Modeling - Clay Pad	E-3-89
E-3-15d	Emission Parameters - Clay Pad	E-3-93
E-3-15e	Receptor Locations - Clay Pad	E-3-93
E-3-15f	Meteorological Data - Clay Pad	E-3-93
E-3-15g	INPUFF Modeling Methodology - Clay Pad	E-3-94
E-3-15h	Modeling Results - Clay Pad	E-3-94
E-3-15i	Environmental Performance Standards - Clay Pad	E-3-95
E-3-16	SAATTP LONG-TERM RELEASE EVENTS - UNLINED PANS	E-3-95
E-3-16a	Health Criteria - Unlined Pans	E-3-99
E-3-16b	Emission Factors - Unlined Pans	E-3-99
E-3-16c	Dispersion Modeling - Unlined Pans	E-3-101
E-3-16d	Emission Parameters - Unlined Pans	E-3-101
E-3-16e	Receptor Locations - Unlined Pans	E-3-101
E-3-16f	Meteorological Data	E-3-104
E-3-16g	ISC2 Modeling methodology	E-3-104
E-3-16h	Modeling Results	E-3-104
E-3-16i	Environmental Performance Standards	E-3-105
E-3-17	Summary of Maximum Impact Receptors Locations for All Treatment Units	E-3-109
E.4	**GROUNDWATER MONITORING [40 CFR 264, SUBPART F AND COMAR 26.13.05.06]**	**E-4-1**
E-4.1	EXEMPTION FROM GROUNDWATER PROTECTION REQUIREMENTS [40 CFR 270.14 AND COMAR 26.13.05]	E-4-1
E-4-1a	Waste Piles	E-4-1
E-4-1b	Landfill	E-4-1
E-4-1c	No Migration	E-4-1
E-4-2	INTERIM STATUS GROUNDWATER MONITORING DATA [40 CFR 270.14(c)(1) and COMAR 26.13.05.06A]	E-4-1
E-4-2a	Description of Wells	E-4-1
E-4-2b	Description of Sampling and Analysis Procedure	E-4-2
E-4-2c	Monitoring Data	E-4-2
E-4-2d	Statistical Procedures	E-4-2
E-4-3	GENERAL HYDROGEOLOGICAL INFORMATION [40 CFR 270.14(c)(2) and COMAR 26.13.07.02(F)(2)]	E-4-2
E-4-3a	Physiography	E-4-2
E-4-3b	Surface Water	E-4-3
E-4-3c	Geology and Stratigraphy	E-4-3
E-4-3c(1)	Geologic Setting	E-4-3
E-4-3d	Hydrogeology	E-4-3
E-4-3d(1)	Regional Hydrogeology	E-4-4
E-4-3d(2)	Local Hydrogeology	E-4-5
E-4-4	TOPOGRAPHIC MAP REQUIREMENTS [40 CFR 270.14(c)(3) and COMAR 26.13.07.02F(3)]	E-4-6
E-4-5	CONTAMINANT PLUME DESCRIPTION [40 CFR 270.14(c)(4) and COMAR 26.13.07.02F(4)]	E-4-7

TABLE OF CONTENTS (Continued)

SECTION		PAGE
E-4-6	GENERAL MONITORING REQUIREMENTS [40 CFR 270.14(C)(5) and COMAR 26.13.07.02F(5) and 26.13.05.06H]	E-4-7
E-4-6a	Description of Wells	E-4-7
E-4-6b	Description of Sampling and Analysis Procedures	E-4-7
E-4-6c	Procedures for Establishing Background Quality	E-4-7
E-4-6d	Statistical Procedures	E-4-7
E-4-7	DETECTION MONITORING PROGRAM [40 CFR 270.14(c)(6) and COMAR 26.13.07.02F(6)]	E-4-7
E-4-7a	Indicator Parameters, Waste Constituents, Reaction Products to be Monitored	E-4-8
E-4-7b	Groundwater Monitoring System	E-4-8
E-4-7b(1)	Description of Monitoring System	E-4-8
E-4-7b(1)(a	Detection Monitoring Wells	E-4-9
E-4-7b(1)(b)	Monitoring Well Construction	E-4-9
E-4-7c	Background Groundwater Concentration Values for Proposed Parameters	E-4-10
E-4-7d	Proposed Sampling and Analysis Procedures	E-4-10
E-4-7-d(1)	Environmental Sampling and Analysis	E-4-10
E-4-7-d(1)(a)	Groundwater Sampling	E-4-10
E-4-7-d(1)(b)	Soil Sampling	E-4-11
E-4-7d(1)(c)	Sediment Sampling	E-4-12
E-4-7d(2)	Operating Procedures	E-4-12
E-4-7d(2)(a)	Monitoring Well Installation	E-4-13
E-4-7d(2)(b)	Well Sampling	E-4-18
E-4-7d(2)(c)	Surface/Subsurface Soil Sampling	E-4-19
E-4-7d(2)(d)	Sediment Sampling	E-4-19
E-4-7d(2)(e)	Background Soil Samples	E-4-20
E-4-7d(2)(f)	Sample Identification System	E-4-20
E-4-7d(2)(g)	Decontamination	E-4-22
E-4-7d(2)(h)	Staff Gauge Installation	E-4-23
E-4-7d(2)(i)	Surveying	E-4-23
E-4-7d(2)(j)	Water Level Measurement	E-4-23
E-4-7d(2)(k)	Well Purging	E-4-24
E-4-7d(2)(l)	Annual Determination of Upper-Most Aquifer Flow Rate and Direction	E-4-24
E-4-7d(2)(m)	Sample Packaging and Shipping	E-4-25
E-4-7d(2)(n)	Chain-of-Custody (COC)	E-4-25
E-4-7d(2)(o)	Transfer of Custody and Shipment	E-4-26
E-4-7d(2)(p)	Quality Control Samples	E-4-26
E-4-7d(2)(q)	Recordkeeping	E-4-27
E-4-7d(2)(r)	Waste Handling	E-4-28
E-4-7d(3)	Procedures for Determining Statistically Significant Increases for Monitored Parameters	E-4-28
E-4-7d(3)(a)	Establish Appropriateness and Distribution of Data	E-4-29
E-4-7d(3)(b)	Statistical Procedure for Evaluating the Data	E-4-30
E-4-7d(3)(c)	Data Collection and Use in Statistical Analysis	E-4-31
E-4-7d(3)(d)	Data Management and Reporting of Results	E-4-32
E-4-7e	Statistically Significant Increase in any Constituent or Parameter Identified at any Compliance Point Monitoring Well	E-4-33
E-4-8	COMPLIANCE MONITORING PROGRAM [40 CFR 270.14(c)(7) and COMAR 26.13.07.02(F)(7)]	E-4-33
E-4-9	CORRECTIVE ACTION PROGRAM [40 CFR 270.14(c)(8) and COMAR 26.13.07.02F(8)]	E-4-34

TABLE OF CONTENTS (Continued)

SECTION			PAGE
F.	PROCEDURES TO PREVENT HAZARDS		F-1
	F-1	SECURITY [40 CFR 264.14(b),(c); 270.14(b)(4) and COMAR 26.13.05.02D AND 26.13.07]	F-1
	F-1a	Security Procedures and Equipment [40 CFR 264.14(a)]	F-1
	F-1a(1)	24-Hour Surveillance System [40 CFR 264.14(b) and COMAR 26.13.05.02E(2)(a)]	F-1
	F-1a(2)	Barrier and Means to Control Entry [40 CFR 264.14(b)(2)(i) and COMAR 26.13.05.02E(2)(b)]	F-1
	F-1a(2)(a)	Barrier	F-1
	F-1a(2)(b)	Means to Control Entry [40 CFR 264.14(b)(2)(ii) and COMAR 26.13.05.02E(2)(c)]	F-2
	F-1a(3)	Warning Signs [40 CFR 264.14(c) and COMAR 26.13.05.02E(3)]	F-2
	F-1b	Waiver	F-3
	F-2	INSPECTION SCHEDULE [40 CFR 264.15; 270.14(b)(5) and COMAR 26.13.05.02F]	F-3
	F-2a	General Inspection Requirements [40 CFR 264.15; 264.14(b)(5); 264.33 and COMAR 26.13.05.02F(1)]	F-3
	F-2a(1)	Types of Problems [40 CFR 264.15(b)(3) and COMAR 26.13.05.02F(2)(c)]	F-5
	F-2a(2)	Frequency of Inspections [40 CFR 264.15(a),(b)(1),(3),(4), and COMAR 26.13.05.02F(2)(d)]	F-5
	F-2b	Specific Process Inspection Requirements [40 CFR 264.15(b); 264.602 and COMAR 26.13.05.02F]	F-5
	F-2b(1)	Container Inspection [40 CFR 264.174 and COMAR 26.13.05.09E]	F-5
	F-2b(2)	Tank System Inspection [40 CFR 264.195 and COMAR 26.13.05.10E]	F-5
	F-2b(3)	Waste Pile Inspection [40 CFR 264.254 and COMAR 26.13.05.12E]	F-5
	F-2b(4)	Surface Impoundment Inspection [40 CFR 264.226 and COMAR 26.13.05.11F]	F-5
	F-2b(5)	Incinerator Inspection [40 CFR 264.347 and COMAR 26.13.05.15D(3)]	F-5
	F-2b(6)	Landfill Inspection [40 CFR 264.303 and COMAR 26.13.05.14C]	F-6
	F-2b(7)	Land Treatment Facility Inspection [40 CFR 264.273(G) and COMAR 26.13.05.13]	F-6
	F-2b(8)	Miscellaneous Unit Inspections [40 CFR 264.15 and COMAR 26.13.05.17C]	F-6
	F-3	DOCUMENTATION OF PREPAREDNESS AND PREVENTION REQUIREMENTS	F-6
	F-3a	Equipment Requirements [40 CFR 264.32 and COMAR 26.13.05.03C]	F-6
	F-3a(1)	Internal Communications [40 CFR 264.32(a) and COMAR 26.13.05.03C(1)]	F-6
	F-3a(2)	External Communications [40 CFR 264.32(b) and COMAR 26.13.05.03C(2)]	F-7
	F-3a(3)	Emergency Equipment [40 CFR 264.32(c) and COMAR 26.13.05.03C(3)]	F-7
	F-3a(4)	Water for Fire Control [40 CFR 264.32(d) and COMAR 26.13.05.03C(4)]	F-7
	F-4	PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [40 CFR 270.14(b)(8) and COMAR 26.13.05.17]	F-8
	F-4a	Unloading Operations [40 CFR 270.14(b)(8)(i) and COMAR 26.13.07.02D(22)(a)]	F-8
	F-4b	Runoff [40 CFR 270.14(b)(8)(ii) and COMAR 26.13.07.02D(22)(b)]	F-10
	F-4c	Water Supplies [40 CFR 270.14(b)(8)(iii) and COMAR 26.13.07.02D(22)(c)]	F-10
	F-4d	Equipment and Power Failure [40 CFR 270.14(b)(8)(iv) and COMAR 26.13.07.02D(22)(d)]	F-10
	F-4e	Personal Protective Equipment [40 CFR 270.14(b)(8)(v)]	F-10
	F-5	PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES [40 CFR 264.17; 270.14(b)(9) and COMAR 26.13.05.02H]	F-11

TABLE OF CONTENTS (Continued)

SECTION			PAGE
	F-5a	Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Waste [40 CFR 264.17 and COMAR 26.13.05.02H]	F-11
	F-5b	General Precautions for Handling Ignitable or Reactive Waste or Mixing of Incompatible Wastes [40 CFR 264.17 and COMAR 26.13.05.02H]	F-13
G.	**CONTINGENCY PLAN [40 CFR 264.50 AND COMAR 26.13.05.04]**		**G-1**
	G-1	GENERAL INFORMATION [40 CFR 264.50 to .56, 270.14(b)(7) AND COMAR 26.13.05.04.B]	G-1
	G-2	EMERGENCY COORDINATORS [40 CFR 264.52(d), 264.55 AND COMAR 26.13.05.04F]	G-3
	G-3	IMPLEMENTATION OF CONTINGENCY PLANS [40 CFR 264.52(a), 264.56(d) COMAR 26.13.05.04.B(2)]	G-4
	G-4	EMERGENCY RESPONSE PROCEDURES [40 CFR 264.529e0 AND COMAR 26.13.05.04G]	G-6
	G-4a	Notification [40 CFR 264.56(a) and COMAR 26.13.05.04G(1)(a) & (b)]	G-6
	G-4b	Identification of Hazardous Materials [40 CFR 264.56 (b) and COMAR 26.13.05.04G(2)]	G-9
	G-4c	Hazard Assessment [40 CFR 264.56(c), 264.56(d) and COMAR 26.13.05.04G(3)]	G-9
	G-4d	Control Procedures [40 CFR 264.52 and COMAR 26.13.05.04G(5)]	G-11
	G-4e	Prevention of Recurrence or Spread of Fires, Explosions, or Releases [40 CFR 264.56(e) and COMAR 26.13.05.04G(5)]	G-14
	G-4f	Storage and Treatment of Release Material [40 CFR 264.56(g) and COMAR 26.13.04.05G(7)]	G-14
	G-4g	Incompatible Waste [40 CFR 264.56(h)(1) and COMAR 26.13.04.05G(8)(a)]	G-15
	G-4h	Post-Emergency Equipment Maintenance [40 CFR 264.56(h)(i) and COMAR 26.13.05.04.G(8)(b)]	G-15
	G-4i	Container Spills and Leakage [40 CFR 264.56(h)(1) and COMAR 26.13.05.04G(8)(b)]	G-16
	G-5	EMERGENCY EQUIPMENT [40 CFR 264.52(e) AND COMAR 26.13.05.04C(5)]	G-16
	G-5a	Chemical-Protective Clothing	G-16
	G-5b	First-Aid Equipment	G-16
	G-5c	Communications Equipment	G-17
	G-5d	Spill Control Equipment	G-17
	G-5e	Emergency Response Protection Equipment	G-17
	G-5f	First-Aid and Medical Supplies	G-17
	G-5g	Emergency Decontamination Equipment	G-17
	G-6	COORDINATION AGREEMENT REQUIREMENTS [40 CFR 264.52(c), 264.37 and COMAR 26.13.05.04C(3)]	G-17
	G-7	EVACUATION PLAN [40 CFR 264.52(f) AND COMAR 26.13.05.04G.(4)(a)]	G-18
	G-8	REQUIRED REPORTS 940 CFR 264.56(j) and COMAR 26.13.05.04G(10)]	G-19
	G-9	AMENDMENT OF CONTINGENCY PLAN [COMAR 26.13.05.04.E]	G-21
H.	**PERSONNEL TRAINING**		**H-1**
	H-1	OUTLINE OF THE TRAINING PROGRAM [40 CFR 270.14(b)(12), 264.16(a)(1) AND COMAR 26.13.05.02G(1)]	H-1
	H-1a	Job Title/Job Description [40 CFR 264.16(d)(1 & 2) and COMAR 26.13.05.02G(3)(a)]	H-1
	H-1a(1)	Environmental Coordinator (EC)	H-1
	H-1a(2)	Emergency Response Coordinator (ERC) or Alternate	H-2

TABLE OF CONTENTS (Continued)

SECTION **PAGE**

	H-1a(3)	Environmental Engineers/Specialists	H-3
	H-1a(4)	Safety Director	H-3
	H-1a(5)	Fire Protection Division (FPD) Chief and Staff	H-3
	H-1a(6)	Cast Operations Manager and Staff	H-4
	H-1b	Training Content, Frequency, and Techniques [40 CFR 264.16(c) and (d)(3) and COMAR 26.13.05.02G(1)(c) and (2)]	H-4
	H-1c	Training Director [40 CFR 264.16(a)(2), and COMAR 26.13.05.02G(1)(b)]	H-9
	H-1d	Relevance of Training to Job Position [40 CFR 264.16(a)(b)(c) and COMAR 26.13.05.02G(1)(b)]	H-9
	H-1e	Training for Emergency Response [40 CFR 264.16(a)(3) and COMAR 26.13.05.02G(1)(c)]	H-11
	H-2	IMPLEMENTATION OF TRAINING PROGRAM [40 CFR 264.16(b) AND COMAR 26.13.05.02.G(2)]	H-11
	H-2a	Training Records and Documents [40 CFR 264.16(b),(d)(4), and (3), 270.14(b)(12) and COMAR 26.13.05.02G(4)]	H-12
I.	**CLOSURE AND POST-CLOSURE PLANS**		**I-1**
	I-1	CLOSURE PLAN [40 CFR 264.112(a) and COMAR 26.13.05.07C]	I-1
	I-1a	Description and Map of Facility	I-1
	I-1b	Description of Waste Management Units to be Closed	I-1
	I-1b(1)	Present Status of the Facility	I-1
	I-1b(2)	Status of Facility After Closure	I-2
	I-1c	Closure Certification (40 CFR 264.115; COMAR 26.13.05.07F)	I-3
	I-1d	Closure Performance Standard (40 CFR 264.111; COMAR 26.13.05.07B)	I-3
	I-1e	Partial Closure and Final Closure Activities [40 CFR 264.112(b); COMAR 26.13.05.07C(2)(c)]	I-5
	I-1f	Maximum Waste Inventory [40 CFR 264.112(b)(3); COMAR 26.13.05.07C(2)(c)]	I-5
	I-1g	Schedule for Closure [40 CFR 264.112(b)(6); 40 CFR 264.113; COMAR 26.13.05.07D]	I-6
	I-1h	Closure Procedures	I-8
	I-1h(1)	Inventory Removal [40 CFR 264.112(b)(3); COMAR 26.13.05.07C(2)(c)]	I-8
	I-1h(2)	Disposal or Decontamination of Equipment, Structures, and Soils [40 CFR 264.112(b)(4) and 264.114; COMAR 26.13.05.07C(2)(d) and .07E]	I-8
	I-1h(3)	Closure of Disposal Units/Contingent Closures [40 CFR 264.258(c)(1); COMAR 26.13.05.12(3)(b)]	I-8
	I-1h(3)(a)	Run-on and Runoff Control	I-8
	I-1h(3)(b)	Groundwater Monitoring	I-8
	I-1i	Closure of Containers (40 CFR 264.178; COMAR 26.13.05.09I)	I-9
	I-1j	Closure of Tanks (40 CFR 264.197; COMAR 26.13.05.10F)	I-9
	I-1k	Closure of Waste Piles (40 CFR 264.258; COMAR 26.13.05.12)	I-9
	I-1l	Closure of Surface Impoundments (40 CFR 264.228; COMAR 26.13.05.11G)	I-9
	I-1m	Closure of Incinerators (40 CFR 264.315; COMAR 26.13.05.15E)	I-9
	I-1n	Closure of Landfills (40 CFR 264.310;/ COMAR 26.13.05.14J)	I-10
	I-1o	Closure of Land Treatment Facilities (40 CFR 264.280; COMAR 26.13.05.13K)	I-10
	I-1p	Closure of Miscellaneous Units (40 CFR 264.601; COMAR 26.13.05.17)	I-10
	I-1p(1)	General	I-10
	I-1p(2)	Closure of OB Units	I-10
	I-1p(3)	Determination of the Presence, Nature, and Extent of Contamination	I-13
	I-1p(4)	Procedures/Methods to Perform Decontamination	I-14

TABLE OF CONTENTS (Continued)

SECTION		PAGE
I-1p(5)	Procedures to Evaluate Effectiveness of Decontamination	I-16
I-1p(6)	Waste Disposal	I-16
I-1q	Closure Plan Amendment [40 CFR 264.115; COMAR 26.13.05.07C(3)]	I-17
I-2	POST-CLOSURE PLAN/CONTINGENT POST-CLOSURE [40 CFR 264.118; COMAR 26.13.05.07H]	I-18
I-2a	Monitoring Plan [40 CFR 264.118(b)(1); COMAR 26.13.05.07H(2)(a)]	I-18
I-2b	Maintenance Plan [40 CFR 264.118(b)(2); COMAR 26.13.05.07(2)(b)]	I-18
I-2c	Post-Closure Security	I-19
I-2d	Post-Closure Contact [40 CFR 264.118(b)(3); COMAR 26.13.05.07H(2)(c)]	I-19
I-3	NOTICES REQUIRED FOR DISPOSAL FACILITIES [40 CFR 264.115 and 40 CFR 264.119; COMAR 26.13.05.07F and COMAR 26.13.05.07I]	I-20
I-4	CLOSURE COST ESTIMATE [40 CFR 264.142 and COMAR 26.13.05.08]	I-20
I-5	FINANCIAL ASSURANCE MECHANISM OF CLOSURE [40 CFR 264.143 and COMAR 26.13.05.08]	I-20
I-6	POST-CLOSURE COST ESTIMATE [40 CFR 264.144 and COMAR 26.13.05.08]	I-20
I-7	FINANCIAL ASSURANCE MECHANISM FOR POST-CLOSURE CARE [40 CFR 264.145 and COMAR 26.13.05.08]	I-20
I-8	LIABILITY REQUIREMENTS [40 CFR 264.147 and COMAR 26.13.05.08]	I-21
I-9	STATE MECHANISMS	I-21
J.	**SOLID WASTE MANAGEMENT UNITS**	**J-1**
J-1	SOLID WASTE MANAGEMENT UNITS	J-2
J-2	AREAS OF CONCERN	J-24

TABLE OF CONTENTS (Continued)

APPENDICES

B-1	PHOTOGRAPHS
C-1	CHEMICAL COMPOSITIONS OF PROPELLENTS, EXPLOSIVES, AND PYROTECHNICS
C-2	MASTER LIST OF MATERIALS ACCEPTABLE FOR TREATMENT AT THE STRAUSS AVENUE THERMAL TREATMENT POINT (SATTP)
C-3	COMPATIBILITY GROUPINGS OF EXPLOSIVELY CONTAMINATED WASTE SOLVENTS
C-4	CHEMICAL COMPOSITION OF ENERGETICS IN ITEMS THAT MAY BE TREATED BY OB AT NAVSURWARCEN IHDIV
C-5	HAZARDOUS WASTE CODES
C-6	CONTAINER SAMPLING PROCEDURES
D-1	INDIAN HEAD DRAWINGS
D-2	SUMMARY OF EVOLVING TREATMENT TECHNOLOGIES FOR REACTIVE ENERGETIC CONTAINING WASTES
E-2-1	DETAILED CALCULATIONS OF REFERENCE CONCENTRATIONS
E-3	TREATMENT ITEM LOCATION TABLE
E-4-1	FIELD INVESTIGATION FORMS
G-1	CONTINGENCY PLAN
H-1	CERTIFICATION PLAN, STRAUSS AVENUE THERMAL TREATMENT POINT
H-2	HAZARD CONTROL BRIEFING, SOP 198-098
H-3	EXAMPLE OF CERTIFICATION EXAM
I-1	RISK ESTIMATION AND DEVELOPMENT OF SOIL CLEANUP LEVELS
I-2	SAMPLING AND ANALYSIS PLAN FOR CLOSURE

TABLES

NUMBER PAGE

D-1 Process Explosive and Personnel Limits D-7
E-2-1 Major Chemical Constituents of Treated Energetic Materials E-2-3
E-2-2 Regulatory Standards/Criteria for Potential Chemical of Concern E-2-13
E-2-3 Dose-Response Parameters, Energetic Materials E-2-16
E-2-4 Calculated Reference Concentrations for Potential Chemicals of Concern E-2-18
E-3-1 Climatological Summary of Mean Monthly Temperature and Precipitation Data for the Washington, D.C., National Airport E-3-5
E-3-2 Summary of the Annual Wind Frequency Distribution for Use at the HDIVNAVSURFWARCEN E-3-7
E-3-3 Ambient Air Quality Data Collected in Charles County, Maryland for the 1995 Annual Period E-3-8
E-3-4 Master List of Federal Health Criteria Concentrations for Potential OB Combustion Products E-3-10
E-3-5 Master List of Maryland Toxic Air Pollutant Screening Level Concentrations for Potential Emission E-3-11
E-3-6 Master List of Calculated Reference Concentrations for Potential Energetic Chemicals of Concern E-3-13
E-3-7 A Summary of Major Model and Minor Treatment Items Modeled by the POLU-11 for the SAMTTP E-3-32
E-3-8 Summary of Air Criteria Concentrations for Short-Term Treatment Events at the SAMTTP 1.1 and 1.3 Pans E-3-35
E-3-9 Summary of Maximum Air Emission Factors for Combustion Products or Item Constituents at the SAMTTP 1.1 and 1.3 Pans E-3-38
E-3-10 Inpuff Model Input Parameters for Short-Term OB Events at the SAMTTP 1.1 and 1.3 Pans E-3-40
E-3-11 Summary of Air Dispersion Factors for Short-Term OB Events at the SAMTTP 1.1 and 1.3 Pans E-3-43
E-3-12 Summary of Allowable Air Emissions Quantities for Short-Term OB Events at the SAMTTP 1.1 and 1.3 Pans E-3-45
E-3-13 Summary of Maximum Allowable Treatment Quantities (Lbs/Averaging Period) for Major Items at the SAMTTP 1.1 and 1.3 Pans E-3-47
E-3-14 Summary of Maximum Allowable Air Treatment Quantities (Lbs/Averaging Period) for Minor Items at the SAMTTP 1.1 and 1.3 Pans E-3-48
E-3-15 Summary of Air Pathway Health Criteria Concentrations for Long-Term Treatment Events at the SAMTTP Slum Pan E-3-53
E-3-16 Summary of Maximum Emission Factors for the SAMTTP Slum Pan E-3-56
E-3-17 ISC2 Model Source parameters for Long-Term Treatment at the SAMTTP Slum Pan E-3-58
E-3-18 Summary of Air Dispersion Factors for the SAMTTP Slum Pan E-3-61
E-3-19 Summary of Allowable Air Emissions for the SAMTTP Slum Pan E-3-62
E-3-20 Summary of Maximum Allowable Treatment Quantities for the SAATTP Slum Pan E-3-63
E-3-21 Summary of Air Pathway Health Criteria Concentrations for Short-Term OB Events at the SAATTP, Solvent Vessel, Thrust Block, and Igniter Vessel Treatment Units E-3-65
E-3-22 List of the Materials or Energetic Items Associated with Short-Term Treatment Events at the Solvent Vessel, Thrust Block, and Igniter Vessel E-3-68
E-3-23 Summary of Maximum Air Emission Factors for Short-Term Thermal Treatment Events at the SAATTP Solvent Vessel E-3-69
E-3-24 Summary of Maximum Air Emission Factors for Short-Term Treatment Events at the SAATTP Thrust Block E-3-71
E-3-25 Summary of Maximum Air Emission Factors for Short-Term Treatment Events at the SAATTP Igniter Vessel E-3-72

TABLES (Continued)

NUMBER		PAGE
E-3-26	Inpuff Model Input Parameters for the SAATTP Solvent Vessel, Thrust Block, and Igniter Vessel	E-3-74
E-3-27	Summary of Air Dispersion Factors for Short-Term Treatment Events at the SAATTP Solvent Vessel, Thrust Block, and Igniter Vessel Emission Points	E-3-78
E-3-28	Summary of Allowable Air Emission Quantities for the SAATTP Solvent Vessel at the SAATTP	E-3-80
E-3-29	Summary of Allowable Air Emission Quantities for the SAATTP Thrust Block and Igniter Vessel Treatment Units	E-3-82
E-3-30	Summary of Maximum Allowable Treatment Quantities for Short-Term Treatment at the SAATTP Solvent Vessel	E-3-84
E-3-31	Summary of Maximum Allowable Treatment Quantities for Short-Term Treatment at the SAATTP Thrust Block	E-3-87
E-3-32	Summary of Maximum Allowable Treatment Quantities for Short-Term Treatment at the SAATTP Igniter Vessel	E-3-88
E-3-33	Summary of Air Pathway Health Criteria for SAATTP Clay Pad	E-3-90
E-3-34	Summary of Maximum Air Emission Factors for the SAATTP Clay Pad	E-3-91
E-3-35	Inpuff Model Source Parameters for the SAATTP Clay Pad	E-3-92
E-3-36	Summary of Air Dispersion Factors for the SAATTP Clay Pad	E-3-96
E-3-37	Summary of Allowable Air Emissions for the SAATTP Clay Pad	E-3-97
E-3-38	Summary of Maximum Allowable Treatment Quantities for the SAATTP Clay Pad	E-3-98
E-3-39	Summary of Air Pathway Health Criteria Concentrations for the SAATTP Unlined Pans	E-3-100
E-3-40	Summary of Maximum Air Emission Factors (EF), Pound of Contaminant Per Pound of Material Treated, SAATTP Unlined Pans	E-3-102
E-3-41	ISC2 Model Input Parameters for the SAATTP Unlined Pans	E-3-103
E-3-42	Summary of OB Air Dispersion Factors for the SAATTP Unlined Pans	E-3-106
E-3-43	Summary of Allowable Air Emission Quantities for OB Operations at the SAATTP Unlined Pans	E-3-107
E-3-44	Summary of Allowable Treatment Quantities for OB Operations at the SAATTP Unlined Pans	E-3-108
E-4-1	Detection Monitoring Program Sampling Frequency, SATTP	E-4-42
E-4-2	Groundwater Sampling Program for SATTP	E-4-43
E-4-3	Summary of Bottle Requirements, Sample Preservation, and Sample Holding Times	E-4-45
E-4-4	Soil Sampling Program for SATTP	E-4-46
E-4-5	Sediment Sampling Program for SATTP	E-4-49
G-1	List of Emergency Contacts	G-8
H-1	Personnel Training Requirements	H-10
J-1	Solid Waste Management Units (SWMUs)	J-3
J-2	Areas of Concern (AOC)	J-5

FIGURES

NUMBER **PAGE**

NUMBER		PAGE
B-1	Geographic Location	B-2
B-2		B-3
B-3	Location Map	B-6
B-4	Topographic Site Map, Strauss Avenue TTP	B-7
B-5	Generalized Cross-Section of the Indian Head Area	B-9
C-1	Request Sheet for New Materials	C-9
E-3-1	Open Burning Thermal Treatment Locations, Strauss Avenue TTP	E-3-3
E-3-2	Radius of Maximum Impact for SATTP Treatment Units	E-3-111
E-4-1	Location Map	E-4-35
E-4-2	Generalized Cross-Section of the Indian Head Area	E-4-36
E-4-3	Potentiometric Surface Map of Lower Sand of Patapsco Formation	E-4-37
E-4-4	Topographic Site Map, Strauss Avenue Thermal Treatment Point	E-4-38
E-4-5	Strauss Avenue Sampling Locations	E-4-39
E-4-6	Detail of Typical Stickup Well	E-4-40
E-4-7	Detail of Typical Well with Flush Mount	E-4-41
F-1	Strauss Avenue Thermal Treatment Point Inspection Checklist	F-4
H-1	Supervisor Training Documentation	H-7
H-2	Operator Training Documentation	H-8
H-3	Typical Personnel Training Record	H-13
J-1	Location Map	J-6

SECTION A

SUBPART X PERMIT APPLICATION

TO BE PROVIDED

SECTION B

FACILITY DESCRIPTION

B. FACILITY DESCRIPTION

This section provides information on the location, operation, and administration of the open burning (OB) unit located at the United States Navy Indian Head Division Naval Surface Warfare Center (IHDIVNAVSURFWARCEN). The section provides the information required by 40 CFR 270.14(b)(1),(10),(11), and (19), and the Code of Maryland State regulations at Title 26, COMAR 26.13.05.17 and 18; 26.13.06; and 26.13.07.02.

B-1 GENERAL DESCRIPTION [40 CFR 270.14(b)(1) and COMAR 26.13.07.02]

The IHDIVNAVSURFWARCEN (the Activity) is located approximately 25 miles south-southwest of Washington, D.C., in west-central Charles County, Maryland. The Activity is situated adjacent to the town of Indian Head, Maryland, at the southern terminus of Maryland Route 210. It occupies a pair of peninsulas on the eastern shore of the Potomac River, as shown on the map in Figure B-1. The northern peninsula occupies 1,961 acres and the southern peninsula occupies 1,171 acres. The peninsulas are separated by the Mattawoman Creek.

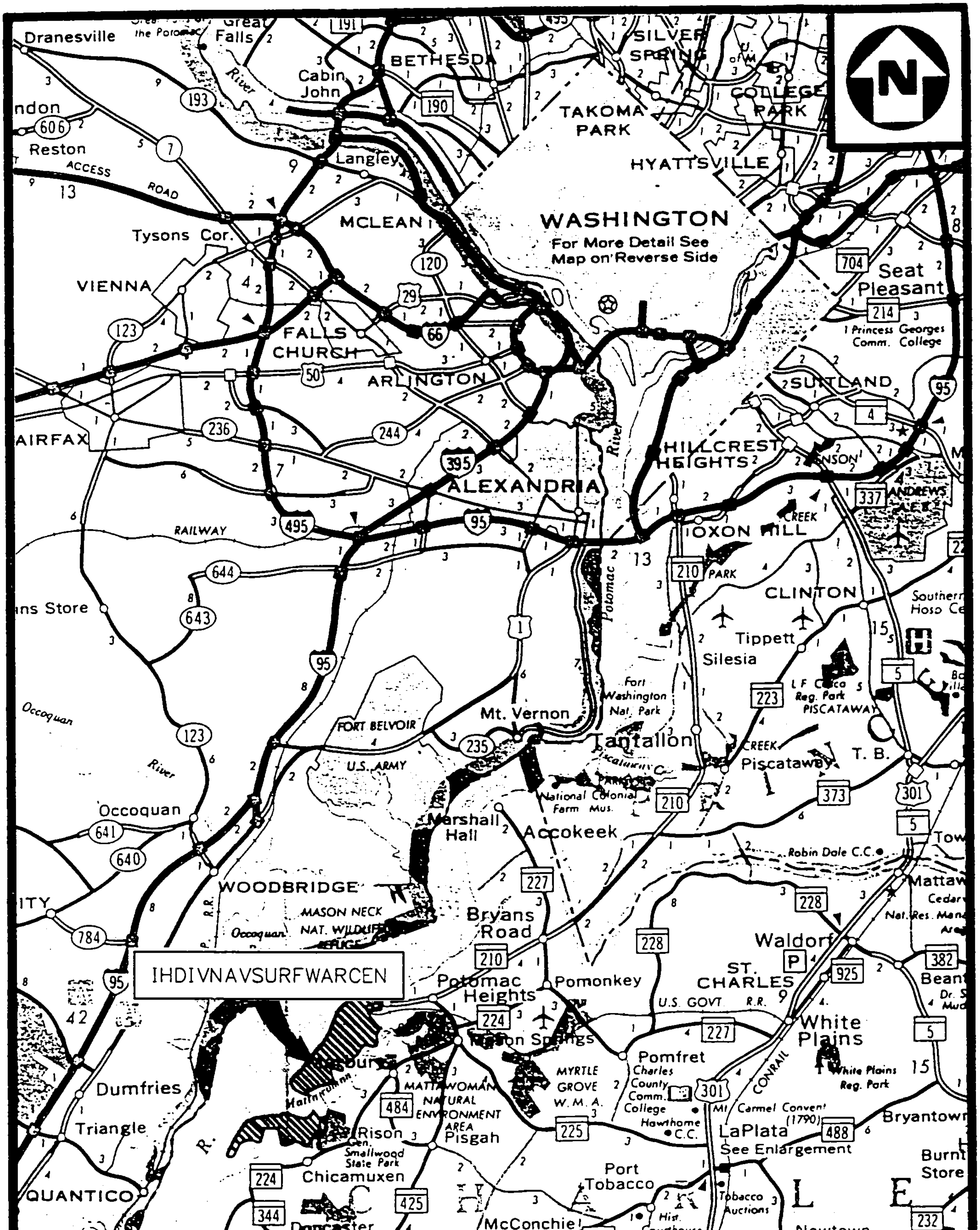
The OB explosive hazardous waste treatment facility located on the northern peninsula is the subject of this permit application. A tenant activity, the Naval Explosive Ordnance Disposal Technology Division (NAVEODTECDIV, also referred to as the Stump Neck Annex), occupies the southern peninsula. NAVEODTECDIV also operates an OB, explosive hazardous waste treatment facility, which shall be addressed in a separate permit application.

The IHDIVNAVSURFWARCEN occupies the lower 2/3 of a northern peninsula that is approximately 4.4 miles long. The small communities of Indian Head, Glymont, and Potomac Heights occupy the eastern third of the peninsula up to the main gate of the base. Offsite public access areas within 1,000 feet are limited to the waters of the Potomac River and Mattawoman Creek and residences, parks, and schools of the town of Indian Head. For additional information on the surrounding area, refer to Figure B-2, which is the United States Geological Survey 7.5-minute series topographic/bathymetric map of the Indian Head quadrangle.

The IHDIVNAVSURFWARCEN mission, since it was established in 1890, is to provide material and technical support for assigned weapons systems, weapons, or components, and to perform any tasks assigned by the Commander, Naval Sea Systems Command. The mission also includes requirements for providing technical support, production capability, and technical expertise in all phases of weapons

ACAD: 0040\BASE.DWG VIEW = 4 09/16/92 MJJ

Date: April 5, 1996



BASE MAP IS A PORTION OF THE STATE OF MARYLAND DEPT OF TRANSPORTATION ROAD MAP.

FIGURE B-1

GEOGRAPHIC LOCATION OF IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

0 4 8
SCALE IN FEET

Brown & Root Environmental

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

INDIAN HEAD QUADRANGLE
MARYLAND–VIRGINIA
7.5 MINUTE SERIES (TOPOGRAPHIC–BATHYMETRIC)
SW/4 INDIAN HEAD 15' QUADRANGLE

Mapped by the Defense Mapping Agency
Edited and published by the Geological Survey
and the National Ocean Survey

Control by USGS, NOS/NOAA, and USCE

Topography by photogrammetric methods from aerial photographs taken 1950. Field checked 1956. Revised by the Geological Survey 1966

Bathymetry compiled by the National Ocean Survey from tide-coordinated hydrographic surveys. This information is not intended for navigational purposes

Mean low water (dotted) line and mean high water (heavy solid) line compiled by NOS from tide-coordinated aerial photographs. Apparent shoreline (outer edge of vegetation) shown by light solid line

Polyconic projection. 10,000-foot grid ticks based on Maryland coordinate system, and Virginia coordinate system, north zone
1000-meter Universal Transverse Mercator grid, zone 18
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 9 meters south and 26 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

Revisions shown in purple compiled by the Geological Survey in cooperation with the Commonwealth of Virginia agencies from aerial photographs taken 1977 and other sources. This information not field checked. Map edited 1978

NATIONAL OCEAN SURVEY
HYDROGRAPHIC SURVEY INDEX

HYDROGRAPHIC SURVEY INFORMATION

Survey Number	Survey Date	Survey Scale	Survey Line spacing (Naut. Miles)
H-9292	1973	1:10,000	.02–.05
H-9322	1972	1:10,000	.01–.06
H-9324	1972–74	1:10,000	.01–.05
H-9349	1973	1:10,000	.01–.05

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
BATHYMETRIC CONTOUR INTERVAL 1 METER WITH SUPPLEMENTARY 0.5 METER CONTOURS—DATUM IS MEAN LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
THE MEAN RANGE OF TIDE IS APPROXIMATELY 0.5 METER

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
NATIONAL OCEAN SERVICE, ROCKVILLE, MARYLAND 20852
AND VIRGINIA DIVISION OF MINERAL RESOURCES, CHARLOTTESVILLE, VIRGINIA 22903
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Heavy-duty / Light-duty / Medium-duty / Unimproved dirt / State Route

INDIAN HEAD, MD.–VA.
SW/4 INDIAN HEAD 15' QUADRANGLE
38077-E2-TB-024

1966
PHOTOREVISED 1978
BATHYMETRY ADDED 1982
DMA 5561 II SW–SERIES V833

FIGURE B–2

AREA SURROUNDING NAVSURFWARCEN IHDIV INDIAN HEAD, MARYLAND

systems propulsion, explosives development, and propellant and explosive chemistry. As a result of these activities, the IHDIVNAVSURFWARCEN produces a wide variety of explosive/propellant materials that generate explosive wastes and explosive-contaminated wastes. These wastes, all of which possess the Resource Conservation and Recovery Act (RCRA) reactivity characteristic (D003), are thermally treated to deactivate the reactivity characteristic.

B-2 STRAUSS AVENUE THERMAL TREATMENT POINT (SATTP)

Thermal treatment consists of OB at the Strauss Avenue Thermal Treatment Point (SATTP). It is located in the southwest portion of the reservation at the end of Strauss Avenue on a narrow, 1,100-foot-long peninsula that extends into Mattawoman Creek. The location of the thermal treatment point is shown on Figure B-3.

Rocket grains, rocket motors, explosive wastes, and other wastes contaminated with explosives and propellants are normally burned at the Main Point, located at the very end of the peninsula. Six clay-lined burn pans, one unlined burn pan, a clay pad, and a small special burn pan are located along the perimeter of the Main Point. Thermal treatment occurs daily, if weather conditions permit, at the Main Point. The Auxiliary Point consists of a smaller peninsula that branches off from the main stem of the of the Strauss Avenue peninsula.

This site contains a clay-lined burn pan, four unlined pans, one solvent treatment vessel, two igniter treatment vessels, one larger clay pad (for treatment of grains and motors too large to fit any of the burn pans), and a device known as a thrust block. Small rocket motors (such as jet-assisted take-off [JATO] rocket motors) are attached to the thrust block to prevent them from moving while they undergo treatment. The solvent treatment vessel is used to treat liquid wastes and solvents contaminated with explosives. This container is supported above ground by steel legs and is inspected daily for leaks. A secondary containment pan is also provided to contain any liquids in the event of a leak. Figure B-4 shows the physical layout of the SATTP, including the relative positions of the Main and Auxiliary Points, and the locations of the specialized thermal treatment units described above.

A series of photographs with accompanying legends is provided in Appendix B-1 to aid in developing an understanding of the OB areas and their physical characteristics. The photographs show views of the OB areas, the layout of the areas from a number of different angles, the steel burn pan placement at each site, and other features of the sites and surrounding areas.

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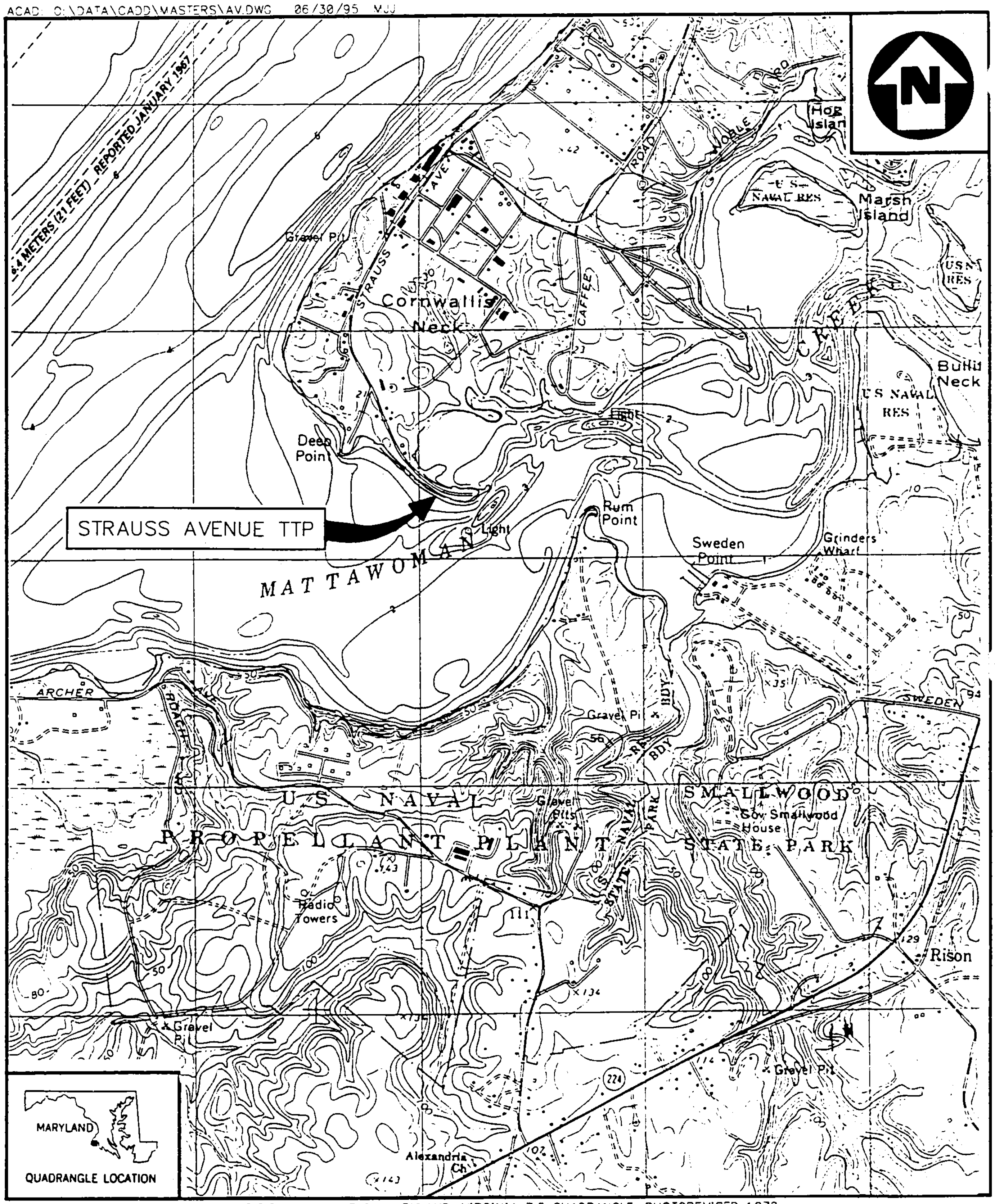


BASE MAP IS A PORTION OF THE U.S.G.S. INDIAN HEAD, MARYLAND-VIRGINIA 7.5 QUADRANGLE, PHOTOREVISED 1978.

FIGURE B-3

LOCATION MAP OF INDIAN HEAD PENINSULA

INDIAN HEAD, MARYLAND

0 2000 4000

SCALE IN FEET

Brown & Root Environmental

ACAD: O:\DATA\CADD\0040\0040CM01.DWG 04/01/96 MB PLOT LIMITS

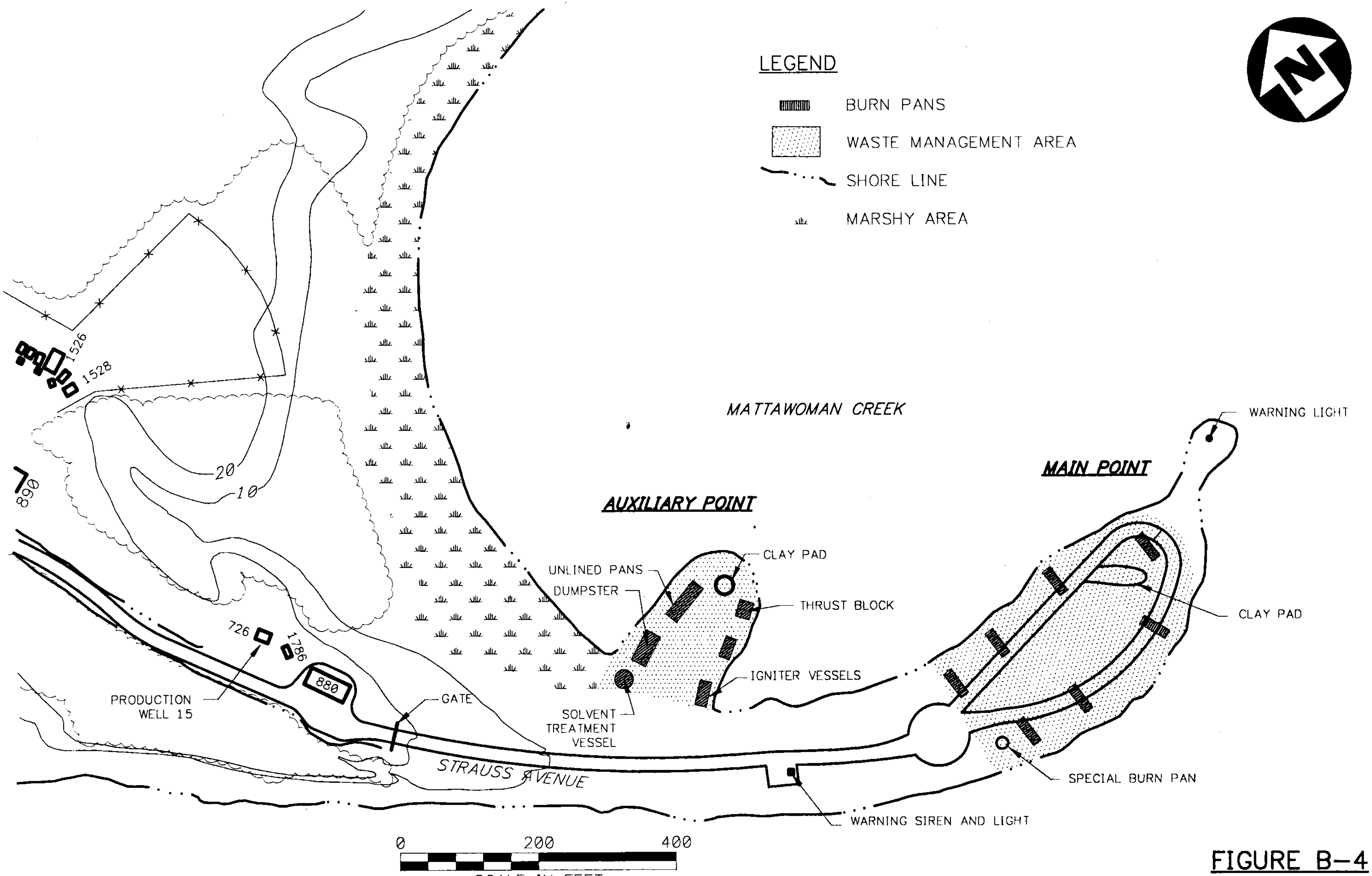


FIGURE B-4

SITE MAP
STRAUSS AVENUE THERMAL TREATMENT POINT
INDIAN HEAD, MARYLAND

Brown & Root Environmental

B-3 TOPOGRAPHIC MAP [40 CFR 270.14(b)(19) and COMAR 26.13.07.02D(35)]

Because of the need for different map scales, several topographic maps are necessary to provide all the information required by the regulations. Figure B-2 provides a general overview of the site and all neighboring communities for several kilometers around the installation. Figure B-4 shows the terrain in the vicinity of the OB area and the location of the OB pans with respect to the nearby surface water. Figure B-4 also indicates the approximate boundaries of the OB areas, the gate which serves as access control, and the locations of the OB pans and other thermal treatment equipment within the SATTP.

Contours on the figure indicate that the thermal treatment areas are located at elevations between 0 and 10 feet. Outside the OB areas, the land rises gently as the base of the peninsula is approached. The topography of the OB site is fairly regular. The slope of the installation gradually increases moving away from the water's edge, eventually reaching an elevation of approximately 100 feet above sea level near the center of the installation.

The Potomac River and Mattawoman Creek, adjacent to the treatment point, are characterized as estuarial waters, which are subject to tidal action and saltwater intrusion. The mean river level for the Potomac River is approximately 0.48 feet above mean sea level (MSL), whereas mean high-water levels are at 1.5 feet above MSL and mean low-water levels are at 0.48 feet below MSL. The treatment units are located above the normal high-water level. The stillwater 100-year flood elevation in the estuary is defined as 8.2 feet above MSL.

Figure B-5 shows a generalized cross-section for the area. The Potomac Group aquifer system is the major confined aquifer in the area and produces water of good quality, having supplied all of the groundwater withdrawn from the 15 production wells on the IHDIVNAVSURFWARCEN. The IHDIVNAVSURFWARCEN is the largest water user in the Indian Head region, pumping more than 1.0 million gallons per day. All known production wells draw water from the deeper formations, typically from 200 to 600 feet. There are no known production wells located in the shallow water zones. For additional details on groundwater and surface water resources, refer to Section E.

The following list contains other required information related to the topographic maps, as listed in 40 CFR 270.14(b)(19) and COMAR 26.13.07.02.D(35):

Date: A 5, 1996

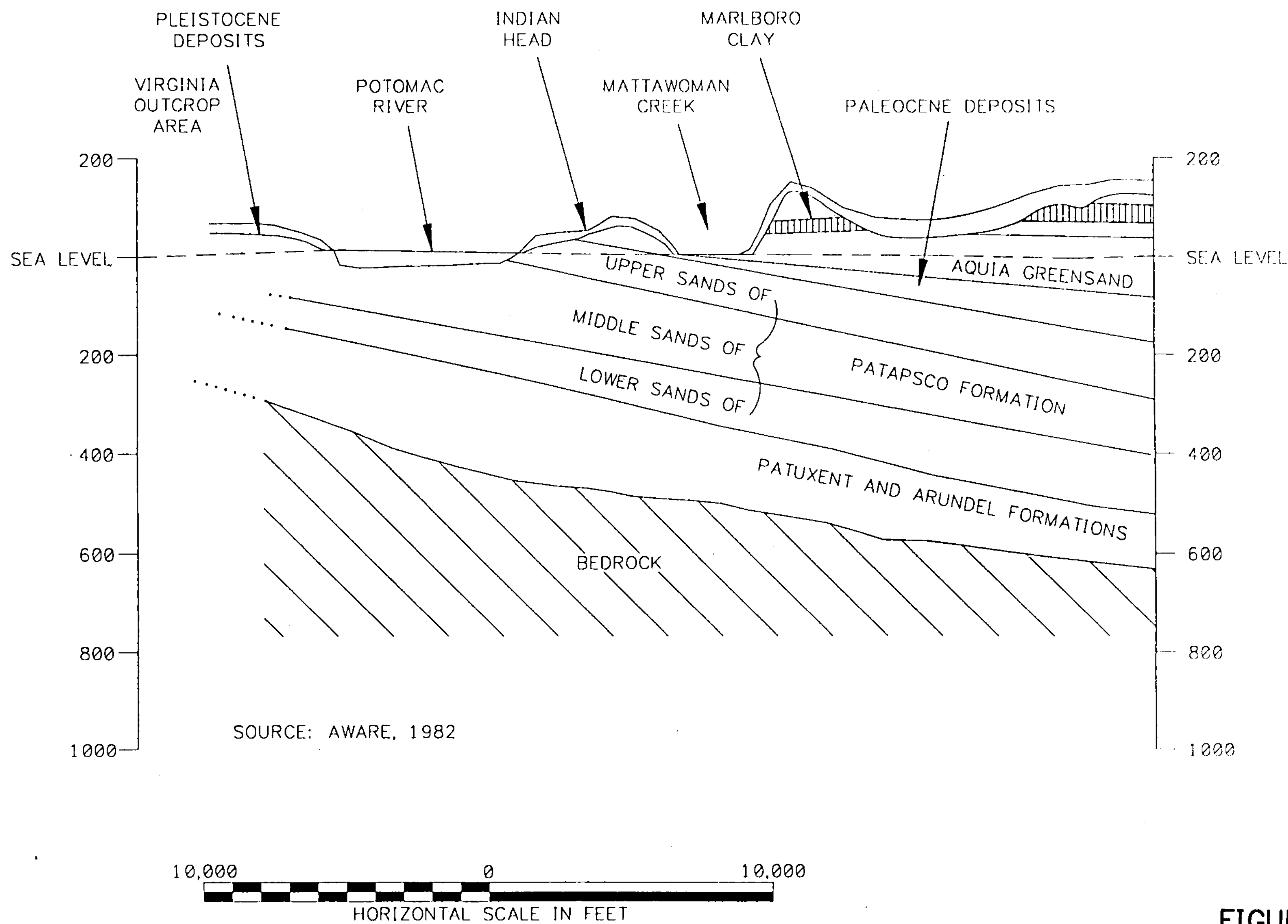


FIGURE B-5

GENERALIZED CROSS-SECTION OF
THE INDIAN HEAD AREA
INDIAN HEAD, MARYLAND

Brown & Root Environmental

KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	
Zone Designations*	ZONE A1 / ZONE A5
100-Year Flood Boundary	
500-Year Flood Boundary	ZONE B
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance and flood plain management purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas. The coastal flooding elevations shown may differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

For adjoining map panels, see separately printed Index To Map Panels.

Coastal base flood elevations shown on this map include the effects of wave action.

Coastal base flood elevations apply only landward of 0.0 NGVD.

INITIAL IDENTIFICATION:
FEBRUARY 7, 1975
FLOOD HAZARD BOUNDARY MAP REVISIONS:
SEPTEMBER 17, 1982

FLOOD INSURANCE RATE MAP EFFECTIVE:
JUNE 5, 1985
FLOOD INSURANCE RATE MAP REVISIONS:

FIGURE B-6

FLOOD INSURANCE RATE MAP INDIAN HEAD, MARYLAND

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

APPROXIMATE SCALE
1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CHARLES COUNTY, MARYLAND
(UNINCORPORATED AREAS)

PANEL 70 OF 170
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
240089 0070 B

EFFECTIVE DATE:
JUNE 5, 1985

Federal Emergency Management Agency

winds of greatest velocity are generally from the northwest at 17 to 21 knots (19 to 24 miles per hour). Median wind velocity is about 5 knots, most frequently from the northwest or south.

6. Orientation of the map (north arrow). Each map provides this information.

7. Legal boundaries of the Hazardous Waste Management (HWM) facility site. The boundaries of SATTP sites are shown as shaded areas on Figure B-4. No official "legal" boundaries have been defined for OB activities, since the total OB areas represent only a small fraction of the IHDIVNAVSURFWARCEN reservation and lie entirely within the security zone of the installation.

8. Access control (fences, gates). The SATTP is located within the high-security zone of the installation, so access may only be had after passing through a security checkpoint and a manned gate. Moreover, the road leading into the OB area has a locked gate to control access and has a number of warning signs posted to notify unauthorized persons of the potential hazards. Several large warning signs are posted along the banks of the two waterways that forbid trespassing and warn of danger. The wording of these signs states, "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT," and the signs are legible from a distance of at least 25 feet. The shoreline is routinely inspected for safety and security reasons associated with possible entry by unauthorized persons during the course of any OB operations. In addition, nightly inspections are performed by station security guards. Twenty-four-hour video monitoring of the SATTP takes place. Treatment does not take place if boaters or swimmers are within the exclusion zone on the creek. Refer to Section F-1 for additional details.

9. Injection and withdrawal wells both on site and off site. There are no known injection wells anywhere on or near the OB activity. Refer to Figure E-4-3 for locations of production wells. With respect to withdrawal wells, the IHDIVNAVSURFWARCEN itself is the largest water user in the Indian Head region, with 15 production wells pumping more than 1.0 million gallons per day. Production well 15 is within a few hundred yards of the SATTP. Well 15 is being abandoned but will be replaced with another production well immediately adjacent to the present well. All onsite production wells draw water from the deeper aquifers and are unlikely to be affected by any potential contamination near the surface from OB activities. An extensive sampling and analysis program has been developed as part of this permit application to evaluate the present amount of contamination in the OB thermal treatment points and to assess the potential for future contamination of the groundwaters serving as potable water sources. Within a 4-mile radius of the site, all of the known public and private water-supply systems, whether community or domestic, rely exclusively upon groundwater for a source of supply. The typical drilled wells

draw water from 200 to 500 feet deep. A few rural areas not served by community water systems, such as in Glymont and the areas southeast of Mattawoman Creek, rely on shallow, hand-dug, large-diameter cisterns, typically only 15 to 30 feet deep.

10. Buildings (treatment, storage, or disposal operations; or other structures). Building 880 serves as a control building for the SATTP operations and is located 500 feet uphill from the Auxiliary Point OB site and 1,000 feet uphill from the Main Point site. Refer to Figure B-4 for the location of Building 880. There are no storage or disposal structures in the vicinity of the OB site. The only treatment practiced in the vicinity occurs at the OB sites themselves. Refer to Figure B-4 for a general arrangement sketch showing the pads and burn pans in relation to the other structures at the site (a clay pad, a concrete block for holding small rocket motors in place while undergoing treatment, a solvent treatment vessel, igniter vessels, a series of hog-out pans for reburning sludges, and a trash dumpster). No storage of hazardous wastes is involved because all waste explosives and propellants are treated within a short time after they are delivered to the OB site. With respect to the SATTP loading/unloading facilities, waste materials are brought to the site by truck directly from the operations where they were generated. No temporary storage or separate unloading operations are involved at the OB treatment areas. Refer to Section D for a description of the equipment-specific OB processes as practiced.

11. Barriers for drainage or flood control. Run-on/run-off controls at SATTP would be ineffective because of the low-lying locations and the tidal nature of the surface water elevations. Instead, the OB operating personnel strive to minimize the potential for washout of contaminated materials by returning unburned materials for further treatment; by keeping the surface soils free of contaminated materials; and by covering all burn pans, vessels, and hog-out pans during cool-down and during periods of inactivity. These measures provide more protection from washout than would dikes or berms.

12. Location of operational units within the HWM site. Refer to Figure B-4 for details on this issue.

B-4 SEISMIC AND FLOODPLAIN ISSUES [40 CFR 264.18(a); 40 CFR 264.18(b)(i)&(ii); 40 CFR 270.14(b)(11)(i)&(iii); COMAR 26.13.06.01]

B-4a Seismic Standards

Location standards cited in the above regulations and in 40 CFR 264.18(a) require owners/operators of new facilities to apply rigid seismic standards if the proposed activities will take place in any county or election district listed in Appendix VI of Part 264. Charles County, and in fact the entire State of Maryland, is not included among those locations where seismic standards apply. Moreover, the IHDIVNAVSURFWARCEN and the SATTP are not new facilities, therefore, no further information is required to demonstrate compliance with 40 CFR 264.18(a).

B-4b Floodplain Standards

Regulations 40 CFR 264.18(b) (i and ii), 270.14 (b) (11) (iii), and COMAR 26.13.06.01 require that this permit application address the consequences of the location of SATTP within a floodplain. In the event of a 100-year flood, much of SATTP would be covered by water. The predicted elevations above mean sea level of 100-year flood waters are 8.2 feet for the Potomac River and 8.1 feet for the Mattawoman Creek. Therefore, there is some potential for residues from the treatment process to come into contact with flood waters. Several factors, however, will mitigate the effects of flooding:

- Treatment activities are not conducted during rainy weather or if there is the imminent threat of rain. The treatment units are covered with tarps or lids when not in use to prevent the accumulation of rainwater. If rainwater does accumulate in the treatment units, the water is collected, analyzed, and managed in a manner appropriate for its waste type.

- The Potomac River and Mattawoman Creek provide a large buffer volume for rain and flood waters. As a result, water levels rise slowly and flash flooding is rare. Sufficient time periods and warnings would be available to react to imminent flooding conditions.

- Treatment activities would not be conducted in the event of floods or imminent threat of flood. Sufficient warning is available prior to a flood to take actions to move thermal treatment equipment out of the floodplain. Thus the possibility of flushing treatment residues from the equipment is avoided. Flood warnings are available from a variety of weather reporting services.

It is concluded from these factors that there is a very low potential for hazardous wastes to be present at SATTP in the event of a flood or rainy weather. Therefore, it is highly unlikely that hazardous wastes would come in contact with flood waters. The thermal treatment equipment would be removed from the site in the event of imminent flooding. Therefore, treatment residues present in the equipment would not come in contact with flood waters. The equipment is covered with tarps or lids when not in use that mitigate the accumulation of rain water. Residues present within the treatment equipment are periodically removed, contained, and managed appropriately to prevent excess accumulations.

The only other source of contaminants that can potentially enter surface waters in the event of flooding those which may be present in soils at SATTP. During a flood there is some potential for loose topsoil to be swept into the surface waters and eventually become downstream sediment. If onsite soil is contaminated, there is some potential for contaminants to leach out and enter surface waters during a flood. Characterization of soils at the site has not been performed as of the submission of this permit application. However, a plan for the sampling and analyzing soils is described in section E-4. If soil contamination is detected, computer models can be used to determine potential impacts on groundwater, surface water, and sediments as a result of flooding.

The written procedures that direct the operations at the activity in response to potential flood conditions may be summarized as follows:

1. Events Leading to Notification of Potential Flood Conditions

   a. A flood warning would be received by teletype at the IHDIVNAVSURFWARCEN Communications Center, Building 20. Such a warning would come from the Naval District Washington (NDW) Washington Navy Yard in D.C. Alternative forecasts would originate from the National Weather Service. Forecasts generally include predictions of the anticipated flood elevations and the approximate times when flooding will occur.

   b. During normal duty hours, the IHDIVNAVSURFWARCEN Communications Center would notify the Emergency Response Coordinator (ERC) to relay the details of the flood warning notice.

   c. After normal duty hours, the IHDIVNAVSURFWARCEN Communications Center would notify the Command Duty Officer (CDO). The CDO in turn would then notify the Chief Staff Officer (CSO) and the ERC.

   d. The ERC would review the forecasted flood elevations and the high tide predictions to determine whether flood control actions were required at SATTP. If necessary, the ERC would consult with the CSO and determine the appropriate course of action:

(1) To prevent the conduct of any further thermal treatment operations for the duration of the flood warning.

(2) To remove thermal treatment equipment from the floodplain at the SATTP.

2. Operations in Response to Flood Warnings

a. Postponement of thermal treatment activities. The ERC would advise the cognizant department heads (Codes 04 - Safety Department; 09 - Public Works; and 20 - Ordnance Department) to delay any imminent or planned thermal treatment operations until the flood warning is lifted. This decision would be reconsidered at least daily until normal activities can be resumed.

b. Removal operations. Working parties, consisting of the necessary operating and supervisory personnel, would be assembled. The working parties would use the necessary equipment to move the thermal treatment equipment out of the floodplain onto higher ground at designated locations. Removal operations would be completed in sufficient time to prevent washout of the equipment.

c. Replacement operations. After the flood situation has passed or the flood warning is lifted, all thermal treatment equipment would be returned to the proper locations at SATTP, and normal operations would resume. The same personnel would be used to conduct the replacement operations as performed the removal operations.

B-5 TRAFFIC INFORMATION [40 CFR 270.14(b)(10)]

The entire eastern boundary of the Activity, which is shared with the town of Indian Head, is enclosed by an 8-foot fence topped with three strands of barbed wire. All traffic entering the Activity must pass through the main gate, which is situated at the terminus of Maryland Route 210. This gate is manned with a security guard from the hours of 3 PM through 2 AM weekdays and continuously manned from Friday evening through Monday morning and during holidays. The main gate is not manned from 2 AM through 3 PM. People entering the main gate, while it is manned, must present an employee identification badge or a visitor's pass. Visitor's passes are obtained from a pass office located immediately outside of the main gate.

Upon passing through the main gate, traffic enters the unrestricted area. This is a relatively small area in which nonhazardous activities occur. Office buildings, military housing, and maintenance and recreational facilities are located within the unrestricted area. While the main gate is unmanned, access to the unrestricted area is not controlled.

The bulk of the land area at the Activity is located within the restricted area. The restricted area is separated from the unrestricted area and the town of Indian Head by an 8-foot-high fence topped with three strands of barbed wire. All hazardous activities, including the SATTP, are located in the restricted area. Hazardous activities are defined as those involving explosives or other industrial operation. All explosive hazardous wastes treated at SATTP originate from onsite sources. Therefore, these wastes are transported only within the restricted area.

All traffic entering the restricted area must pass through a second gate manned with a security guard 24 hours a day. This gate is situated at the intersection of Patterson and Farnum Roads. People entering the restricted-area gate must present an employee identification badge or a visitor's pass. The maximum legal gross weight for any vehicle entering the Activity is 79,800 pounds. Onsite roadways were designed and constructed to be structurally capable of supporting this weight. Intersections within the restricted area were designed and constructed with ample visibility and sufficient vehicle turning distances.

The following factors prevent traffic from entering SATTP: (1) the site is located at the end of Strauss Avenue and there is no through traffic; (2) access to the site is restricted to government vehicles delivering wastes or transporting site personnel; (3) a gate, warning sign, and flashing lights are located at the entrance to the site; and (4) site personnel, who are present at the site during operating hours, monitor traffic. At the onsite roadways at SATTP, traffic ranges from 20 to 30 trips per week. By contrast, traffic on Strauss Avenue within the unrestricted area averages 3,600 vehicles per day (2-way volume).

People and vehicles entering the restricted area are not permitted to carry matches, lighters, or other flame-producing devices. A safety permit must be obtained for flame-producing devices that must enter the restricted area (e.g., welding equipment). Tobacco smoking occurs in the restricted area only in designated areas that have electronic ignition devices.

Many roadways and areas in the restricted area, including SATTP, are limited to government vehicles. Explosive hazardous wastes may be carried only in government vehicles that are equipped with placards indicating that the contents are explosive, a fire extinguisher, and a flame arrestor on the tailpipe. When carrying explosives, government vehicles must operate four-way flashing emergency lights and head lights. These vehicles are inspected for explosive safety on a regular basis. The routes that vehicles carrying explosives travel are selected to avoid traffic congestion and concentrations of personnel. The drivers of government vehicles that carry explosives must obtain a government license, receive training on explosive handling and transportation, and must wear safety equipment (flame resistant coveralls or lab coat and hat, conductive shoes, and safety glasses) when transporting explosives.

The speed limit on the Activity is 25 miles per hour or slower in specially marked areas. The roadways are monitored by an internal police force, which enforces local traffic regulations. Traffic control signs are posted throughout Activity roadways.

All vehicles must yield the right-of-way to vehicles carrying explosives, including those carrying explosive wastes, on Activity roadways. The yielding vehicles must immediately pull to the right side of the road and stop until the vehicle carrying explosives passes. When traveling in the same direction, vehicles may not pass or come within a unsafe distance of vehicles carrying explosives.

There are no impacts on surrounding public roadways from the operations of SATTP. All wastes are transported via onsite roadways within the restricted area of the Activity.

B-6 DOCUMENTATION OF COMPLIANCE WITH MANIFEST SYSTEM, RECORDKEEPING, AND REPORTING REQUIREMENTS [40 CFR 264.70 and COMAR 26.13.05.05]

The provisions of 40 CFR Part 264 Subpart E, Manifest System, Recordkeeping, and Reporting, are not specifically identified in 40 CFR Part 270 as information requirements for a Part B permit. Permit applicants are not required to submit compliance demonstration material with the Part B, but failure to comply with the Subpart E requirements is a violation of any permit that may be issued.

The regulations of Subpart E apply to owners and operators of both offsite and onsite facilities. Offsite facilities are facilities that receive hazardous wastes generated offsite for treatment, storage, or disposal. Onsite facilities are facilities that do not receive hazardous wastes from other generators for treatment, storage, or disposal but that treat, store, or dispose of hazardous wastes generated only within their own facility. Sections 264.72 (COMAR 26.13.05.05C) (Manifest Discrepancies) and 264.76 (COMAR 26.13.05.05G) (Unmanifested Waste Report) do not apply to owners and operators of onsite facilities, such as IHDIVNAVSURFWARCEN, that do not receive any hazardous waste from offsite sources.

Sections 264.71 (COMAR 26.13.05.05B) (Use of Manifest System), 264.73 (COMAR 26.13.05.05D) (Operating Record), 264.74 (COMAR 26.13.05.05E) (Availability, Retention, and Disposition of Records), 264.75 (Biennial Report), COMAR 26.13.05.05F (Annual Report), and 264.77 (COMAR 26.13.05.05H) (Additional Reports) apply to both onsite and offsite facilities, and therefore, apply to IHDIVNAVSURFWARCEN.

The IHDIVNAVSURFWARCEN does not normally receive hazardous wastes from other generators for treatment, storage, or disposal. IHDIVNAVSURFWARCEN does ship hazardous wastes generated at IHDIVNAVSURFWARCEN to other offsite disposal facilities. Thus, for hazardous wastes generated onsite and treated or stored on site, IHDIVNAVSURFWARCEN is not required to meet the manifest standards of 40 CFR Part 262. For hazardous wastes generated on site and shipped off site for treatment, storage, or disposal, IHDIVNAVSURFWARCEN complies with the manifest standards of 40 CFR Part 262 and the applicable provisions of 40 CFR Part 264 Subpart E. The manifest system is discussed below. Recordkeeping and reporting are discussed in Section D-8j.

B-6a **Manifest System [40 CFR 264.71 and COMAR 26.13.05.05B]**

This section discusses existing manifest handling procedures for IHDIVNAVSURFWARCEN shipments to other sites, as well as procedures for handling manifests if hazardous wastes are received at IHDIVNAVSURFWARCEN in the future.

B-6a(1) **Generator Manifest Handling Requirements [40 CFR 264.71(c) and COMAR 26.13.05.05B(3)]**

The procedures used at IHDIVNAVSURFWARCEN for manifest handling for hazardous wastes shipped off site for treatment, storage, or disposal are as follows:

1. When hazardous wastes are shipped from IHDIVNAVSURFWARCEN, the Environmental Coordinator, acting as an agent of the U.S. Navy, prepares the manifest for shipment. The manifest is prepared using Environmental Protection Agency (EPA) Form 8700-22 and 8700-22A (if necessary). The manifest contains the following information:

    a. Name and address of the facility authorized to treat, store, or dispose of the waste described on the manifest. An alternative authorized facility may also be designated for use if an emergency prevents delivery of the waste to the primary designated facility.

b. IHDIVNAVSURFWARCEN's name, mailing address, and telephone number.

c. IHDIVNAVSURFWARCEN's EPA ID number.

d. Transporter's company name, EPA ID number, state ID number, and phone number.

e. U.S. Department of Transportation (DOT) description (shipping name, hazard class, and ID number) of the wastes being shipped under the manifest; a description of the number and type of containers, total quantity of that waste, and the quantity units; handling codes for the wastes, and additional descriptions or special instructions for the wastes.

2. The U.S. Navy or an agent of the U.S. Navy signs and dates the generator certification on the manifest.

The transporter(s) of the wastes also signs and dates the acknowledgement of receipt of the wastes; and the owner/operator of the facility receiving the wastes for treatment, storage, or disposal indicates any discrepancies in the manifest, and signs and dates the manifest to indicate receipt of the wastes. If significant discrepancies are noted, they must be satisfactorily resolved within 15 days, or a letter indicating the discrepancies and attempts to resolve them, together with a copy of the manifest, must be forwarded to regulatory authorities by the owner/operator of the receiving facility.

3. For any wastes that are restricted under 40 CFR Part 268 (Land Disposal Restrictions), a notification to the treatment, storage, or disposal facility is included; the notification includes (in addition to items listed above) the manifest number, the EPA Hazardous Waste Number and corresponding treatment standard and all applicable prohibitions contained in 40 CFR 268.32 or Section 3004(d) of RCRA, and any available waste characterization data. If the waste is restricted under 40 CFR Part 268, but can be land disposed without further treatment, a certification identifying the applicable restriction and stating that the applicable treatment standard or prohibition levels have been met will be included. Similarly, for wastes that are subject to treatment standards, technology

standards, maximum concentration standards, or other requirements prior to disposal or further management at an offsite facility, certifications consistent with the provisions of 40 CFR 268.7 will be provided, and appropriate notifications will be made.

If the wastes are subject to a case-by-case extension under 40 CFR 268.5, an exemption under 40 CFR 268.6, or a nationwide variance under 40 CFR Part 268 Subpart C, the notification will include (in addition to items listed above) the date that the prohibitions will apply to the waste.

B-6a(2) Treatment Facility Manifest Handling Requirements [40 CFR 264.71(a), 264.71(b)]

Although IHDIVNAVSURFWARCEN does not receive hazardous wastes from off site at the present time, the following procedures will be followed for any hazardous wastes received in the future for treatment at the SATTP:

1. When hazardous wastes are received at IHDIVNAVSURFWARCEN from an offsite source the Environmental Coordinator, acting as an agent for the U.S. Navy, will:

    a. Sign and date each copy of the manifest to certify that the hazardous waste covered by the manifest was received.
    b. Note any significant discrepancies in the manifest [as defined in §264.72(a)] on each copy of the manifest.
    c. Immediately give the transporter at least one copy of the signed manifest.
    d. Within 30 days after the delivery, send a copy of the manifest to the generator.
    e. Retain at the facility a copy of each manifest for at least 3-years from the date of delivery.

2. If the wastes are received by rail, accompanied by a shipping paper containing all the information required by the manifest (excluding EPA ID numbers, generator certification, and signatures) and the manifest has not been received by the time action is required, the procedures in 1(a) through 1(d) above will be followed using the shipping paper in lieu of the manifest. Both the shipping paper and the manifest will be retained for at least 3-years if the shipping paper was signed in lieu of the manifest at the time of delivery.

3. If significant discrepancies noted in 1(b) or 2(b) above, are not resolved within 15 days, a letter indicating the discrepancies and the attempts to resolve them, together with a copy of the manifest or shipping document, will be sent to the regulatory agencies involved.

4. If a shipment is accepted without an accompanying manifest or shipping paper, and IHDIVNAVSURFWARCEN has not received certification from the generator that the waste is excluded from the regulations, IHDIVNAVSURFWARCEN will submit a single copy of an "Unmanifested Waste Report" to the MDE within 15 days of receiving the waste. The report will include the following information:

   a. The identification number, name, and address of the facility.
   b. The date the facility received the waste.
   c. The identification number, name, and address of the generator and the transporter, if available.
   d. A description and the quantity of each unmanifested hazardous waste facility received.
   e. The method of transfer, treatment, storage, or disposal for each hazardous waste.
   f. The certification signed by the owner or operator of the facility or his authorized representative.
   g. A brief explanation of why the waste was unmanifested, if known.

SECTION C

WASTE CHARACTERISTICS

C. WASTE CHARACTERISTICS [40 CFR 270.14(b)(2), 264.13(a), and COMAR 26.13.05.02D, 26.13.07.02D16 and 17]

The physical and chemical characteristics of wastes treated at the open burning (OB) units are described in this section of the permit application. All hazardous wastes treated handled at the open burning (OB) facilities possess the hazardous characteristic of reactivity (D003) because of the reactive properties of propellants and/or explosives which constitute all or part of the treated wastes. The chemical and physical characteristics of the propellants and explosives thermally treated and treatment residues are described in Section C-1. Section C-2 contains a waste analysis plan that addresses procedures for sampling, testing, and evaluating the wastes treated and the residue generated from OB treatment activities. The information submitted has been developed in accordance with the requirements of 40 CFR 270.14(b)(3), 264.13(b) and COMAR 26.13.05.

C-1 CHEMICAL AND PHYSICAL ANALYSES [40 CFR 270.14(b)(2), 264.13(a), and COMAR 26.13.05.02D]

C-1a Containerized Waste [40 CFR 270.15 and COMAR 26.13.05.09]

The residues (essentially ash) resulting from open burning (OB) waste treatment are collected from the hazardous OB units periodically. Representative samples of the residues are taken and analyzed for waste characteristic of toxicity. The residues are initially accumulated in a 90-day area and later transferred to an onsite hazardous waste storage facility. The storage facility is permitted under the Activity's RCRA Part B Permit.

C-1b Waste in Tanks [40 CFR 270.16 and COMAR 26.13.05.10]

Indian Head Division Naval Surface Warfare Center (IHDIVNAVSURFWARCEN) does not use tanks to store or treat hazardous waste.

C-1c Waste in Piles [40 CFR 270.18 and COMAR 26.13.05.12]

IHDIVNAVSURFWARCEN does not use waste piles to store or treat hazardous waste.

C-1d **Landfilled Wastes [40 CFR 270.21 and COMAR 26.13.05.14]**

IHDIVNAVSURFWARCEN does not dispose of hazardous waste in landfills.

C-1e **Wastes Incinerated and Wastes Used in Performance Tests [40 CFR 270.19 and COMAR 26.13.05.15]**

IHDIVNAVSURFWARCEN does not incinerate hazardous waste.

C-1f **Wastes to be Land Treated [40 CFR 270.20 and COMAR 26.13.05.13]**

IHDIVNAVSURFWARCEN does not use land treatment for hazardous wastes.

C-1g **Wastes in Miscellaneous Treatment Units [40 CFR 270.23 and COMAR 26.13.05.17 AND 26.13.05.18]**

Wastes thermally treated at the IHDIVNAVSURFWARCEN OB units include various energetic materials. The facility generates a wide variety of reactive wastes in the course of its operational, production, demilitarization, and experimental activities. Once generated, most of the wastes are temporarily accumulated in a designated satellite, or less-than-90-day site, and then taken directly to Straus Avenue Thermal Treatment Point (SATTP). Some wastes are taken directly to SATTP when generated. Reactive wastes generated at the facility include ordnance-related wastes, explosive wastes, small quantities of solvents, excess reagents, or other chemicals that have been contaminated during use with explosives or propellants from laboratory operations, and explosive-contaminated solvents from manufacturing and research operations.

Energetic materials are chemical compounds or mixtures of chemical compounds, and can be divided into three broad classes according to use: 1) propellants; 2) explosives; and 3) pyrotechnics. Burning of energetic materials produces exothermic chemical reactions. The reactions are self-sustaining after an initial activating energy has been supplied. Propellants and explosives, when initiated, evolve large quantities of gas in a short time. The difference between propellants and explosives is the rate at which the reaction proceeds. In explosives, a fast reaction produces a very high pressure shock in the surrounding medium. Chemical transformation passes through the material faster than the speed of sound (1,100 feet/second at sea level). This process is referred to as a detonation and is capable of shattering objects. In propellants a slower reaction produces lower pressure over a longer period of time. This process is referred to as a deflagration and is used to propel objects. Pyrotechnics are chemicals or mixtures of chemicals which, when ignited, undergo an energetic chemical reaction at a controlled rate intended to produce, on demand and in various combinations, specific time delays or quantities of heat, noise, smoke, gas, light, or infrared radiation. Pyrotechnic formulations vary widely because of the variety of functions they perform. Some pyrotechnics burn at relatively slow rates, while, others undergo rapid deflagration and appear to react much like high explosives.

Although some of the reactive wastes are designed to detonate or are capable of detonating under confined condition, all treatment processes performed at SATTP occur by open burning.

A more detailed discussion of propellants, explosives, pyrotechnics, and explosive materials is in Appendix C-1.

C-1g(1) Unit-specific Wastes

A wide variety of explosive reactive wastes are treated in several units at the SATTP, which is divided into two treatment areas; the Main Point and the Auxiliary Point. All wastes treated at the SATTP must be listed on the latest version of the "Master List of Materials Acceptable for Treatment at Strauss Avenue Thermal Treatment Point (SATTP)" (Appendix C-2). This list describes the waste material nomenclature, type, and any applicable treatment restrictions. New waste materials are added on an on-going basis, depending upon the activities generating reactive wastes at the IHDIVNAVSURFWARCEN. Typically, the treatment restrictions are waste material specific treatment quantity limits. Prior to a waste material being placed on the list, the waste will be evaluated to determine the DOD waste classification (i.e., 1.3 or 1.1) and the need for treatment restrictions. Class 1 Division 3 (1.3) is a mass fire, minor blast or fragment hazard. Class 1 Division 1 (1.1) is a mass detonation hazard. The following is a description of the wastes that are treated in each unit at SATTP.

C-1g(1)(a) <u>Main Point</u>

Pans 1, 2, 3, 4, and 5

These pans are used to treat 1.3 propellants. Most of these wastes consist primarily of propellants and explosives. The typical wastes treated at these pans include the following:

- 1.3 propellants
- Cast and extruded grains
- ASROC grains

- 1.3 explosive contaminated materials
- Boron Potassium Nitrate ($BKNO_3$)
- Selected SR-121 and JATO grains
- Double-based sheet stock (carpet rolls)
- Dry propellant explosive scrap
- Fluorocarbon propellants (MTV, MTH)

Pan 6 - Slum Pan

The Slum Pan is used to treat liquids contaminated with explosives, propellants, and explosive contaminated material. Liquids are "slummed" by pouring them onto sawdust so that all the liquid is absorbed and no free liquids are present. Slumming takes place at the point of generation. The concentration of propellants and explosives in the liquid wastes is relatively low. The weight percent is further reduced during the slumming process typically to less than 10 percent. The typical wastes treated at this pan include the following:

- Alcohol, heptane, and water wet explosive scrap. Typical energetic contaminants include RDX, PNC, and EDDN.

- Explosive liquid slums contaminated with energetics such as NG and other nitrate esters.

- Rags, bags, gloves, inhibitors, plastics, etc. contaminated with 1.1 and 1.3 energetics.

- Slummed laboratory solvents.

- Propellant and explosive contaminated materials.

Pan 7

Pan 7 is used to treat 1.1 waste materials. Pan 7 may also treat 1.3 materials, but not at the same time. Most of the wastes treated consist primarily of propellant and explosive material.

Typical materials treated include the following:

- 1.1 or 1.3 waste materials
- Oxidizers contaminated with a metal, a flammable material, or an organic material

- $BKNO_3$
- Wet explosive scrap
- Explosive contaminated materials
- Ammonium perchlorate ground to less than 15 microns in size

Clay Pad

The clay pad is used to treat the following rocket motor grains:

- MK53, 61, and 73 grains
- Terrier grains
- Talos sections

Special Burn Vessel

Waste materials treated in the special burn vessel consist of small quantities (a few gram be up to 2 pounds) of highly sensitive (very reactive) waste materials. These wastes are too sensitive to safely stored. The elemental composition and chemical constituents are similar to those described for 1.1 and 1.3 materials.

C-1g(1)(b) **Auxiliary Point**

Thrust Block

This unit consists of a concrete block with clamps to hold rocket motors during burning. The wastes treated are composed of propellants. Typical rocket motors treated include the following:

- MK109
- SR-121-NP-2 JATO
- MK 25 JATO
- CK-7A, MK-128 JATO

Solvent Vessel

The solvent vessel is used to treat up to 150 gallons of contaminated solvents. Solvents treated must be listed either on the Master List (Appendix C-2) or in Groups B, C, and H of Appendix C-3. The solvents treated include:

- ELBA Solvent
- Acetone
- Alcohols
- Hexane
- Toluene
- Methyl Ethyl Ketone

Igniter Vessel

This unit is used to treat small waste items such as cartridge activated devices and small rocket motors which are typically enclosed within metal casings. The vessel serves to contain the waste items in the event that they are propelled during open burning. The quantity of reactive waste that can be treated in the igniter vessel is determined on a case by case basis considering operational and safety factors. For example, up to 20 Smokey Sam rocket motors, with one pound of propellant each, can be burned at a time. The vessel is also limited by the maximum volume of waste items it can contain. Excelsior (wood shavings) wet with fuel oil and interspersed with the waste items is used to initiate and sustain combustion during open burning. The igniter vessel is used to treat the following wastes:

- Ignition devices
- Cartridges
- Pull tubes
- Smokey Sam Motors
- Cartridge Activated Devices

Clay Pad

Certain items, typically rocket motors, are too large to place in a burn pan for thermal treatment. These items are placed on a concrete or clay-like soil pad for treatment.

The Clay Pad is used to treat the following large rocket motor grains:

- MK 53, 61, and 73 grains
- Terrier grains
- Talos sections

The large rocket motors are ignited remotely with the use of an ignition train consisting of an electric match or squib wrapped within a fuel oil soaked rag. When ignited, the match in turn ignites the rag which provides a sustained flame for ignition of the rocket motor.

Unlined Pans

There are four unlined pans constructed of steel with aluminum constructed secondary containment systems. Each pan has an aluminum constructed cover.

The unlined pans are used to treat the following:

- Water wet propellant waste from the hog-out facility. This waste is treated using No. 2 fuel oil, waste acetone, or waste ELBA solvent as a fuel source.

- Reactive ash residue from other treatment units.

C-1g(2) Chemical Compositions

The chemical composition of the waste treated at the SATTP are known in all cases prior to treatment. Historical data, specifications, and ordnance publications are used to obtain information regarding the nature of the waste to be burned. These data, which are from standard U.S. military technical manuals, field manuals, various handbooks, or the personal knowledge of the generator are sufficient to determine the suitability of the waste material for treatment.

C-1g(2)(a) Wastes Treated

Appendix C-4, "Chemical Composition of Energetics in Items that may be treated by OB at IHDIVNAVSURFWARCEN," lists 565 treatment materials and provides detailed item-specific chemical composition data. These items are representative of those that may be treated. No reactive hazardous wastes are treated unless the chemical and physical composition and properties are adequately known to enable safe treatment.

Appendix C-5, "Hazardous Waste Codes", lists the applicable waste codes for each item currently allowed to be treated by OB. The wastes treated in the OB areas all carry the EPA hazardous waste number D003 (reactivity).

Each generator must fill out a "Request Sheet for New Materials" (Figure C-1). Prior to being placed on the Master List, the chemical composition and DOD explosive classification of the wastes are determined.

C-1g(2)(b) <u>Treatment Residues</u>

Residues are generated from the open burning of reactive wastes in the treatment units. The residues are typically in the form of dry ash, however, on occasion, large pieces of unburnt explosives remain in the units. If unburnt explosives are clearly identified in the residues, they are either left in the pan or moved to the unlined pans for future treatment.

Dry ash which does not visibly contain explosives is removed from the unit using a nonmetallic shovel and placed in a 55-gallon, U.S. DOT 17E steel drum. The drum is labeled with the following information: (a) the words "of Hazardous Waste", (b) an accumulation start date, (c) the origin of the ash. Ash originating from the treatment of Class 1.1 explosives is segregated from ash originating from Class 1.3 explosives. The drums are sealed and transported to a less than 90 day storage facility for storage.

The ash is periodically tested for the hazardous waste toxicity characteristic (TC) due to the possible presence of metals. Container sampling procedures are described in Appendix C-6. If TC metals are present in concentrations greater than or equal to the specified limits, then the residue is managed as hazardous waste by the Property Disposal Officer (PDO). If TC metals are not detected or are present below specified limits, the residue is managed as a nonhazardous solid waste by the PDO.

Typically, significant quantities of residue do not accumulate in the solvent tank. If residue accumulation is detected, however, residue treatment is performed within the tank. Residues are not removed because of the difficulty of accessing the tank interior. Treatment is performed by burning a fuel oil and excelsior mixture within the tank.

Date: April 5, 1996

FIGURE C-1

REQUEST SHEET FOR NEW MATERIALS

Send to Code 2110

1. Type and Name of Material (select one of (a) through (d))

   (a) Raw Material_____(Attach MSDS for material)

   Name of Material:

   (i) Used in propellant formulation _______

   (ii) Used in Explosive Formulation _______

   (iii) Used during Processing _______

   Solid _______ Liquid _______

   Explosive Itself _______ Explosive Contaminated ______

   (b) Propellant Formulation _______

   Name of Formulation:

   (i) Single-base

   (ii) Double-base

   (iii) Triple-base

   (iv) Composite

   (v) Composite double-base

   (vi) Fluorocarbon

   (vii) Nitramine

   (c) Explosive Formulation: ____________________

   Name of Formulation: ____________________

   (d) Pyrotechnic: ______________

   Name of Pyrotechnic: ____________________

   (i) Igniter _______

   (ii) Cartridge _______

   (iii) Primer _______

   (iv) Other _______

2. Frequency: One-time _____ On-going _____ Variable ______

3. Estimated Quantity: _______

4. Mix Sheet (formulation) and Safety Test Data

   Attached ___________ Not Attached _______

   If not attached, why: ___________________________

5. Point of Contact: ___________________________

   (Name/Code/Phone Number)

Typically, ash residue is dry and free of liquids. The OB units and ash storage containers are protected from rain water intrusion. On occasion, however, water may be mixed with ash within an OB unit. When this occurs, free liquid is separated from the ash placed in a container. The liquid is pumped into a 55-gallon drum then sampled and tested for TC metals. If TC metals are present in concentrations greater than or equal to the specified limits, then the residue is managed as hazardous waste by the Property Disposal Officer (PDO). It TC metals are not detected or are present below specified limits, the liquid is managed as a nonhazardous waste by the PDO.

Metal components remaining after reactive waste treatment, such as metal casings from the ignitor vessel or rocket motor cases from the thrust block, are placed in containers and transported to a facility known as the Solid Waste Recycler (SWR). The SWR is essentially a furnace in which the treated components are heated to a high temperature to insure that they are free of explosive material and that they can be handled safely. This step is necessary before metals components can be classified as safe to handle and sold to private parties for recycling.

C-1g(3) Unusual Cases/Emergencies

Because of health and safety concerns, OB of reactive-containing energetic items sometimes must be undertaken on an emergency basis. In the event a determination is made that immediate and imminent substantial endangerment to human health and/or the environment requires immediate treatment of an energetic containing item, a request will be made to the Manager of the Cast Plant for a temporary emergency permit to allow treatment of such items not covered by the permit. This request will be oral (by phone) and will be followed by a written notification of the emergency activity. If the emergency event occurs during a time when the Manager is unavailable (or during off-hours, weekends, and holidays), the Manager will be informed by phone as soon as possible of the emergency treatment followed by a written notification.

C-1g(4) Additions to the Master List

As noted in section C-1g(2)(a), only wastes listed on the "Master List of Materials the acceptable for Treatment at SATTP" (or simply the "Master List", shown in Appendix C-2) may be treated at the SATTP. Occasionally, new reactive hazardous wastes or new configurations of listed reactive hazardous wastes are generated which are not on the Master List. In order to treat a new waste or a new waste configuration at SATTP, the generator must either request permission for a "one-time-burn" or request approval to add the waste to the Master List. If the waste will only be generated and treated once, then a one-time-burn is requested. If the waste will be generated and treated in large quantities or over a long period of time, than it is added to the Master List. In either case, essentially the same procedures are used. These procedures are summarized as follows:

- A request sheet, shown in Figure C-1, is filled out and submitted by the generator. It contains the following information about the waste: name, use, configuration, physical state, formulation, quantity, frequency of treatment, hazard sensitivity data, special safety requirements, explosive classification, and an attached material safety data sheet (MSDS).

- The operations engineer writes a procedure to treat the waste that includes: (1) measures to prevent propulsion of waste, as in the case of rocket motor grains, (2) which treatment unit shall be used, (3) configuration of waste within the unit, (4) method of ignition, (5) required explosive and personnel limits and (6) required personal protective equipment.

In addition to operational criteria discussed above, an assessment is made to determine the treatment conditions required for new wastes in order to meet environmental performance standards described in Section E. Environmental performance standards for safety, surface pathway (surface water and soils) and subsurface pathway (subsurface soils and groundwater) are met, for example, through implementation of standard operating procedures and a groundwater monitoring program. These performance standards shall be in effect regardless of whether new or existing wastes are treated at SATTP. In practice, the assessment of whether treating a new waste will meet environmental performance standards will be limited to an air pathway environmental assessment which is described in detail in Section E-3. The basic steps in an air pathway assessment are summarized as follows:

- The type and quantity of combustion products resulting from treatment of the subject waste are predicted using the POLU-11 computer model. Where this model is not applicable, other prediction methods are used. The results of the model (or alternate prediction method) are reported in units of weight of combustion product generated per unit weight of waste burned (i.e., lb/lb).

- The maximum quantity of waste which may be treated in a single event is determined based upon: (1) the weight of combustion products generated per unit weight of waste treated, (2) the dispersion of those combustion products from SATTP (as predicted by standard U.S. Environmental Protection Agency (EPA) air pollutant dispersion models, such as ISCST2 and INPUFF) and (3) applicable federal and state standards for ambient concentrations of air pollutants for a given time period 1-hour, 8-hours and annual).

- The air pathway, environmental performance analysis described in Section E-3 is based upon a worst case analysis of the wastes on the master list. If the assessment of the new waste yields a more stringent limitation than that derived from the listed waste, then Section E-3 shall be modified to reflect the more stringent air pathway performance standards.

C-2 WASTE ANALYSIS PLAN [40 CFR 270.14(b)(3), 264.13(b), 264.13(c), 268.7, and COMAR 26.13.05.02D]

IHDIVNAVSURFWARCEN generates various forms of explosive, propellant, and explosive/propellant-contaminated waste at any given time. Appendix C-4 of this permit application lists the materials that are or may be thermally treated at this facility. Appendix C-3 lists the compatibility groupings of explosive contaminated waste solvents. Appendix C-5 lists the appropriate hazardous waste codes for currently allowable OB ordnance/demolition items at IHDIVNAVSURFWARCEN. A detailed waste analysis is not necessary to ensure successful treatment by OB, as the constituents of the propellant and explosives treated are known prior to treatment. All data on wastes treated by OB is maintained in the facility operating record. To properly and safely handle, store, transport, and dispose of the waste material, it must be properly characterized. This Waste Analysis Plan serves the following purposes:

- To determine if waste is hazardous as defined by or listed in regulations promulgated by U.S. EPA and the State of Maryland in implementing RCRA.

- To determine if waste is restricted from land disposal as defined by regulations promulgated by the State of Maryland and the U.S. EPA in implementing the Land Disposal Restriction Regulations.

- To identify waste hazard classes as defined by the DOD for selection of proper treatment, labeling and transport of waste treatment residues to off site facilities.

- To provide for required hazardous waste identification of treatment residues, required by transporters and disposal operators as prescribed by RCRA.

- To determine the chemical and physical data on wastes necessary to define treatment unit, treatment techniques, and treatment quantity limits.

- To determine explosive compatibility of different wastes.

C-2a Characterized Wastes

Safety regulations require that all explosive materials must be thoroughly characterized for chemical and physical properties and explosive hazard sensitivity prior to being processed or otherwise used at the Activity. Material safety data sheets (MSDS), test reports, process documentation, and government and/or commercial technical literature on explosive materials serve as documentation for the characteristics of these materials. In addition, Activity personnel possess extensive knowledge of the explosive materials. Interim or final Department of Defense (DOD) hazard classifications (Class/Division of either 1.1 (mass explosion) or 1.3 (mass fire) are also typically established for most explosive materials used at the Activity.

As a result of the documentation described above, reactive hazardous waste generated from the use of explosive materials are well characterized from existing information and process knowledge. Typically, there is no need to perform waste characterization tests on reactive hazardous wastes or materials contaminated with reactive hazardous wastes prior to treatment. As noted in section C-1g(2)(a), only wastes listed on the "Master List of Materials Acceptable for Treatment at SATTP" (or simple the "Master List", shown in Appendix C-2) may be treated at the SATTP. Wastes listed on the Master List have been assigned an explosive hazard classification and meet the criteria for reactive hazardous wastes.

Hazardous waste codes (in addition to D003) which apply to reactive hazardous wastes treated at SATTP are listed in Appendix C-5. These other codes apply because the reactive hazardous wastes contain toxicity characteristic metals or U-listed chemicals.

C-2b Wastes Which Have Not Been Characterized

The waste analysis plan (WAP) for wastes with unknown properties is described in this section. This WAP is used to: (1) determine if a waste is a reactive hazardous waste as defined by 40 CFR 261 and COMAR 26.13.02, (2) determine the explosive hazard classification, as defined by Department of Defense (DOD) regulations, of reactive hazardous wastes, (3) determine if the residues from the open burning treatment process are reactive hazardous wastes, and (4) determine if the residues are toxicity characteristic hazardous waste in the event they are not reactive.

Explosive properties are characterized, in part, by a series of hazard sensitivity tests which are performed by the manufacturer of the explosive material. These tests can also be performed on-site, if necessary, at Activity laboratories. The hazard classification of an explosive material is based, in part, upon the results of hazard sensitivity testing. An explosive material hazard classification allow the SATTP engineer and operators to establish the quantity of waste that may be treated and to identify the appropriate treatment unit and treatment techniques to employ. In addition, reactive hazardous wastes with different hazard classifications are segregated and treated in separate units.

If a waste is determined not to be a reactive hazardous waste, it cannot be treated at SATTP. Further testing is performed to determine whether the waste is a non-reactive hazardous waste. The procedures which are followed to characterize non-reactive hazardous wastes are described in the Activity's Controlled Hazardous Substance (CHS, i.e., hazardous waste as per RCRA) Facility Permit issued by the Maryland Department of the environment. The CHS Facility Permit is the equivalent of a RCRA, Part B permit. The WAP described herein only concerns reactive hazardous waste and the residues from its treatment.

C-2c Hazard Sensitivity Tests

The purpose of hazard sensitivity testing is to determine the relative hazards associated with the handling and processing of hazardous materials. The data is meaningful only when it is compared to other materials which have been characterized on the same apparatus. The rudimentary hazard sensitivity tests which are performed to determine the relative sensitivity of an explosive material are: impact, sliding friction, and electrostatic discharge. A fourth test, differential scanning calorimetry (DSC), is performed to determine whether energetic materials are present in a sample of unknown material or treatment residues. A brief description of each test is discussed below.

The impact sensitivity test determines the maximum impact energy which will not initiate an explosive material. In this test small samples of the explosive material are exposed to the impact energy of a standard falling weight. The height from which the weight is dropped is varied until the maximum height at which 20 consecutive negative results (i.e., no reaction occurs) are obtained with at least one positive result (i.e., a reaction of some kind) at the next higher height.

The sliding friction test determines the maximum frictional energy which can be applied to an explosive material without causing some type of decomposition reaction. In this test, a sample of an explosive material is placed between a block and a stationary wheel. Pressure is applied to the wheel by a hydraulic ram. A weighted pendulum is then swung from a predetermined position so that it strikes the end of the block causing it to move. The pressure applied to the wheel is varied until the lowest pressure level at which 20 consecutive negative results (i.e., no reaction occurs) are obtained with at least one positive result at the next higher pressure level.

The electrostatic discharge test determines the sensitivity of an explosive material to ignition by the discharge of electrical energy. In this test, electrical energy, which is stored in a charged capacitor, is discharged into a sample of an explosive material. The electrical energy discharged from the capacitor is varied until the lowest energy level at which 20 consecutive negative results (i.e., no reaction occurs) are obtained with at least one positive result at the next higher energy level.

The DSC test determines whether an exothermic reaction (i.e., a reaction characterized by the evolution of heat) occurs when a sample (about 1 to 7 mg) of the subject material is heated at a constant rate. In this test, a sample of the subject material is hermetically sealed within a small aluminum container. The container is then placed within the DSC instrument cell and heated at a rate of 10 degrees C per minute from 20 degrees C to 550 degrees C. The cell is purged with nitrogen gas to vent any gases released from the sample container during the test. The heat flow from the sample is measured and plotted versus temperature. Any exothermic reactions are noted. An exothermic reaction indicates the presence of an energetic material. Energetic materials typically exhibit a characteristic exotherm(s) at a specific temperature or range of temperatures. If no reaction or an endothermic reaction (i.e., a reaction characterized by the absorption of heat) occurs, this indicates that energetic materials are not present.

C-2d Frequency of Analyses [40 CFR 264.13(b)(4) and COMAR 26.13.05.02D(2)]

C-2d(1) Wastes Treated

In almost all cases wastes are characterized by process knowledge prior to treatment. In the event that the physical properties and chemical composition is unknown, it will be sampled and analyzed. If an emergency exists and the wastes cannot be safety sampled, it will be immediately treated.

C-2d(2) Treatment Residues

C-2d(2)(a) Solids

The composition of energetic containing wastes from which ash residue is generated is positively identified prior to treatment. An initial analysis is performed on a sample of ash generated from treatment of a particular PEP item with analytes based on waste composition. If multiple containers of waste are generated from a particular type of waste, multiple analyses are not performed. Only the initial analysis is performed, unless there is reason to suspect that the nature of the ash has changed. Residues from waste generating processes will be reanalyzed whenever a change occurs in a process that is expected to alter waste composition.

C-2d(2)(b) Liquids

Liquids that are removed from treatment units will be sampled on all occasions.

C-2e Additional Requirements for Waste Generated Off-Site [40 CFR 264.13(c) and COMAR 26.13.05.02D(2)]

Wastes from off site sources are not currently accepted for storage or treatment. However, IHDIVNAVSURFWARCEN may accept explosive/reactive wastes for safe storage or treatment from other Naval installations. Wastes accepted from off site sources for treatment are inspected prior to treatment to insure that the wastes received for treatment are as described. In addition, all of the information necessary to comply with the requirements of this section will be submitted. Unknown wastes will not be accepted.

The facility may accept wastes generated off-site at some time in the future. In the event that energetic-containing wastes from off site sources must be treated at the SATTP, information necessary to comply with the requirements of this section and the environmental performance standards will be obtained prior to treatment.

It is not anticipated that analyses will be required for off site materials because only wastes of the types to be covered by this permit (including future modifications thereof) will be accepted for treatment. Section C-1g(2)(a) contains a detailed discussion of why testing of these materials is not necessary. However, all off site wastes will be fully characterized prior to treatment at the SATTP.

Items received for treatment will be examined by experienced military ordinance personnel to assure that items listed on the manifest are the items that are received. The different types of munitions are identifiable by size, weight, shape, color, and markings stamped or stenciled on the article or the shipping container.

Procedures for handling hazardous waste manifests are presented in Section B.

C-2f **Additional Requirements for Ignitable, Reactive or Incompatible Wastes [40 CFR 264.13(b)(6), 264.17, and COMAR 26.13.05.02H]**

All waste materials accepted for treatment in the OB areas must be reactive. The ash residue is considered reactive until proven otherwise because it is the residue from a reactive hazardous waste treatment process. Wherever possible, the explosive and explosive/propellant-contaminated wastes designated for thermal treatment are collected and packaged in the labeled containers at the point of generation. Containers and bulk items of explosive and explosive contaminated wastes are characterized by the generating command on an internal tracking form.

All materials delivered to the SATTP must be accompanied with a Scrap Sheet. These Scrap Sheets are used by the SATTP personnel to determine if the correct item has been sent for treatment, to determine treatment quantities and to identify appropriate treatment units. There is a different Scrap Sheet for each of the six categories of scrap: propellants; explosives; oxidizers; explosive contaminated materials; ignition devices, cartridges and pull tubes; and laboratory wastes. The supervisor of the scrap generating area enters the information onto the computer generated Scrap Sheet for each different category of waste material to be treated. The Scrap Sheet is reviewed by SATTP personnel. If the information on the Scrap Sheet is incorrect or incomplete, the scrap material will be returned to the generator.

IHDIVNAVSURFWARCEN has a Hazardous Materials Safety Program, as described in NAVSEA OP-5, applicable Standard Operating Procedures, and Safety Department directives, that stipulates procedures for properly labeling and packaging explosive and explosive/propellant-contaminated wastes. These documents address the methods for handling the wastes in a safe manner to protect personnel and the environment in the immediate vicinity of the thermal treatment areas. IHDIVNAVSURFWARCEN maintains and enforces the program for all operating departments that use or handle such hazardous substances and manage explosive and explosive/propellant-contaminated wastes. The policy for safe handling of this type of waste is set by the Safety and Operating Departments. The safety program is monitored by Safety Department, Environmental Division, the Property Disposal Office, and all operating department supervisors. The requirements for handling and storage of ignitable, reactive, or incompatible wastes at IHDIVNAVSURFWARCEN are set forth in Section D and Section F-5 of this permit application.

C-2g **Waste Analysis Requirements Pertaining to Land Disposal Restrictions [40 CFR 270.14(b)(3), 264.13, 268.7, 268.8, 268.30, 268.31, 268.32, 268.33, 268.34, 268.41, 268.42, 268.43, 268.50, Part 268 - Appendix I and COMAR and 40 CFR 268.35]**

C-2g(1) **Waste Characterization [40 CFR 264.13(a)(1), 268.7 and COMAR]**

IHDIVNAVSURFWARCEN does not handle first-third or second-third restricted wastes. Third-third restricted wastes are handled at the OB treatment areas (i.e., D003, D004, D005, D006, D007, D008, D009, D030). These wastes are characterized through process knowledge and when necessary sampling and analysis as described in Section C-2 of this permit application. No other restricted wastes are handled at this facility.

C-2g(2) **Notification and Certification Requirements [40 CFR 268.7]**

C-2g(2)(a) **Retention of Generator Notices and Certifications [40 CFR 268.7(a)]**

IHDIVNAVSURFWARCEN retains on-site a copy of all notices, certifications, demonstrations, waste analysis data, and other documentation produced pursuant to the Land Disposal Restriction Regulations and will retain these documents for at least five years from the date the waste was either received on-site for treatment or was sent off-site for further treatment or disposal.

C-2g(2)(b) **Notification and Certification for Wastes to be Further Managed [40 CFR 268.7(b)(6) and COMAR]**

If land disposal restricted wastes or treatment residues of restricted wastes will be further managed at an off site treatment, storage or disposal (TSD) facility, IHDIVNAVSURFWARCEN will submit the applicable notice and/or certification to the receiving TSD in accordance with state and Federal requirements pertaining to the Land Disposal Restrictions. If wastes determined to meet applicable treatment standards are shipped off-site, a notice and certification stating that the waste meets treatment standards will be submitted to the receiving facility. If wastes to be shipped off-site do not meet applicable treatment standards, IHDIVNAVSURFWARCEN will notify the receiving treatment or storage facility in writing of the appropriate treatment standards for the waste. The notice will include the following information:

- EPA hazardous waste number(s).
- The corresponding treatment standard(s).
- The manifest number associated with the shipment of waste.
- Waste analysis data.

The notice and/or certification will be attached to the hazardous waste manifest accompanying the shipment. The notification will include the following information:

- Name and address of the facility receiving the waste shipment.
- Description of the waste as initially generated, including applicable EPA hazardous waste number(s).
- Treatment standards applicable to the waste at the initial point of generation.

The certification will be signed by an authorized representative of IHDIVNAVSURFWARCEN and will state the following:

> "I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d). I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment."

C-2g(2)(c) Notification and Certification for Soft Hammer Wastes Not Subject to California List Prohibitions

IHDIVNAVSURFWARCEN does not handle Soft Hammer wastes at any of the OB treatment areas.

C-2g(2)(d) Additional Notification and Certification Requirements For Treatment Facilities [40 CFR 268.7(b)(4), (5), and (8)]

Wastes with Treatment Standards Expressed as Concentrations [40 CFR 268.7(b)(5)(i)]

IHDIVNAVSURFWARCEN does not treat restricted wastes with treatment standards expressed as waste concentrations in the OB treatment areas.

Wastes with Treatment Standards Expressed as Technologies [40 CFR 268.7(b)(5)(ii)]

If treatment residue from a restricted waste will be sent from IHDIVNAVSURFWARCEN to a land disposal facility, a certification statement following the format set forth in COMAR will accompany the shipment.

California List Wastes Not Subject to Treatment Standards

IHDIVNAVSURFWARCEN does not treat California List wastes by OB.

Recyclable Materials Used in a Manner Constituting Disposal

IHDIVNAVSURFWARCEN does not treat recyclable materials in a manner constituting disposal. All recycled materials are sold as metal scrap.

Additional Notification and Certification Requirements for Disposal Facilities

IHDIVNAVSURFWARCEN does not operate a hazardous waste disposal facility.

Notification and Certification Requirements Pertaining to Landfill and Surface Impoundment Disposal Restrictions

IHDIVNAVSURFWARCEN does not operate a hazardous waste landfill or surface impoundment.

C-2g(3) Additional Requirements Pertaining to Storage of Restricted Wastes [40 CFR 268.50]

C-2g(3)(a) Restricted Wastes Stored in Containers [40 CFR 268.50(a)(2)(i)]

The storage of restricted wastes in containers at IHDIVNAVSURFWARCEN is conducted under the following conditions:

- Such wastes are stored solely for the purpose of accumulating such quantities as necessary to facilitate proper recovery, treatment, or disposal.
- Each container is clearly marked to identify the contents and the date each period of accumulation began.
- Such wastes will not be stored longer than a one year period unless necessary for the purpose of accumulation as necessary to facilitate proper recovery, treatment or disposal.

C-2g(3)(b) Restricted Wastes Stored in Tanks [40 CFR 268.50(a)(2)(ii)]

IHDIVNAVSURFWARCEN does not store restricted wastes in tanks.

C-2g(3)(c) Storage of Liquid PCB Wastes [40 CFR 268.50(f)]

IHDIVNAVSURFWARCEN does not store liquid PCB wastes.

C-2g(4) Additional Requirements for Treatment Facilities [40 CFR 264.13(a)(1), 268.7(b)]

The waste analysis procedures followed by IHDIVNAVSURFWARCEN when treating restricted wastes follow those outlined in Section C-2a above.

C-2g(5) Additional Requirements for Land Disposal Facilities [40 CFR 268.43, 268.7(b)(3)]

IHDIVNAVSURFWARCEN does not operate a land disposal facility.

C-2g(6) Exemptions from and Extensions to Land Disposal Restrictions [40 CFR 268.41, 268.7(b)(1), Part 268 - Appendix I]

IHDIVNAVSURFWARCEN does not handle wastes that are exempted from or have been granted an extension to the LDRs.

C-2g(7) Requirements for Land Disposal Facilities with an Approved Exemption or Extension

This section does not apply to IHDIVNAVSURFWARCEN.

C-3 QUALITY ASSURANCE (QA) [40 CFR 261 - Appendix 3]

Quality assurance (QA) procedures for laboratory analysis of treatment residues will be followed according to the third edition of Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA, SW-846, 1986). The laboratory will use strict chain-of-custody procedures which conform with the EPA requirements contained in SW-846.

SECTION D

PROCESS INFORMATION

D. PROCESS INFORMATION

The Naval Surface Warfare Center Indian Head Division (IHDIVNAVSURFWARCEN) thermally treats propellants, explosives, and pyrotechnics via open burning (OB) at the Strauss Avenue Thermal Treatment Point (SATTP). Section D-8 provides details on each of those miscellaneous hazardous waste treatment units. No other hazardous waste units or systems are operated at the IHDIVNAVSURFWARCEN OB facility, as stated in Sections D-1 through D-7.

D-1 CONTAINERS [40 CFR 270.15 and COMAR 26.13.05.09]

IHDIVNAVSURFWARCEN does not store containers of hazardous waste at the OB facility.

D-2 TANK SYSTEMS [40 CFR 270.16 and COMAR 26.13.05.10]

IHDIVNAVSURFWARCEN does not manage hazardous waste in tank systems at the OB facility.

D-3 SURFACE IMPOUNDMENTS [40 CFR 270.17 and COMAR 26.13.05.11]

IHDIVNAVSURFWARCEN does not manage hazardous waste in surface impoundments at the OB facility.

D-4 WASTE PILES [40 CFR 270.18 and COMAR 26.13.05.12]

IHDIVNAVSURFWARCEN does not manage hazardous waste in waste piles at the OB facility.

D-5 INCINERATORS [40 CFR 270.19 and COMAR 26.13.05.15]

IHDIVNAVSURFWARCEN does not manage hazardous waste in incinerators at the OB facility.

D-6 LANDFILLS [40 CFR 270.21 and COMAR 26.13.05.14]

IHDIVNAVSURFWARCEN does not manage hazardous waste in landfills at the OB facility.

D-7 LAND TREATMENT [40 CFR 270.20 and COMAR 26.13.05.13]

IHDIVNAVSURFWARCEN does not manage hazardous waste in land treatment units at the OB facility.

D-8 MISCELLANEOUS UNITS [40 CFR 270.23 and COMAR 26.13.05.17]

IHDIVNAVSURFWARCEN conducts thermal treatment of reactive hazardous wastes (D003) and materials contaminated with reactive hazardous wastes. These wastes are generated from the production and other use of propellants, explosives and pyrotechnics (PEP). Thermal treatment occurs by open burning (OB) at a facility known as the Strauss Avenue Thermal Treatment Point (SATTP). The SATTP is located at the southern end of the Activity at the terminus of Strauss Avenue. It consists of a 1,100-foot long peninsula that extends into Mattawoman Creek.

Figure B-4 shows a schematic of the SATTP and indicates the location of the Main Point (MP), at the end of the peninsula, and the Auxiliary Thermal Treatment Point (ATTP), on the eastern side of the peninsula. The bulk of reactive hazardous wastes are treated at the MP in units known as burn pans. Explosive hazardous wastes in the form of rocket motors, explosive contaminated solvents, water-wet propellant processing waste, explosive contaminated residual ash, and waste explosive contained with metal components are treated at the ATTP.

The frequency and quantity of reactive hazardous waste treated at SATTP varies from year to year and is partially dependent upon the rate of production at the Activity ordnance plants. In general, as the rate of production increases, the rate of reactive hazardous waste generation and thus the rate of waste treatment increases, and vice versa. Currently, treatment of reactive wastes occurs on a daily basis with up to 9,000 pounds of waste treated per event.

Only reactive hazardous wastes and materials contaminated with reactive hazardous wastes listed on the "Master List of Materials Acceptable for Treatment at SATTP" (or simply the "Master List", shown in Appendix C-2) may be treated at SATTP. Wastes listed on the Master List have been assigned an explosive hazard classification and meet the criteria for reactive hazardous wastes.

Reactive hazardous wastes treated at SATTP can be classified into the following four categories:

(1) Waste propellant, including single-base, double-based, triple-base, composite, composite double-base, fluorocarbon, and nitramine propellants;

(2) waste explosives, including explosive raw materials, such as RDX, nitrocellulose, HMX, or lead azide and explosive formulations, such as: plastic bonded explosive (PBX), stabilized nitrate esters, or solvated nitrated esters;

(3) waste oxidizers contaminated with organics, including contaminated ammonium perchlorate (AP), ammonium nitrate (AN), lithium perchlorate (LP), and potassium perchlorate (KP);

(4) Wastes contaminated with explosives.

D-8a Description of Miscellaneous Units [40 CFR 270.23]

D-8a(1) Description of Reactive Hazardous Wastes [40 CFR 270.23(a) and COMAR 26.13.05.17F]

The SATTP typically treats materials consisting mainly of off-specification production materials, residues, droppings, scrapings, and other byproducts. In addition, outdated ordnance and rework materials may also be thermally treated. A representative list of materials currently acceptable for treatment is included in Appendix C-2. The maximum quantity of wastes that are thermally treated at this site is 9,000 pounds per event. In many instances, it is necessary to add supplemental fuel, such as No. 2 fuel oil or wooden items, to the waste in order to assist in initiating and sustaining effective thermal treatment of the waste.

D-8a(2) Treatment Unit Description [40 CFR 270.23(a) and COMAR 26.13.05.17B(2)]

D-8a(2)(a) SATTP - Main Point

The main thermal treatment point is the area where the bulk of the explosives, propellants, and explosive contaminated solid wastes are thermally treated. Appendix D-1, Drawing 1 shows the location of the SATTP.

There are a total of seven burn pans located at the main point (Appendix D-1, Drawing 2). Pans numbered 1, 2, 3, 4, and 5 are 1.3 burn pans. Appendix D-1, Drawing 3 shows construction details. The 1.3 materials are defined as materials which present predominantly a fire hazard. Pan No. 6 is used as a slum burn pan Appendix D-1, Drawing 4 shows construction details of the 1.3 burn pans. Slummed materials are liquid wastes which have been adsorbed onto sawdust/wood chips, so that no free liquids are present. Pan No. 7 is a 1.1 burn pan (Appendix D-1, Drawing 5). The 1.1 materials are defined by DOD as materials which present an explosive hazard.

1.3 Burn Pans

The 1.3 burn pans are constructed with 1/4-inch steel plate and measure 20 feet long x 8 feet wide x 14 inches deep. A tarp is used to cover the pans when not in use. Each pan has at least 2.75 inches of clay. The pans are placed on cinder blocks and are electrically grounded.

1.1 and Slum Burn Pans

The 1.1 and slum burn pans are constructed of 1/2-inch steel plate and each measures approximately 16 feet long x 8 feet wide x 13 inches deep. A tarp is used to cover the pans when not in use. The 1.1 pan has a 6-inch deep layer of clay maintained as a thermal insulation layer. The pans are electrically grounded.

Special Burn Vessel

The special burn vessel is approximately the same capacity and shape as a 5-gallon can and constructed of carbon steel. This vessel is used to treat small quantities (a few grams to 2 pounds) of reactive wastes which are so sensitive that they cannot be safely stored and must be immediately treated regardless of weather conditions. While the special burn vessel is in use, no other treatment would be taking place at the SATTP.

D-8a(2)(b) SATTP - Auxiliary Thermal Treatment Point (ATTP)

Appendix D-1, Drawing 1 shows the location of the ATTP. The ATTP contains vessels to treat solid and liquid explosive contaminated waste. These include a clay fired burn pan, the solvent thermal treatment vessel, two igniter treatments vessels, 4 unlined pans, one large clay pad, a thrust block, and the special burn vessels. The set-up of the auxiliary point is illustrated in Appendix D-1, Drawing 6.

Maximum allowable limits have been established for each unit for the amount of reactive material that may be treated in each unit and the number of personnel (except the special burn vessel and clay pad) that may be present near the unit. These limits are described in Table D-1.

Solvent Thermal Treatment Vessel

Explosive/propellant-contaminated liquid wastes are treated in the solvent thermal treatment vessel. The solvent thermal treatment vessel is approximately 4 feet in diameter and 3'3" in height. It is constructed of 1/4-inch stainless steel on the sides and has a flat bottom constructed of 1/2-inch stainless steel and an open top. The cover is constructed of 1/10-inch aluminum sheet. It is supported on legs. The solvent vessel is placed inside a secondary containment tray 5'6" long x 5'6" wide x 10" deep constructed of welded 1/4-inch stainless steel plate. The maximum quantity of explosive/propellant-contaminated solvent treated per event is 150 gallons. The solvent thermal treatment vessel is illustrated in Appendix D-1, Drawing 7.

Igniter Thermal Treatment Vessels

Solid explosive/propellant contaminated waste is treated in one of the igniter containment vessels. Each igniter thermal treatment vessel is constructed of carbon steel and is approximately 10' long x 3'4" wide x 2' deep. It is shaped like a semi-cylinder with a 2 1/2-foot radius. There is a steel grating across the top of the semi-cylinder. A igniter thermal treatment vessel is illustrated in Appendix D-1, Drawing 8.

Unlined Pans

Moist solid constituents from motor propellant hog-out and reburns of ash from other thermal treatment units are treated in unlined pans. There are a total of four unlined pans placed end to end. The primary containment pans are constructed of steel 1/4-inch thick for walls and lips and 3/8-inch thick for the bottom, and each measures approximately 10'4" long x 4' wide x 8" deep. A secondary containment pan is constructed of aluminum 1/4-inch thick, 4'4" wide and 12'9" long. Each pan is fit with an aluminum cover 1/4-inch thick and equipped with handles, which can be manually lifted over the primary containment pan and fitted down over its sides. The cover is 11' long x 5' wide with pitched angle tops that add another 3 inches in height. The unlined pans are illustrated in Appendix D-1, Drawing 9.

Container Flashing

Explosive contaminated dumpsters and other containers are also thermally treated by flashing at the auxiliary point on a secondary containment system with clay-like soils. The containers are the primary containment devices. These containers are reused after decontamination.

Clay Pad

Some explosive/propellant-contaminated items, such as rocket motors, are too large to place in a burn pan for thermal treatment. These items are placed on a concrete or clay-like soil pad which serves as the secondary containment system. As the contaminants are trapped in the item, and are not subject to disengagement from the item by gravity, the item itself is considered to be the primary containment system.

Thrust Block

Additionally, as in the case of rocket motors, it may be necessary to attach the item to a concrete thrust block, which is a 30-inch cube with eyelets on top and a restraining bracket on the side to prevent the item from unrestrained movement from the pad. The concrete block is illustrated in Appendix D-1, Drawing 10.

D-8b Procedures to Protect the Environment

D-8b(1) Integrity of Burn Pans

This section addresses the concern that ash or residual wastes may be released from burn pans if they should develop a leak, or should break or crack. Such releases will be minimized through pre-burn and post-burn inspections (see Section F) to determine burn pan integrity. Any deterioration will result in cessation of burning operations in the defective equipment.

D-8b(2) Deterioration or Malfunction Procedures

The most serious deterioration or malfunction during OB would be the loss of integrity, or the development of a leak, in one of the burn vessels. Should an accidental release occur, the released waste materials will be collected and either treated in the next burn (if reactive), in-place if unsafe to be moved to a treatment unit, or taken to a disposal site if non-hazardous. Most of the wastes treated are solids or liquids adsorbed onto solids, which can be easily collected if released. The only exception is liquid wastes treated in the solvent thermal treatment vessel located at the auxiliary point at the SATTP. The solvent vessel is placed on legs and has a secondary containment device. This secondary containment device minimizes the potential of an accidental release onto the ground surface. The unlined pans, and slum pans which treat adsorbed liquids, also have secondary containment pans. If the pre-burn inspection shows that the pan integrity has been compromised, the vessel will not be used. Where post-burn inspections show that the pan is deformed substantially or its integrity has been compromised, it will be taken out of service and replaced. If the pan is replaced, the clay is reused. Additionally, clay-like soil is kept at the SATTP in order to replenish and/or replace any clay lining material in the pans.

TABLE D-1

PROCESS EXPLOSIVE AND PERSONNEL LIMITS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Building	Bay	Personnel	Explosive Limit (lbs)	Comments
Main Burn Area		8	9,000 lbs.	Scrap Disposition and Treatment
Auxiliary Burn Area		5	4,000 lbs.	Overall total Auxiliary Point
Auxiliary Burn Area	Solvent Tank	5	300 gals of explosive-contaminated solvent	Only two persons within 25 feet of tank, when dispensing solvent
Auxiliary Burn Area	Igniter Vessels (2 each)	3	One layer and two cages of Pyrotechnics or 20 Smokey SAM motors	Mk 188 charge cans and Mk 154 igniters, or any combination, shall not exceed 20 units per thermal treatment
Auxiliary Burn Area	Burn Pans	3	1,000 lbs	Prototype burn pan
			500 lbs in four pans	Propellant from hog-out facility (unlined pans)
Auxiliary Burn Area	Thrust Block	3	9 grains (SR-121)	SR-121, MK128, Mk 6, CKU-7 grains MK 25, DEMNS MK 16
			8 chambers/ grains (Mk 25/1Mk 28)	
			28 grains (CKU-7) 4 Motors (DEMNS) 8 grains (MK 16)	

D-8b(3) Prevention of Accumulated Precipitation Within Burn Pans

During non-operational periods the use of tarps and pan covers on pans prevents precipitation from accumulating in the burn units. Each pan cover is equipped with handles to allow operations personnel to move it easily on and off the pans. These covers, the specifications for which are given in Appendix D-1, are tight fitting and remain on the pans during non-operational periods. Tarps are tied down, so as to secure them to the pan to prevent them from being blown off.

If water accumulates in a burning pan, it is removed by pumping the water into a drum, sampled in accordance with procedures outlined in Section C, analyzed in accordance with procedures outlined in Section C, and disposed in accordance with appropriate regulations. The procedures for collecting accumulated liquids are described below.

- Follow general operating procedures (Section D-8g).
- Push solids to sides of pan using a non-metallic rake in order to expose liquid.
- Pump liquid into 55-gallon drums using a diaphragm pump and compressor.
- Place a "Hazardous Waste " label on to each drum. Include accumulation start date and source of liquid.
- Obtain a sample for analysis.
- Transport drums to a less-than 90-day storage area pending test results.
- Obtain test results and contact the environmental coordinator for disposal procedures.

Any accumulated precipitation would not be a reactive waste. If analyses determine that the water is contaminated with explosive constituents, it will be treated in installation wastewater treatment units which treat wastewaters contaminated with explosives/propellants.

D-8b(4) Control of Ejected Waste During Burning

The area in the immediate vicinity of the units are kept free of undergrowth and shrubbery, or other vegetation, such as grass, leaves, as well as other combustible material and glass (and glass particles). If any of this material is present, it is removed prior to a burn activity.

Pre-burn inspections are conducted of the burning vessels to ensure that they have retained their structural integrity. Post-burn inspections are conducted of the area surrounding the for the presence of ejected materials. Any ejected materials will be collected from the burn area and reburned.

D-8c Protection of Human Health and Safety

The operating provisions that will be employed to protect human safety during OB operations include the following:

- Establishment of process explosive and personnel limits (Table D-1).
- Utilization of personnel protective equipment by operating personnel.
- Use of non-sparking tools.
- Establishment of safety-based procedures for classes of materials treated for each unit.
- Clearance of combustionable material (including vegetation) from the treatment area.
- Establishment of operation-specific minimum wait times before personnel can reenter treatment areas after finish of burn(s).
- Requirements that no planes and boats be between the treatment point ant the Sweden Point buoy.
- Inspection Procedures.
- Contingency Plan.

Additional details on procedures designed to protect human health and the environment are described in Section F. Emergency procedures are described in Section G.

D-8d Ash/Residue Management

Ash/residue is generated within the treatment units as a result of the thermal treatment process. Periodically, the ash from the unlined pans and burn pans is collected and placed in labeled steel containers with secured lids. These drums are held in an accumulation area prior to testing and subsequent disposal. The ash is sampled, as discussed in the Waste Analysis Plan (see Section C). All ash from treatment units is taken to the unlined pans for a reburn, if necessary.

D-8e Fire Hazard Minimization

Ejection of energetic material waste during the burn can result in the deposition of hot embers on the ground adjacent to the burn pan. The fire hazard is minimized during open burning by the fact that the treatment units are in the OB area, which has a cleared area around the pans. Section F contains detailed procedures for minimization of fire hazards. Procedures and equipment made available for protection in the unlikely event that an uncontrolled fire starts are discussed in Section G (Contingency Plan).

D-8f Effectiveness of Treatment

Effectiveness of treatment is defined by removal of the reactivity characteristic. The initial check is based on a visual determination that the physical form of the material being treated has been altered by the combustion process. The thermal combustion process will charge solids and liquids to an ash. Presence of ash and the lack of presence of the waste being treated in its initial physical form is confirmation that the reactivity characteristic has been removed.

D-8g Operating Procedures

The sequence of operating procedures at the SATTP are generally performed as follows:

1. Prepare burn area and burn pans. Perform a comprehensive check of safety devices that will be or may be utilized during a burn.

2. Receive explosive and/or explosive/propellant contaminated waste via vehicle transport. Only properly identified, and marked wastes are received for thermal treatment at the SATTP. All waste materials must be on the Master List. If the materials delivered do not meet this criteria, they are returned to the generator for appropriate identification.

3. Load treatment units. Place packaged slums and scrap propellant up to the applicable quantity limit into the appropriate burn vessel. Do not stack materials within the treatment units.

4. Notify the security office dispatcher and the Cast Division office. Immediately (two minutes) before ignition of each thermal treatment event. Clear and check the area and notify appropriate supervisory staff prior to ignition. Verify that communications are in proper working order. Make sure that no boat or air traffic is present in the area between Sweden Point Buoy and the thermal treatment point. Initiate thermal treatment event by remote control.

5. Ignite treatment unit. Add fuel oil/solvents, etc. excelsior if necessary, as combustion aids or fuel sources. Set up the igniter system as applicable for each type of burn vessel. Wait appropriate times to reignite if a partial or complete misfire occurs.

6. Inspect the area surrounding the unit. Following proper waiting times and a temperature check of the ash residual. Untreated residuals if any, are collected, placed in the pan, and retreated at the next scheduled thermal treatment operation.

7. Collect ash/residual. Periodically, ash/residue will be collected from the unlined pans using a nonmetallic shovel after reburn has taken place. The ashes remaining are sampled, and analyzed to determine selected constituents. The disposal method used for these ashes depends on the results of the analysis. Collected ash will be subjected to a TC metals test. If the test determines that the ash is hazardous, it will be managed as hazardous waste, and disposal will be conducted as per NAVOARDSTAINST 5090.2 - Hazardous Waste Management. If the ash does not exhibit the characteristic of toxicity, it will be disposed of in a suitable solid waste disposal facility. Each drum will be covered and placed into a safety-approved storage shed or kept at least 50 feet from any area where burning takes place.

8. Perform patching of burn pans. Verify integrity of burn pans and patch with clay, if necessary. Moisten the clay-like soil surface for safety concerns prior to the next thermal treatment event. Follow prescribed waiting periods following treatment.

9. Replace cover over burn pan(s). The burn pans are kept covered at all times, except during use for thermal treatment.

10. Verify weather conditions. Thermal treatment operations are not to be conducted if there is a projection of inclement weather conditions for the day, unless necessitated by an emergency. Should such inclement conditions (e.g. lightning and thunder) arise after the initiation of preparation steps for thermal treatment, the operations will be halted (any time prior to ignition) and operation personnel are to seek shelter in nearby Building 880. Operations are resumed only after the return of suitable weather conditions.

11. Verify wind speed. Thermal treatment operations are not to be initiated if the wind speed is greater than 30 mph, based on surface anemometer measurement at the SATTP. When wind speeds are in excess of 15 mph, special permission is required from the Cast Division Director prior to commencing thermal treatment operations.

D-8h **Waste Characterization [40 CFR 264.601(a)(1), 264.601(b)(1), and 264.601(c)(1) and COMAR 26.13.D5.02D]**

The chemical and physical characteristics of wastes typically treated in the OB areas are presented in Section C of this permit application. The maximum volume of waste treated at any one time in any treatment unit is based on the net explosive weight (NEW) of the waste being treated. Section C describes the process by which generators add waste materials to the Master List.

D-8i **Demonstration of No Existing Alternate Technologies or Waste Management Options Other Than OB That Provide Adequate Protection of Human Health and the Environment**

The energetic material items treated by OB at IHDIVNAVSURFWARCEN, exhibit the characteristic of reactivity, which classifies them as a hazardous waste (assuming that the intent is to discard a given item, making it a solid waste). Reactive hazardous waste is classified as a D003 waste. Propellants, energetics, and pyrotechnics 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. The inherent safety problems with handling explosives, as reflected by accidents that have occurred at explosive manufacturing and demilitarization facilities, emphasize the need for OB capabilities to routinely demilitarize outdated energetic material items. The OB operation at IHDIVNAVSURFWARCEN serves an important purpose by allowing disposal of ordnance items in an effective and efficient manner that is more environmentally sound than other methods such as land disposal and is less threatening to human health than reclamation of the explosive material in each item following deactivation.

It is not economically feasible to build separate plants to deal with the different categories of wastes that need to be disposed. Additionally, it is not economically feasible nor is it safe to manipulate all of the materials until they are in a form, such as a slurry, that is amenable to disposal in conventional hazardous waste incinerators. None of the individual waste streams have a large enough flow rate to justify efforts to recover or recycle materials. Virgin feed stocks can be produced cheaper and purity controlled better than can recycled or recovered materials. To date no feasible and/or practical alternative use for waste energetic material exists. Commercial explosives are produced too cheaply for the waste products to be viable alternatives. Inadequate storage space exists to store materials until sufficient quantities exist to operate waste specific facilities. In other words, wastes must be disposed of as they are generated if IHDIVNAVSURFWARCEN is to continue to operate. There exists no facility that will accept and destroy the energetic wastes. If such a facility existed IHDIVNAVSURFWARCEN would be unable to ship much of the wastes since they are inherently dangerous and have no transportation classification. The liability of shipping such material would be unacceptable. Efforts have been underway for a number of years and are ongoing to minimize every waste stream.

Over the past fifteen years Cast Division personnel have followed developments within the industry. As solutions were developed for specific industrial problems the solutions have been evaluated in regards to the technologies applicable to IHDIVNAVSURFWARCEN problems. IHDIVNAVSURFWARCEN has followed the efforts of the Joint Commanders Group and the JANNAF subcommittee as they studied the disposal problem and evaluated candidate technologies. Lately the disposal of strategic missiles has become of prime importance and these efforts are being monitored.

Nevertheless, the U.S. Navy and the other branches of the U.S. military have been actively involved in several investigations of alternative treatment technologies for the safe disposition of waste explosives. These include literature searches and subsequent evaluation of possible technologies and investigation of possible waste explosive use and reuse alternatives. In addition, the U.S. Navy is actively conducting programs in alternative treatment and reuse technologies.

IHDIVNAVSURFWARCEN along with the International Technology Corporation, IT, is now actively developing a concept for a Confined Burn Facility which is intended to replace the SATTP. This concept will be tested on a sub-pilot scale within the next two years. If successful, pilot scale testing will take place which can lead to a Military Construction Project projected for completion at the turn of the century.

Appendix D-2 contains a summary of evolving treatment technologies for reactive energetic containing wastes. As new treatment technologies become available, a "best available control" technology analysis will be conducted by the U.S. Navy on a munition-by-munition and energetic-material case-by-case basis to determine whether OB or some alternative disposal process should be applied.

D-8j **Facility Operating Record [40 CFR 264.73 and COMAR 26.13.05.05D]**

A written operating record will be kept at IHDIVNAVSURFWARCEN for OB hazardous waste treatment activities. This record will consist of the following elements and will be kept until the facility is closed.

D-8j(1) Waste Description/Quantities/Treatment [40 CFR 264.73(b)(1) and COMAR 26.13.05D(2)(a)]

A record will be maintained of the description and quantity of each waste received for treatment, as well as the method and date of each treatment. This information will be obtained from the waste characterization procedures described in Section C. The IHDIVNAVSURFWARCEN Environmental Department will maintain records on the description and quantity of wastes received and the treatment method.

D-8j(2) Waste Location Information [40 CFR 264.73(b)(2) and COMAR 26.13.05.05D(2)(b)]

Waste will be treated immediately upon receipt at the SATTP area, so it is not necessary to provide waste location information. The OB facilities are not disposal facilities. Based on these considerations, it is not necessary to record location. However, all OB treatment will take place in areas designated for each type of waste.

D-8j(3) Waste Analysis Records [40 CFR 264.73(b)(3) and COMAR 26.13.05.05D(2)(c)]

Records and results of waste analysis will be kept by the IHDIVNAVSURFWARCEN Environmental Department. This list of approved wastes (Appendix C-2) contains information on the energetic composition of approved items. Waste composition information obtained in the process of evaluating additional items for treatment at the OB facilities will be added to this appendix.

D-8j(4) Contingency Plan Incidents [40 CFR 264.73(b)(4) and COMAR 26.13.05.05D(2)(d)]

Reports on incidents requiring implementation of the contingency plan will be made, as described in Section G-8. A record of these reports will be kept at the facility.

D-8j(5) Inspection Record [40 CFR 264.73(b)(5) and COMAR 26.13.05.05D(2)(e)]

Records and results of all inspections will be kept for 3 years. Section F-2 describes the general inspection procedures and contains the inspection forms.

D-8j(6) Corrective Action and Monitoring Analysis Results [40 CFR 264.73(b)(6) and COMAR 26.13.05.05D(2)(h)]

A record of any monitoring and analytical results, and corrective action will be maintained.

D-8j(7) Notices to Generators [40 CFR 264.73(b)(7) and COMAR 26.13.05.05D(2)(f)]

IHDIVNAVSURFWARCEN does not currently receive waste shipments from any non-DOD off-site generators. In the event such shipments are received, the notification requirements in COMAR 26.13.05.05D(2)(f) relating to possession of the required permits will be met.

D-8j(8) Closure Cost Estimates [40 CFR 264.73(b)(8) and COMAR 26.13.05.05D(2)(g)]

IHDIVNAVSURFWARCEN is a Federal facility and is therefore exempt from requirements to prepare a closure-cost estimate.

D-8j(9) Waste Minimization Certification [40 CFR 264.73(b)(9) and COMAR 26.13.05.05D(2)(i)]

An annual certification will be made that a program is in place to reduce the volume and toxicity of hazardous waste generated to the degree determined to be practicable from the standpoint of economics and safety. The certification will also include a statement that the treatment by OB is the only practicable method currently available to minimize present and future threats to human health and the environment.

D-8j(10) Reports [40 CFR 264.73(b)(10) and COMAR 26.13.05.05H]

IHDIVNAVSURFWARCEN will submit the following reports covering hazardous waste activities at the facility:

Responsible Agency	Form Number	Title/Description
EPA	8710-16(10/91)	Inventory of Federal Hazardous Waste Activities at Currently Owned or Operated Federal Facilities
EPA	PS	Waste Treatment, Disposal, or Recycling Process System
COMAR	EPA 9020	Facility Annual Hazardous Waste Report [COMAR 26.13.05.05F]
COMAR	None	Unmanifested Waste Report [COMAR 26.13.05.05G]*
COMAR	None	Groundwater Contamination and Monitoring Data Report [COMAR 26.13.05.05H(2)]
COMAR	None	Facility Closure [COMAR 26.13.05.05H(3)]

* IHDIVNAVSURFWARCEN does not receive hazardous wastes, which require manifests, from off site at the present time.

D-8j(11) Additional Reports [40 CFR 264.73(b)(10) and COMAR 26.13.05.05H]

Additional reports will be submitted as required, including reports requiring implementation of the contingency plan and closure certifications.

SECTION E-1

OVERVIEW OF
ENVIRONMENTAL PERFORMANCE STANDARDS

E-1 OVERVIEW OF ENVIRONMENTAL PERFORMANCE STANDARDS [CFR 270.23 AND COMAR 27.13.07.02E(8)]

Waste management regulations described in 40 Code of Federal Regulations (CFR) 264, 40 CFR 270, Code of Maryland Regulations (COMAR) 26.13.05.07, and COMAR 23.13.07.02 require that RCRA permits for miscellaneous units contain such terms and conditions as necessary to protect human health and the environment. Protection of human health and the environment includes:

- Prevention of any releases that may have an adverse effect on human health and the environment due to migration of waste constituents in the groundwater or subsurface environment.

- Prevention of any releases that may have adverse effects on human health and the environment due to migration of waste constituents in surface water or wetlands or on the surface soil.

- Prevention of any release that may have adverse effects on human health or the environment due to migration of waste constituents in the air.

The OB facilities at IHDIVNAVSURFWARCEN located at Strauss Avenue Thermal Treatment Point (SATTP) are subject to the Subpart X standards of U.S. EPA 40 CFR 264 and COMAR 23.13.07.02.

Discussions provided in previous sections of this permit application, including facility descriptions in Section B, waste characteristics in Section C, and process descriptions in Section D, have been provided to describe the general site characteristics, chemical characteristics of the reactive wastes to be treated, along with process design and operating procedures as required by the regulations covering each of the above pathways. All of the terms and provisions imposed by the information contained in these previous sections have been applied to the evaluation of each of the environmental pathway analyses described in detail in the following subsections of E. Sections following E then describe inspection requirements and responses to releases (F and G) followed by other pertinent information (training in H; closure in I; and SWMUs in J) completing the environmental performance standard demonstration requirements for this permit application.

The remainder of Section E describes the detailed environmental pathway characterizations and analyses conducted within the overall environmental performance standard framework specified in the Subpart X miscellaneous units regulations. Where applicable, conceptual approach sections, figures, and flowcharts have been provided to more clearly illustrate IHDIVNAVSURFWARCEN's specific environmental compliance approach. A brief description of the structure of Section E is provided below.

The information in Section E describes the evaluation of effects of OB emissions to the environment and on human health and the derivation of proposed environmental performance standards for OB treatment operations.

Section E-2, titled "Human Health and Environmental Criteria," describes potentially applicable regulatory standards and criteria for various environmental media. These criteria were used in assessing the effects of OB emissions on human health and the environment and benchmarks to determine whether adverse effects to human health and the environment may potentially occur. Exceeding these criteria establishes a need for risk analysis.

Section E-3, titled "Air Pathway Assessment", describes the potential emissions from OB operations as controlled by site SOPs and other conditions described in Section D, and analyzes potential impacts on receptors with respect to applicable criteria described in Section E-2. Potential effects of OB emissions through the air pathway have been analyzed using numerous computer modeling studies. Assumptions and specific modeling techniques used in evaluating the potential effects of OB emissions on human health and the environment are provided in the text with supporting documentation in the appendices.

Section E-4, titled "Groundwater Monitoring," contains a detection monitoring program for groundwater to obtain groundwater samples and site-specific hydrogeologic information at the OB facilities.

Section E-5, titled "Subsurface Pathways Assessment," will be submitted at a later date. This section will be submitted after field data required for model input is obtained. This section will describe the potential emissions from OB operations as controlled by site SOPs and other conditions described in Section D and will analyze potential impacts on receptors with respect to the applicable criteria described in Section E-2. Potential effects of OB/OD emissions through the subsurface pathway will be evaluated utilizing multimedia computer modeling studies. Assumptions and specific modeling techniques used in evaluating the potential effects of OB/OD emissions on human health and the environment will be provided in the text with supporting documentation in the appendices.

Section E-6, titled "Surface Pathways Assessment," will be submitted at a later date. This section will be submitted after field data required for modeling input is obtained. This section will describe the potential emissions from OB/OD operations controlled by site SOPs and other conditions described in Section D and will contain the evaluation of potential impacts on receptors with respect to the criteria described in

Section E-2. Potential effects of OB/OD emissions through the surface pathway will be evaluated using multimedia computer modeling techniques. Assumptions and specific modeling techniques used in evaluating the potential effects of OB/OD emissions on human health and the environment will be provided in the text with supporting documentation in the appendices.

SECTION E-2

HUMAN HEALTH AND ENVIRONMENTAL CRITERIA

E-2 HUMAN HEALTH AND ENVIRONMENTAL CRITERIA

This section summarizes available health and environmental criteria and regulatory standards or the major energetic material constituents and potential emissions associated with open burning (OB) operations at IHDIVNAVSURFWARCEN. A compilation of energetic material chemical constituents and contaminated materials involved with OB operations at IHDIVNAVSURFWARCEN is provided in Table E-2-1. The potential emissions released into the environment from OB events can include the following emission groups:

- Unreacted energetic contaminated materials
- Unreacted energetic constituents
- Products of combustion

Health and environmental criteria for the chemical constituents of energetic material and potential products of OB combustion can be found in Federal and state regulations and technical guidance. The list of health and environmental criteria associated with OB emissions to the ambient air is provided in Tables E-2-2 through E-2-4 and in Table E-3-5 (Section E-3).

The list of the potential emission constituents was generated based on the following information:

- Waste composition data
- POLU-11 modeling
- Literature studies of OB emissions

Once the list of chemicals that might be emitted was developed, potentially applicable regulatory standards and criteria were identified. These standards/criteria include National Ambient Air Quality Standards (NAAQS), proposed Resource Conservation and Recovery Act (RCRA) Action Levels, Clean Water Act Ambient Water Quality Criteria (AWQC) for the protection of aquatic life and human health, Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs), and United States Environmental Protection Agency (U.S. EPA) Drinking Water Health Advisories (HAs).

A summary of the regulatory standards/criteria that are potentially applicable to OB activities at IHDIVNAVSURFWARCEN is provided as Table E-2-2. This table identifies applicable criteria for representative release constituents for OB that were used to evaluate potential human health and environmental impacts.

In addition, "reference concentrations" were developed for energetics (propellants/explosives) for which toxicity information is available. The methodology and detailed calculations used to develop these "reference concentrations" are contained in Appendix E-2-1. Reference concentrations were derived for air, water, and soil based on published dose-response parameters, including Reference Doses and Cancer Slope Factors. The Reference Doses and Cancer Slope Factors are summarized in Table E-2-3. The derived reference concentrations are presented in Table E-2-4.

The majority of the health and environmental standards/criteria presented in Table E-2-2 are based on protection of human rather than environmental receptors. The reasons for this are twofold. First, with the exception of the AWQC for the protection of aquatic organisms, standards and criteria for the protection of environmental receptors have not been developed to date. Second, human receptors are generally the most sensitive receptors considered, and concentrations protective of human health are expected to be protective of environmental receptors as well. Comparison of the AWQC for the protection of human health with the AWQC for protection of aquatic organisms from acute and chronic effects provides evidence to support this assertion.

A detailed discussion of each of the regulatory standards/criteria is provided in the subsections that follow. Section E-2-3 provides details regarding the derivation of the reference concentrations.

TABLE E-2-1

MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
INDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Energetic Material	Group
1,1'-(1,3,5-benzenetriyltricarbonyl tris[2-ethylaziridine])	EC
1,1'-(1,3-phenylenedicarbonyl)-bis(2-methyl-aziridine)	EC
1,1,1-tris(hydroxymethyl)propane	EC
1,2,4-butanetriol trinitrate	EC
2-ethylaziridine (1,2-butylene imine)	EC
2-ethylhexyl acrylate	EC
2-methylaziridine (propylene imine)	EC
2-nitro-1,2,4-triazol-5-one	EC
2-nitrodiphenylamine	EC
2,2'-methylene-bis-(4-methyl-6-tertbutyl-phenol)	EC
2,4-toluene diisocyanate	EC
4-nitrodiphenylamine	EC
4,4'-methylenebis(1,6-ditert-butylphenol)	EC
a-butyl stearate	EC
Acetyl triethyl citrate	EC
Acetyl triethyl nitrate	EC
Agerite white	EC
Ammonium nitrate	EC
Ammonium perchlorate	EC
Ammonium picrate	EC
Barium nitrate	EC
Basic lead carbonate	EC
Bi(butylcarbitol)formal	EC
Biphenyl bismuth	EC
Bis(butylcarbite)formal	EC
Black powder	EC
Butyl carbitol formal	EC
Butyl rubber	EC
Candellila wax	EC
Carboxyl terminated polybutadiene	EC

TABLE E-2-1
MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

Energetic Material	Group
Carboxyl terminated polybutadiene nitrile	EC
Cellulose acetate butyrate	EC
Cobalt(III)acetylacetonate	EC
Cotton	EC
Cyclodextrin nitrate	EC
Cyclotetramethylene	EC
Cyclotetramethylenetetranitramine (HMX)	
Cyclotrimethylene-trinitramine (RDX)	EC
DETA	EC
Di(2-hydroxyethyl)dimethyl-hydentoin	EC
Di-n-propyl adipate	EC
Di-n-propyladipate	EC
Diatomaceous earth	EC
Dibutyltin dilaurate	EC
Dibutyltin sulfide	EC
Dicyclohexylmethane-3,4'-diisocyanate	EC
Diethylphthalate	EC
Difunctional epoxy resin	EC
Diisocyanates	EC
Dinitrophenoxy ethanol	EC
Dinitrotoluene	EC
Dioctyl maleate	EC
Dioctyl sebacate	EC
DMMBP	EC
Dinitronaphthalene (DNN)	EC
Ethylene diamine dinitrate	EC
Ferric acetyl acetonate	EC
Ferric ammonium ferricyanide	EC
Flexamine	EC
Glycidyl ether of glycerine (epoxy resin)	EC
Glycol ethers	EC

TABLE E-2-1
MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 3

Energetic Material	Group
Hydroxyl terminated polybutadiene	EC
Imine curing agents	EC
Isopherone diisocyanate	EC
Laminac	EC
Lauryl methacrylate	EC
Lead azide	EC
Lead beta resorcylate	EC
Lead stearate (added)	EC
Lead styphnate	EC
Lead tribasic maleate monohydrate	EC
Lead-2-ethylhexoate	EC
Lecithin	EC
Manganese delay	EC
Motriol trinitrate	EC
Magnesium teflon viton (MTV)	EC
n-hexyl carborane	EC
n-lead ß-resorcylate	EC
n-phenol morpholine	EC
n-phenyl-b-naphthylamine	EC
n-vinyl-2-pyrrolidine	EC
Naphthenic distillate	EC
Nitranol	EC
Nitric oxide	EC
Nitrocellulose	EC
Nitroglycerin	EC
Nitroguanidine	EC
Nitrosylsulfuric acid	EC
Octodecyl isocyanate	EC
PDDP	EC

TABLE E-2-1
MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 4

Energetic Material	Group
Pelletized nitrocellulose	EC
Pentaerythrite tetranitrate	EC
Pentaerythrol tetranitrate (PETN)	EC
Phenol	EC
Phenolic resin	EC
Phenyl diisodecyl phosphite	EC
Polybutadiene	EC
Polycaprolactone	EC
Polyethylene glycol	EC
Polyglycol adipate	EC
Polymethylene polyphenyl-isocyanate	EC
Polypropylene	EC
Potassium nitrate	EC
Potassium salicylate	EC
Propylene glycol dinitrate	EC
Pyridine	EC
Resorcinol	EC
Salicylic acid	EC
Sodium barbiturate	EC
Sodium nitrate	EC
Sugar	EC
Sulfur	EC
t-butyl hydroperoxide	EC
t-butyl perbenzoate	EC
t-butyl pyrocatechol	EC
TBK	EC
Tepanol	EC
Tertiary butyl-2-ethylhexanoate	EC
Tetracene	EC

TABLE E-2-1
MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 5

Energetic Material	Group
Tetranitrodibenzo-1,3a,4,6a-tetraza-pentalene (TACOT)	EC
Titanium hydride perchlorate	EC
TMXDI	EC
Toluene-2,4-diamine	EC
Tri-phosphite	EC
Triethylene glycol dimethacrylate	EC
Triethylene glycol dinitrate	EC
Triethylene glycol trinitrate	EC
Triethylenetriamine	EC
Trifunctional epoxy resin	EC
Trinitrophenylmethylnitramine	EC
Trinitrotoluene	EC
Triphenyl bismuth	EC
Tris(2-methyl-1-aziri-dinyl)phosphine oxide	EC
Tungsten delay	EC
Vistanex (CAS #9803-27-4)	EC
Zirconium nickel delay	EC
1-acetyloctahydro-3,5,7-trinitro-1,3,5,7-tetrazocine	MC
1,1,1-trichloroethane	MC
Acetic acid	MC
Acetic anhydride	MC
Acetone	MC
Acetonitrile	MC
Acetylhexahydrodinitrotriazine	MC
Aluminum powder	MC
Aminodinitrobenzofuroxan	MC
Ammonium dichromate	MC
Azidoethanol	MC
Barium styphnate	MC
Benzoyl peroxide	MC

TABLE E-2-1
MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 6

Energetic Material	Group
Bis(2,2-dinitropropyl)acetal/formal	MC
Bis(2,2,2-fluorodinitrotriethyl)formal (FEFO)	MC
Butyl acetate	MC
Butyl alcohol	MC
Butyl hydroperoxide	MC
Carbon tetrachloride	MC
Catocene	MC
Cellulose acetate	MC
Chloroform	MC
Chloroprene	MC
Cumene hydroperoxide	MC
Cyclohexane	MC
Dibutyl phthalate	MC
Dibutyl sebacate	MC
Dichloroethane	MC
Diethylene glycol dinitrate	MC
Dimethyl sulfoxide	MC
Dimethylbenzene hydroperoxide	MC
Dimethylformamide	MC
Dinitrofumarate	MC
Dinitropentanoate	MC
Dioctyl adipate	MC
Dioxane	MC
Diphenylamine	MC
Ethanol amine	MC
Ethyl acetate	MC
Ethyl alcohol	MC
Ethyl cellulose	MC
Ethyl centralite	MC
Ethyl lactate	MC

TABLE E-2-1
MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 7

Energetic Material	Group
Ethylene glycol	MC
Ethylene glycol monomethyl ether	MC
Formaldehyde	MC
Glycerin	MC
Glycidyl azide polymer	MC
Heptane	MC
Hexane	MC
Hexanitrohexaazaisowurtzitane	MC
Hexanitromurzitane	MC
Hexanitropiperazine	MC
Hexanitropyrazine	MC
Hexanitrostilbene	MC
High bulk density nitroguanidine	MC
Hydroxyl ammonium perchlorate	MC
Hydroxylammonium nitrate	MC
Isodecyl pelargonate	MC
Isodecylpherone	MC
Isopropanol	MC
Lithium perchlorate	MC
Maleic anhydride	MC
Methanol	MC
Methyl ethyl ketone	MC
Methyl isobutyl ketone	MC
Methylene chloride	MC
Mineral oil	MC
Nitric acid	MC
Nitrogen dioxide	MC
Nitromethane	MC
Nitropropane	MC
Potassium permanganate	MC
Propylene oxide	MC

TABLE E-2-1
MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 8

Energetic Material	Group
Styphnic acid	MC
Sulfuric acid	MC
Tetrahydrofuran	MC
Tetranitropyrazine	MC
Tetryl	MC
Titanous chloride	MC
Toluene	MC
Triacetin	MC
Triaminoguanidine nitrate	MC
Triaminotrinitrobenzene	MC
Trichloroethane	MC
Trichloroethylene	MC
Triethanol ammonium nitrate	MC
Triethanolamine	MC
Trimethyloelthane trinitrate	MC
Trimethylol propane	MC
Trinitrotribromobenzene	MC
Xylene	MC
Aluminum	MI
Aluminum oxide	MI
Antimony sulfide	MI
Barium chromate	MI
Boron Potassium Nitrate ($BKNO_3$)	MI
Black carbon	MI
Boron	MI
Calcium chromate	MI
Calcium silicide	MI
Carbon	MI
Carbon black	MI
Cerium oxide	MI
Charcoal	MI

TABLE E-2-1
MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 9

Energetic Material	Group
Cobalt naphthenate	MI
Cryalite (Na3AlF6)	MI
Cupric salicylate	MI
Ferric oxide	MI
Graphite	MI
Iodine	MI
Iron oxide	MI
Lead chromate	MI
Lead nitrate	MI
Lead oxide (Pb02)	MI
Lead salicylate	MI
Magnesium	MI
Magnesium oxide	MI
Manganese	MI
Monobasic cupric ß-resorcylate	MI
Monobasic cupric salicylate	MI
Potassium chlorate	MI
Potassium perchlorate	MI
Potassium sulphate	MI
Silica (hydrophobic)	MI
Stannous octonate	MI
Sulfur dioxide	MI
Teflon	MI
Titanium	MI
Titanium dioxide	MI
Tungsten	MI
Yellow iron oxide	MI
Zinc powder	MI
Zirconium	MI
Zirconium carbide	MI
Zirconium oxide	MI

TABLE E-2-1
MAJOR CHEMICAL CONSTITUENTS
OF TREATED ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 10

Energetic Material	Group
Zirconium-nickel alloy	MI
ZrKCl04 (ZKG)	MI

EC: Energetic Materials Constituent (including Non-Energetic Components of Formulations)
MC: Materials Contaminated by Energetics
MI: Metals and Inorganics in Energetic Formulations

TABLE E-2-2

REGULATORY STANDARDS/CRITERIA FOR POTENTIAL CHEMICALS OF CONCERN IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Chemical	Standard/Criteria								
	NAAQS[1] ($\mu g/m^3$)	RCRA Action Levels[2]			AWQC ($\mu g/L$)[3]				MCLs & Health Advisories[4] (mg/L)
		Air ($\mu g/m^3$)	Water ($\mu g/L$)	Soil ($\mu g/kg$)	Freshwater Life		Human Health		
					Fish	Fish/Water	Acute	Chronic	
Energetic Materials									
Cyclotrimethylene-tetranitramine (HMX)									20 (HA)
Cyclotrimethylene-trinitramine (RDX)									0.4 (HA)
Nitroguanidine									40 (HA)
Trinitrotoluene									0.02 (HA)
Aromatics									
Dinitrotoluene			0.00005	1					
Diphenylamine			0.9	2,000					
Phenol			20	50,000	1.0E+1	2.6E+0	4.6E+3	2.1E+1	20 (HA)
Toluene		7,000	10	20,000	1.8E+1		2.0E+2	6.8E+0	1
o-Xylene		1,000	70	200,000					10
m-Xylene		1,000	70	200,000					10
p-Xylene		1,000	70	200,000					10
Metals and Inorganics									
Aluminum									0.05 (S)
Antimony			0.01	30	9.0E+0	1.6E+0	4.3E+0	1.4E-2	0.006
Barium		0.4	2[8]	4,000					1
Chromium[5]		0.00009	0.1[6]	400	2.1E-2	2.9E-4	6.7E+2[7]	3.3E+1[7]	0.05

Chemical	Standard/Criteria								
	NAAQS[1] ($\mu g/m^3$)	RCRA Action Levels[2]			AWQC ($\mu g/L$)[3]				MCLs & Health Advisories[4] (mg/L)
		Air ($\mu g/m^3$)	Water ($\mu g/L$)	Soil ($\mu g/kg$)	Freshwater Life		Human Health		
					Fish	Fish/Water	Acute	Chronic	
Metals and Inorganics (continued)									
Copper					1.8E-2[9,12]	1.2E-2[9,12]			1.3
Iron									0.3 (S)
Lead	1.5 (Qtly Avg)		0.015	500[10]	8.2E-2[9,12]	3.2E-3[9,12]			0.05
Nickel			0.7	2,000	1.4E+0[9,12]	1.6E-1[9,12]	4.6E+0	6.1E-1	0.1 (R)
Zinc					1.2E-1[9,12]	1.1E-1[9,12]			10 (HA)
Gaseous Constituents									
Carbon monoxide	10,000 (8 hr) 40,000 (1 hr)								
Hydrogen cyanide			0.7	2,000					
Nitric oxide			4	8,000					
Nitrogen dioxide	100 (Annual)		40	80,000					
Ozone[11]	235 (1 hr)								
Particulates (PM10)	50 (Annual) 150 (24 hr)								
Sulfur dioxide	80 (Annual) 365 (24 hr) 1300 (3 hr)								

(1)	National Ambient Air Quality Standards.
(2)	Proposed Resource Conservation and Recovery Act Subpart S Action Levels (U.S. EPA, July 27, 1990).
(3)	Clean Water Act Ambient Water Quality Criteria (U.S. EPA, November 1980). Human health values based on consumption of fish and consumption of fish/water.
(4)	Safe Drinking Water Act Maximum Contaminant Levels and U.S. EPA Drinking Water Health Advisories (U.S. EPA, April 1991).
(5)	Hexavalent chromium (VI) unless noted otherwise.
(6)	Hexavalent chromium (VI) - Value reported in error as 0.05 mg/L in 55 Federal Register 145 (U.S. EPA, July, 1990).
(7)	Trivalent chromium (III) - Primary species in surface water environments.
(8)	MCL for Barium reported in error as 1 mg/L in 55 Federal Register 145 (U.S. EPA, July, 1990).
(9)	Criteria based on a hardness of 100 mg/L.
(10)	Concentration noted to result in increased blood levels in children (U.S. EPA, June 1989).
(11)	Ozone emissions are not directly associated with OB operations; however OB emissions of nitrogen oxides and volatile organic compounds are precursors of ozone formation.
(12)	Expressed as a function of total hardness (100 mg/L as $CaCo_3$).
(HA)	Drinking Water Health Advisory.
(R)	Being remanded.
(S)	Secondary MCL.

TABLE E-2-3

DOSE-RESPONSE PARAMETERS
ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Potential Chemical of Concern[1]	Absorption Factor (Percent)	Reference Dose (mg/kg/day)		Cancer Slope Factor $(mg/kg/day)^{-1}$		Source
		Oral	Inhalation	Oral[2]	Inhalation[2]	
RDX	5	3×10^{-3}	2×10^{-4}	1.1×10^{-1} (C)	2.2×10^{0} (C)	1
HMX	5	5×10^{-2}	3×10^{-3}	--	--	2
TNT	60	5×10^{-4}	3×10^{-4}	3.0×10^{-2} (C)	5.0×10^{-2} (C)	3
NG	50	5×10^{-2}	3×10^{-2}	1.7×10^{-2} (C)	3.4×10^{-2} (C)	4
DIMP	80	8×10^{-2}	6×10^{-2}	--	--	5
DNT	60	1×10^{-3}	6×10^{-4}	6.8×10^{-1} (B)	1.1×10^{0} (B)	6
DNB	60	1×10^{-4}	6×10^{-5}	--	--	7
NQ	100	1×10^{-1}	1×10^{-1}	--	--	8
Tetryl	60[3]	1×10^{-2}	6×10^{-3}	--	--	6

(1) RDX - Cyclotrimethylenetrinitramine
HMX - Cyclotetramethylenetetranitramine
TNT - Trinitrotoluene
NG - Nitroglycerine
DIMP - Diisopropyl methylphosphonate
DNT - 2,4- and 2,6-Dinitrotoluene
DNB - 1,3-Dinitrobenzene
NQ - Nitroguanidine
Tetryl - Trinitrophenylmethylnitramine

TABLE E-2-3
DOSE-RESPONSE PARAMETERS
ENERGETIC MATERIALS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE TWO

(2) The parenthetical alphabetical character designations indicate the U.S. EPA Weight-of-Evidence for Carcinogenicity (for additional clarification, see Section E-2-4C).

(3) Absorption factor assumed based on structural similarity to TNT.

(C) - Chemical is considered a Group C carcinogen

(B) - Chemical is considered a Group B carcinogen

Sources:

1. U.S. EPA, January 1991. Health Effects Assessment Summary Tables, Annual FY-1991. 9200.6-303 (91-1). Office of Emergency and Remedial Response. U.S. EPA, November 1988. Health Advisory for Octahydro-1,2,5,7-Tetranitro-1,2,5-Triazine (HMX). Office of Drinking Water

2. U.S. EPA, July 1991. Integrated Risk Information System. On-line Data Base; U.S. EPA, November 1988. Health Advisory for Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX). Office of Drinking Water.

3. U.S. EPA, January 1991. Health Effects Assessment Summary Tables, Annual FY-1991. 9200.6-303 (91-1). Office of Emergency and Remedial Response. U.S. EPA, January 1989. Health Advisory for Trinitrotoluene. Office of Drinking Water.

4. U.S. EPA, September 1987. Health Advisory for Trinitroglycerol. Office of Drinking Water.

5. U.S. EPA, July 1991. Integrated Risk Information System. On-line Data Base; U.S. EPA, January 1989. Health Advisory for Diisopropyl Methylphosphonate (DIMP). Office of Drinking Water.

6. U.S. EPA, January 1991. Health Effects Assessment Summary Tables, Annual FY-1991. 9200.6-303 (91-1). Office of Emergency and Remedial Response.

7. U.S. EPA, January 1991. Health Advisory for 1,3-Dinitrobenzene. Office of Drinking Water.

8. U.S. EPA, May 1990. Health Advisory for Nitroguanidine. Office of Drinking Water.

Notes:

Reference Doses - inhalation (RfD_{inh}) = $RfD_{oral} \times \frac{\text{Absorption Factor}}{100}$

Cancer Slope Factor - inhalation (CSF_{inh}) = $CSF_{oral} \times \frac{100}{\text{Absorption Factor}}$

TABLE E-2-4

CALCULATED REFERENCE CONCENTRATIONS FOR POTENTIAL CHEMICALS OF CONCERN IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Potential Chemical of Concern[1]	Noncarcinogenic Effects[2]			Carcinogenic Effects		
	Soil (mg/kg)	Water (mg/L)	Air (mg/m^3)	Soil (mg/kg)	Water (mg/L)	Air (mg/m^3)
RDX	$2.1x10^{3}$	$1.0x10^{-1}$	$6.9x10^{-4}$	$6.4x10^{1}$	$3.2x10^{-3}$	$1.6x10^{-5}$
HMX	$3.5x10^{4}$	$1.7x10^{0}$	$1.0x10^{-2}$	-	-	-
TNT	$3.5x10^{2}$	$1.7x10^{-2}$	$1.0x10^{-3}$	$2.3x10^{2}$	$1.2x10^{-2}$	$7.0x10^{-4}$
NG	$3.5x10^{4}$	$1.7x10^{0}$	$1.0x10^{-1}$	$4.2x10^{2}$	$2.1x10^{-2}$	$1.0x10^{-3}$
DIMP	$5.5x10^{4}$	$2.8x10^{0}$	$2.1x10^{-1}$	-	-	-
DNT	$6.9x10^{2}$	$3.5x10^{-2}$	$2.1x10^{-3}$	$1.0x10^{0}$	$5.1x10^{-5}$	$3.2x10^{-6}$
DNB	$6.9x10^{1}$	$3.5x10^{-3}$	$2.1x10^{-4}$	-	-	-
NQ[1]	$6.9x10^{4}$	$3.5x10^{0}$	$3.5x10^{-1}$	-	-	-
Tetryl	$6.9x10^{3}$	$3.5x10^{-1}$	$2.1x10^{-2}$	-	-	-

(1) RDX - Cyclotrimethylenetrinitramine
HMX - Cyclotetramethylenetetranitramine
TNT - Trinitrotoluene
TNG - Trinitroglycerol
DIMP - Diisopropyl methylphosphonate
DNT - 2,4- and 2,6-Dinitrotoluene
DNB - 1,3-Dinitrobenzene
NQ - Nitroguanidine
Tetryl - Trinitrophenylmethylnitramine

(2) Reference concentrations based on a target Hazard Quotient (Dose/Reference Dose) of 0.99. To determine the Hazard Quotient, multiply ratio of measured concentration/reference concentration by 0.99.

(3) Reference concentrations based on a target Incremental Cancer Risk of 10^{-6} (B Carcinogens) or 10^{-5} (C Carcinogens). To determine the Incremental Cancer Risk, multiply ratio of measured concentration/reference concentration by either 10^{-6} or 10^{-5}, as appropriate.

E-2-1 AIR QUALITY CRITERIA

40 CFR Subpart X provides for the prevention of any releases that may have adverse effects on human health and the environment because of migration of waste constituents in the air. In addition, Federal environmental statutes (the 1977 Clean Air Act Amendments and Executive Order 12088) require Department of Defense (DOD) installations to comply with all Federal, state, and local air pollution rules, regulations, and standards, with the most stringent taking precedence. These rules, regulations, and standards normally define (1) the maximum allowable incremental and/or cumulative ambient air quality impacts of the project (expressed in terms of ambient air quality standards); (2) maximum allowable emission limits for specified pollutants; and, in certain cases, (3) the minimum acceptable emission control technology requirements for various sources. The numerous applicable requirements are discussed separately below for each governmental level of authority.

It should be noted that the Clean Air Act Amendments of 1990 (CAAA) require the U.S. EPA to identify source categories that may emit any of 189 toxic air pollutants. The U.S. EPA is required to issue technology-based standards for toxic source categories over a period of ten (10) years. However, it is expected that the U.S. EPA will not regulate OB units as a source category under the 1990 CAAA.

The State of Maryland and Federal requirements that are applicable to the OB operations at the IHDIVNAVSURFWARCEN are discussed below.

Federal Government

National Ambient Air Quality Standards (NAAQS)

The national primary and secondary ambient air quality standards have been established by the U.S. EPA to define maximum acceptable concentration levels for selected atmospheric pollutants over specified averaging times (40 CFR 50). Primary standards are designed to protect the public health by providing an adequate safety margin in pollution levels. Secondary levels are established to provide for the public welfare. Public welfare includes impacts on soil, water, vegetation, animals, weather, visibility, and personal comfort and well-being. These standards are summarized in Table E-2-2. The short-term average concentrations (i.e., standards for averaging times between 1 and 24 hours) may be exceeded no more than once per year.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

National emission standards have been developed by U.S. EPA to define the maximum allowable emission limits for a selected list of hazardous air pollutants and specific source types (40 CFR 61). The NESHAPs are not considered applicable to the OB unit operations at IHDIVNAVSURFWARCEN because these miscellaneous sources are not regulated by 40 CFR 61.

State Government

The following rules and regulations of the State of Maryland are applicable to the OB operations at the IHDIVNAVSURFWARCEN.

1. Maryland Air Quality Standards

   The Maryland Ambient Air Quality Standards and Guidelines are contained in Maryland Air Pollution Control Regulation 26.11.03. The State of Maryland has adopted the NAAQS given in Tables E-2-2 and E-3-4 (Section E-3).

2. Maryland Toxic Air Pollutants

   The State of Maryland has promulgated regulation 26.11.15 to control the emissions of toxic air pollutants (TAPs). The policy is applicable to installations or sources that discharge Class I or Class II TAPs into the ambient air and required to obtain a permit or approval under Maryland regulation 216.11.02.03. The regulation contains a listing of the Class I and Class II TAPs. Only those TAP emissions applicable to the IHDIVNAVSURFWARCEN are considered in this section. Exemptions apply for certain source types or premises discharging small quantities of Class I and Class II TAPs.

   New and existing sources are required to quantify emissions for each TAP that will be discharged. New or reconstructed installations are required to install and operate best available control technology for toxics (BACT).

   Ambient impact demonstrations are required for new and existing sources of the TAPs given in 26.11.15.12. The demonstration must show that total allowable emissions from the installation of each TAP will not unreasonably endanger human health. To demonstrate compliance with this regulation, the source may use either a screening analysis or a second-tier analysis, request a special permit, or use other options provided by the regulation.

The ambient impact demonstration contained within this permit application for the IHDIVNAVSURFWARCEN was conducted using a screening analysis and the applicable TAP screening-level concentrations. The screening-level concentrations are pollutant specific and apply to 1-hour, 8-hour, or annual averaging periods. The methodology regarding the derivation of the various screening-level concentrations is given in Section 26.11.12.08 of the regulation. A listing of screening levels for common TAPs was obtained from the Maryland Department of the Environment, Air Management Administration, and was published in January 1991. The screening-level TAPs that are applicable to the OB operations at the IHDIVNAVSURFWARCEN are listed in Table E-3-5. Demonstration of compliance with the TAP screening levels for the IHDIVNAVSURFWARCEN is discussed in Section E-3.4 of this permit application.

3. Other Applicable State Rules and Regulations

   1. The State of Maryland regulation for the control of open fires or open burning is contained in the Maryland Air Pollution Control regulation 26.11.07. Permissible open burning is regulated by the State of Maryland Air Quality Control Area (AQCA).

E-2-2 RCRA ACTION LEVELS

The RCRA Action Levels for air quality in Table E-3-4 were taken from U.S. EPA's criteria for corrective action proposed on July 27, 1990, U. S. EPA; 55 Federal Register 30789. These health-based levels represent U.S. EPA's estimates of concentrations in environmental media at which corrective measures may be necessary. Below these levels generally no evaluation of the need for corrective measures is needed. Above these levels a risk assessment and evaluation of the need for corrective measures should take place. Such evaluations may result in the determination that no corrective measures are required.

U.S. EPA derived these concentrations based on consideration of four criteria (U.S. EPA, July 27, 1990, 55 Federal Register 30789). First, the concentrations were derived in a manner consistent with principles and procedures set forth in Agency guidelines for assessing the health risks of environmental pollutants, which were published in the Federal Register on September 24, 1986 (U.S. EPA; 51 FR 33992, 34006, 34014, 34028). Second, toxicology studies used to derive action levels were conducted in accordance with the Good Laboratory Practice Standards (40 CFR 792), or the equivalent. Third, concentrations used as action levels (for carcinogens) were associated with a 1×10^{-6} upperbound excess cancer risk for

Class A and Class B carcinogens, and a 1 x 10^{-5} upper bound excess cancer risk for Class C carcinogens. Finally, for systemic toxicants (referring to toxic chemicals that cause effects other than cancer or mutations), the action levels were concentrations to which the human population (including sensitive subgroups) could be exposed on a daily basis without appreciable risk of adverse effects during a lifetime.

The RCRA air action levels in Table E-3-4 (Section E-3) are intended to represent annual average air concentrations in (mg/m^3) and were used as such in the air pathway analysis to determine the environmental performance standards for various energetic compounds.

E-2-3 WATER QUALITY CRITERIA

Federal Government

Ambient Water Quality Criteria (AWQC)

Ambient Water Quality Criteria (AWQC) are nonenforceable regulatory guidelines published pursuant to Section 304(a)(1) of the Clean Water Act. They are of primary utility in assessing acute and chronic toxic effects in aquatic organisms and in identifying potential human health risks. AWQC consider acute and chronic effects in both freshwater and saltwater aquatic organisms, and adverse systemic and carcinogenic effects in human receptors. AWQC for the protection of human health are based on ingestion of aquatic organisms (6.5 grams/day) and water (2 liters (L)/day), as well as on ingestion of aquatic organisms alone.

The AWQC for protection of human health for carcinogenic substances are based on the United States Environmental Protection Agency's specified target incremental cancer risk range of one additional case in an exposed population of 100,000 to 10,000,000 persons (i.e., the 10^{-5} to 10^{-7}) risk range. The carcinogenic AWQC values presented in Table E-2-2 are based on the midpoint of the target risk range (i.e., 10^{-6}).

Maximum Contaminant Levels (MCLs)

Maximum Contaminant Levels (MCLs) are enforceable standards promulgated under the Safe Drinking Water Act (40 CFR 141, 142, and 143) and are designed for the protection of human health. MCLs are based on laboratory or epidemiological studies and apply to drinking water supplies consumed by a minimum of 25 persons. They are designed for prevention of human health effects associated with lifetime exposure (70-year lifetime) of an average adult (70 kg bodyweight) consuming 2 liters of water per day. These standards also reflect the technical feasibility of removing the contaminant via Best Available Treatment technologies and are set as close to the nonenforceable Maximum Contaminant Level Goals (MCLGs) as is practicable. The MCLs also reflect the fraction of the toxicant that is absorbed in the gastrointestinal tract. Both proposed and finalized MCLs are summarized in Table E-2-2.

Drinking Water Health Advisories (HAs)

The United States Environmental Protection Agency Drinking Water Health Advisories (HAs) are guidelines developed by the Office of Drinking Water for nonregulated contaminants in drinking water. These guidelines are designed to consider both acute and chronic toxic effects in children (assumed body weight of 10 kg) who consume 1 liter of water per day and in adults (assumed body weight of 70 kg) who consume 2 liters of water per day. Health Advisories are generally available for acute (1 day), subchronic (10 days), and chronic (longer-term) exposure scenarios. These guidelines are designed to consider only threshold effects and, as such, are not used to set acceptable levels for known or probable human carcinogens.

State Government

To be provided when Sections E-5 and E-6 are submitted.

E-2-4 REFERENCE CONCENTRATIONS FOR ENERGETIC COMPOUNDS

Reference concentrations for energetic compounds were developed for 9 chemicals associated with OB activities at IHDIVNAVSURFWARCEN. These chemicals were selected as potential chemicals of concern based on information regarding the constituents of materials treated at the facility via OB. The chemicals for which reference concentrations were developed are as follows:

- Cyclotrimethylenetrinitramine (RDX)
- Cyclotetramethylenetetranitramine (HMX)
- Trinitrotoluene (TNT)
- Nitroglycerine (NG)
- Diisopropyl methylphosphonate (DIMP)
- 2,4-Dinitrotoluene and 2,6-Dinitrotoluene (DNT)
- 1,3-Dinitrobenzene (DNB)
- Nitroguanidine (NQ)

- Trinitrophenylmethylnitramine (Tetryl)

The criteria for these compounds were developed based on protection of human health because humans are considered the most sensitive receptors in the vicinity of IHDIVNAVSURFWARCEN. They were designed to be protective of human receptors from both noncarcinogenic and carcinogenic effects. Reference concentrations were developed for soil, water, and air.

Dose-response parameters, including Reference Doses (RfDs) and Cancer Slope Factors (CSFs), were used as the basis for the reference concentrations. Specific criteria by which the reference concentrations were determined are as follows:

- The hazard quotient for each systemic toxicant was less than 1.0.
- The incremental cancer risk for Group A and B carcinogens was equivalent to 10^{-6}.
- The incremental cancer risk for Group C carcinogens was equivalent to 10^{-5}.

The specific approach used to develop the reference concentrations is discussed in the remainder of this subsection.

E-2-4a Intake Estimation Methods

Intakes of the potential chemicals of concern were estimated using conservative exposure assessment assumptions that are consistent with the general guidance outlined in the RCRA Facility Investigation Guidance document (U.S. EPA, 1989) and RCRA Regulations (40 CFR 264, Subpart 5) for corrective action at Solid Waste Management Units. Intakes via exposure to various media were estimated as described in the following subsections.

Soil Ingestion Intake Estimation Methods

Soil ingestion intakes were estimated using the following equation:

$$\text{Intake (mg/ kg/ day)} = \frac{RCS \times IR \times CF \times EF \times ED}{BW \times AT}$$

Where RCS = the soil reference concentration (mg/kg)

IR = the soil ingestion rate (mg/day)

CF = a conversion factor (kg/mg)

EF = the exposure frequency (days/year)

ED = the exposure duration (years)

BW = the receptor body weight (kg)

AT = the averaging time (days)

Water Intake Estimation Methods

Water ingestion intakes (both surface and groundwater) were estimated using the following equation:

$$\text{Intake (mg/ kg/ day)} = \frac{RCW \times IR \times EF \times ED}{BW \times AT}$$

Where RCW = the water reference concentration (mg/L)

IR = the water ingestion rate (L/day)

EF = the exposure frequency (days/year)

ED = the exposure duration (years)

BW = the receptor body weight (kg)

AT = the averaging time (days)

Air Inhalation Intake Estimation Methods

Air inhalation intakes were estimated using the following equation:

$$\text{Intake (mg/ kg/ day)} = \frac{RCA \times IR \times EF \times ED}{BW \times AT}$$

Where RCA = the air reference concentration (mg/m^3)

IR = the air inhalation rate (m^3/day)

EF = the exposure frequency (days/year)

ED = the exposure duration (years)

BW = the receptor body weight (kg)

AT = the averaging time (days)

E-2-4b Exposure Parameter Assumptions

The assumptions outlined in the Subpart S rules were used as input for the various intake parameters identified in Section E-2-4a. The soil and groundwater ingestion rates were specified as 100 mg/day and 2 L/day, respectively. The inhalation rate was specified as 20 m^3/day. The exposure frequency was specified as 365 days/year (continuous exposure), whereas the exposure duration was set as 70 years (lifetime exposure).

Based on current and projected land and water use, it is anticipated that adults are the most likely receptors for chemicals released from the OB unit. Therefore, the receptor body weight was specified as 70 kg. The ingestion and inhalation rates are reasonable values for adults, as outlined in both the RFI Guidance document (U.S. EPA, May 1990) and in CERCLA risk assessment guidance (U.S. EPA, December 1989). The averaging time was set as 25,550 days (70 years times 365 days/year). Note that the EF, ED, and AT terms cancel out for each of the exposure routes considered.

E-2-4c Dose-Response Parameters

Reference Doses and Cancer Slope Factors were identified for various chemicals of concern. Reference Doses may be used to generate quantitative noncarcinogenic risk estimates whereas Cancer Slope Factors may be used to generate quantitative estimates of potential carcinogenic risks. The dose-response parameters may be more fully described as follows:

Reference Dose (RfD)

The RfD is developed by the U.S. EPA for chronic and/or subchronic human exposure to hazardous chemicals and is solely based on the noncarcinogenic health effects imparted by a chemical. The RfD is usually expressed as a dose (mg) per unit body weight (kg) per unit time (day). It is generally derived by dividing a no-observed-(adverse)-effect-level (NOEL or NOAEL) or a lowest-observed-adverse-effect-level (LOAEL) by an appropriate uncertainty factor. NOAELs, etc., are determined from laboratory or epidemiological toxicity studies. The uncertainty factor is based on the availability of toxicity data.

Uncertainty factors are generally applied as multiples of 10 to represent specific areas of uncertainty in the available data. A factor of 10 is used to account for variations in the general population (to protect sensitive subpopulations), when extrapolating test results from animals to humans (to account for interspecies variability), when a NOAEL derived from a subchronic study (instead of a chronic study) is used to develop the RfD, and when a LOAEL is used instead of a NOAEL. In addition, the U.S. EPA reserves the use of a modifying factor of up to 10 for professional judgment of uncertainties in the data base not already considered. The default value of the modifying factor is 1.

The RfD incorporates the surety of the evidence for chronic human health effects. Even if applicable human data exist, the RfD (as diminished by the uncertainty factor) still maintains a margin of safety so that chronic human health effects are not underestimated. Thus, the RfD is an acceptable guideline for evaluation of noncarcinogenic risk, although the associated uncertainties preclude its use for precise risk quantitation.

Cancer Slope Factor (CSF)

CSFs are applicable for estimating the lifetime probability (assuming a 70-year lifetime) of human receptors developing cancer as a result of exposure to known or potential carcinogens. This factor is generally reported by the U.S. EPA in units of $(mg/kg/day)^{-1}$ and is derived through an assumed low-dosage linear relationship and an extrapolation from high to low dose responses determined from animal studies. The value used in reporting the CSF is the upper 95 percent confidence limit.

The U.S. EPA's Cancer Assessment Group has assigned weight-of-evidence designations for potential carcinogenic substances. The weight of evidence designations indicate the likelihood that a chemical is a human carcinogen, based on both animal and human studies. The classification is as follows:

- A - Known human carcinogen.
- B - Potential human carcinogen. B1 indicates that limited human data are available. B2 indicates that there is sufficient evidence of carcinogenicity in animals, but inadequate or no evidence in humans.
- C - Possible human carcinogen.
- D - Not classifiable as to human carcinogenicity.
- E - Evidence of noncarcinogenicity in humans.

Oral Reference Doses for each of the potential chemicals of concern were either identified in the literature or derived from toxicity information. Cancer Slope Factors were identified for several of the potential chemicals of concern, including RDX, TNT, NG, and DNT. The remaining constituents are reported as Group D carcinogens (not evaluated for human carcinogenicity).

Values of the dose-response parameters and sources are presented in Table E-2-3. Table E-2-3 also includes a summary of oral absorption factors identified in the literature. These absorption factors indicate the percentage of the orally administered dose that is absorbed in the gastrointestinal tract. In general, conservative values of the absorption factor (i.e., the lowest values) were selected. The absorption factors were then used to develop RfDs and CSFs for inhalation exposure. Based on the assumption that 100 percent of an inhaled dose will be absorbed, the RfDs based on absorption can then be used to determine risks (and Reference Concentrations) for inhalation exposure.

E-2-4d Reference Concentrations

Using the exposure assessment methods and assumptions outlined in Sections E-2-4a and E-2-4b and the dose-response parameters presented in Section E-2-4c, reference concentrations were determined for soil, water, and air at IHDIVNAVSURWARCEN. Detailed calculations outlining this procedure are included in Appendix E-2-1. Table E-2-4 provides a summary of the reference concentrations for the various media. These concentrations may be used for either qualitative or quantitative purposes.

For example, if a measured or simulated concentration of one of the chemicals of concern does not exceed the reference concentration, it may be concluded that releases of that constituent would not pose unacceptable human health risks. On the other hand, if the measured/modeled concentration exceeds the reference concentration, a human health threat may exist.

In addition, quantitative risk estimates may be generated using the reference concentrations. Quantitative estimates of both systemic (noncarcinogenic) and carcinogenic risks may be determined using the reference concentrations. In accordance with U.S. EPA guidance, numerical noncarcinogenic and carcinogenic risk estimates may be presented in the form of Hazard Quotients and Incremental Cancer Risks.

The Hazard Quotient is the ratio of an estimated dose and a published References Dose, and is determined as follows:

Hazard Quotient (HQ) = Dose/Reference Dose

If the value of the Hazard Quotient exceeds unity (1.0), there is a potential human health risk associated with exposure to the particular chemical under consideration. For example, if an RDX concentration of 3,000 mg/kg is measured in the soil matrix, the Hazard Quotient (HQ) for this exposure route may be determined as follows:

$$\frac{3{,}000\ mg/kg}{2{,}100\ mg/kg} = \frac{HQ}{THQ}$$

HQ = 0.99(3,000/2,100) = 1.4

THQ = Target Hazard Quotient = 0.99 (i.e., <1)

The Incremental Cancer Risk (ICR) may be determined using the published Cancer Slope Factors and estimated doses:

ICR = CSF x Dose

The resulting number is a unitless expression of an individual's likelihood of developing cancer as a result of exposure to the carcinogenic chemical of concern. This risk is in addition to the risks incurred by everyday activities. The Incremental Cancer Risk (ICR) (e.g., $1x10^{-6}$ or 1 in 1,000,000) can also be applied to a given population to determine the number of excess cases of cancer that could be expected to result from the exposure (e.g., $1x10^{-6}$ corresponds to one additional case of cancer in an exposed population of 1,000,000 persons).

RDX is a Group C carcinogen (target risk = 10^{-5}). Therefore, the incremental cancer risk associated with human exposure to soil containing 3,000 mg/kg of RDX may be determined as follows:

$$\frac{3{,}00\ mg/kg}{64\ mg/kg} = \frac{ICR}{TICR}$$

ICR = $10^{-5}(3{,}000/64) = 4.7'10^{-4}$

TICR = Target Incremental Cancer Risk = 10^{-5} (Class C carcinogen)

DNT is a Group B carcinogen (target risk = 10^{-6}). Therefore, the incremental cancer risk associated with human exposure to soil containing 300 mg/kg DNT may be determined as follows:

$$\frac{300\ mg/kg}{1\ mg/kg} = \frac{ICR}{TICR}$$

$ICR = 10^{-6}(300/1) = 3.0 \times 10^{-4}$

$TICR = 10^{-6}$ (Class A and B carcinogens)

SECTION E-3

AIR PATHWAY ASSESSMENT

SECTION E-3

AIR PATHWAY ASSESSMENT

E-3 AIR PATHWAY ASSESSMENT

An air pathway assessment was conducted for open burning (OB) operations at the Indian Head Division Naval Surface Warfare Center (IHDIVNAVSURFWARCEN) located at Indian Head, Maryland. The information pertaining to the OB operation and the air pathway analysis is partitioned into four (4) principal subject areas. These areas are:

- Environmental Setting
- Health Criteria
- Air Pathway Analysis Protocol
- OB Modeling Demonstrations and Environmental Performance Standards

These subject areas contain detailed information addressing the existing environment at the IHDIVNAVSURFWARCEN, the health criteria used to develop the environmental performance standards, the protocol used to conduct the air pathway analysis, and finally the modeling demonstrations and environmental performance standards that were developed for each OB treatment scenario conducted at the IHDIVNAVSURFWARCEN.

E-3-1 ENVIRONMENTAL SETTING

E-3-1a Facility Description

The IHDIVNAVSURFWARCEN is located at Indian Head, within Charles County, on the Maryland shore of the Potomac River, approximately 25 miles south of Washington, D.C. The principal mission of the IHDIVNAVSURFWARCEN is the research, development, and production of propellants and explosives for the United States Navy.

The IHDIVNAVSURFWARCEN conducts thermal treatment of various waste munition items containing energetic materials referred to as PEP (propellants, explosives and pyrotechnics) using OB. The waste materials can include off-specification explosives, propellants, overage fleet return, and production scrap wastes. OB is the most effective and safe treatment method available for these materials.

The OB operations at the IHDIVNAVSURFWARCEN are conducted at a controlled burning location known at the Strauss Avenue Thermal Treatment Point (SATTP). The SATTP consists of two separate treatment areas known as the Main and Auxiliary Points. Each point treats contaminated wastes according to the nature of the wastes generated.

Both treatment points conduct short- and long-term OB treatment at various units which are listed below:

Main Point (SAMTTP)

Short-term Treatment	**Long-term Treatment**
1.1 pan	Slum pan
1.3 pans	

Auxiliary Point (SAATTP)

Short-term Treatment	**Long-term Treatment**
Solvent Vessel	Unlined Pans
Thrust Block	
Igniter Vessel	
Clay Pad	

A listing of the various munition waste items approved for thermal treatment at the Main Point and Auxiliary Point is given in the Location List found in Appendix E-3-1.

The location of these two treatment points is shown in Figure E-3-1.

E-3-1b Topography

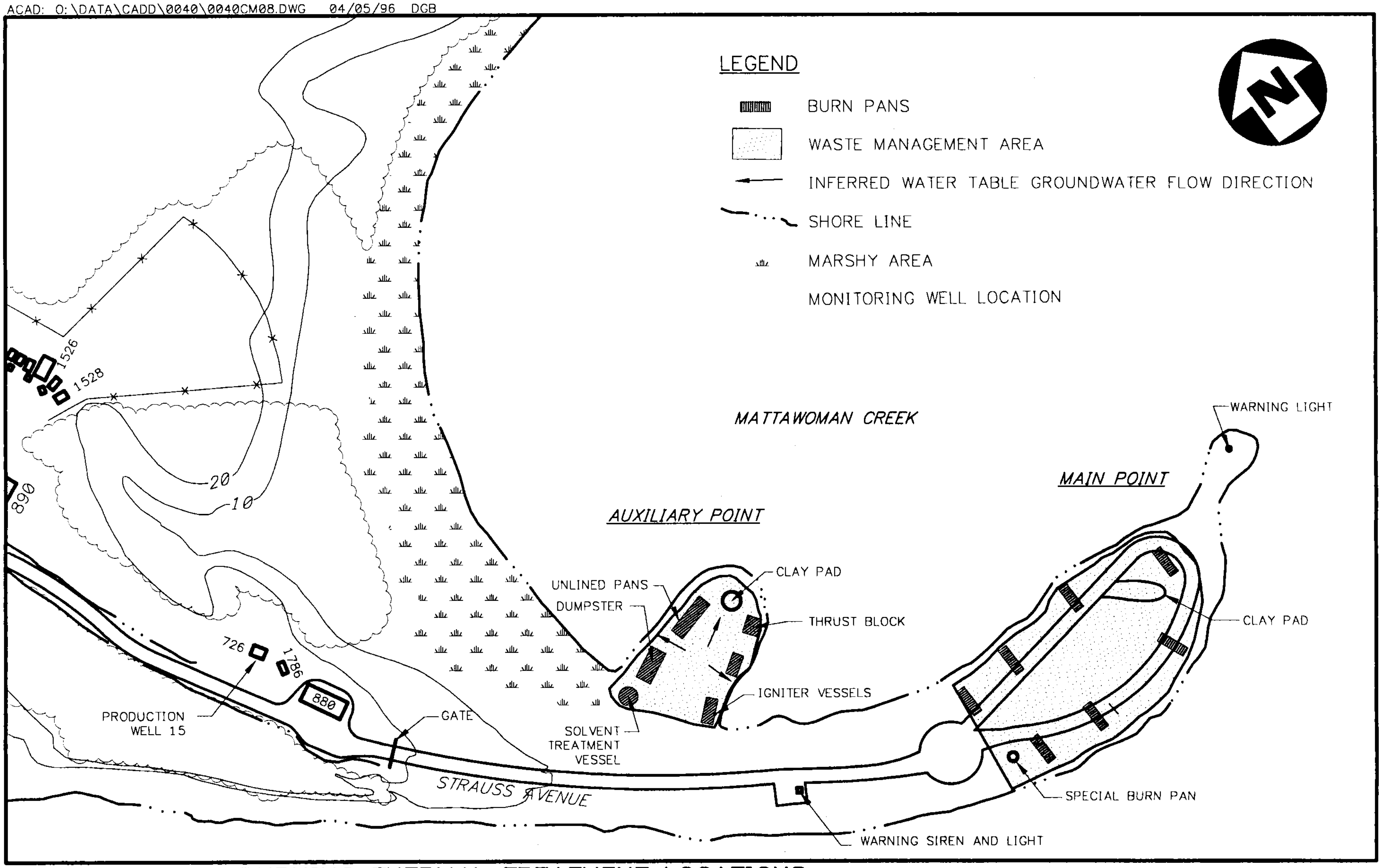
The IHDIVNAVSURFWARCEN is located in the U.S. Geological Service (USGS) Indian Head topographic quadrangle. Terrain relief on the Center ranges from sea level to 111 feet in the northern section of the peninsula near the Center boundary. Swampy areas are common adjacent to major waterways, and flat upland plains exist in most interstream areas.

The portion of the Indian Head peninsula adjacent to the Potomac River is characterized by 40 to 50 foot bluffs at the shoreline. On the Mattawoman Creek, the shoreline generally exhibits a more gradual slope. Most of the land surface of the peninsula slopes to the east and southeast toward Mattawoman Creek.

The elevation at the SATTP is about 5 feet above sea level.

E-3-1c Land Use Classification

The total population of Charles County is approximately 70,000 and the population of Indian Head is approximately 2,000. The county is 40 percent agricultural, 50 percent wooded, and contains widely



OPEN BURNING THERMAL TREATMENT LOCATIONS
STRAUSS AVENUE TTP
INDIAN HEAD, MARYLAND

0 200 400
SCALE IN FEET

DRAWING E-3-1

Brown & Root Environmental

Date: April 5,1996

dispersed residential subdivisions. Most of the residential area is located to the south and east of the Center. The area surrounding the IHDIVNAVSURFWARCEN is void of heavy industry.

E-3-1d Meteorology/Climatology

The IHDIVNAVSURFWARCEN is located in a coastal region characterized by a continental type of climate with well defined seasons that are moderately influenced by the Chesapeake Bay and the Potomac River. The area lies in the humid, temperate climatic belt of the eastern United States. Summers are warm and humid and winters are cold, but not severe. Periods of pleasant weather often occur in the spring and the fall.

The summertime temperature is in the upper 80's and in the 20's in the winter. The annual average daily temperature is 57.2°F (287°K).

Precipitation is rather evenly distributed throughout the year with annual average precipitation of 39 inches. Thunderstorms can occur at any time of the year, but are most prevalent during the late spring and summer. The storms are most often accompanied by downpours and gusty winds, but are not usually severe.

Although snowfall of 10 inches or more in 24 hours is unusual, several notable snowfalls of more than 25 inches have occurred. The normal total snowfall during the winter season is 18 inches.

The potential annual evapotranspiration for the area is approximately 31 inches with an average annual rate of evaporation from surface waters of approximately 37 inches.

Onsite meteorological data is not collected at the IHDIVNAVSURFWARCEN. Information regarding the climatology of the IHDIVNAVSURFWARCEN facility is based on climatological data from nearby meteorological recording stations.

Climatological data, regarding mean monthly temperature and liquid precipitation that is considered representative of the IHDIVNAVSURFWARCEN is summarized in Table E-3-1. This data was acquired for the Washington, D.C., National Airport which is located about 20 miles north-northeast of the IHDIVNAVSURFWARCEN along the Potomac River.

TABLE E-3-1

CLIMATOLOGICAL SUMMARY OF MEAN MONTHLY TEMPERATURE AND PRECIPITATION DATA FOR THE WASHINGTON, D.C., NATIONAL AIRPORT*
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Month	Mean Temperature (°F)	Mean Liquid Precipitation (Inches)
January	35.2	2.76
February	37.5	2.62
March	45.8	3.46
April	56.7	2.93
May	66.0	3.48
June	74.5	3.35
July	78.9	3.88
August	77.6	4.40
September	71.1	3.32
October	59.3	2.90
November	48.7	2.82
December	38.9	3.18
Annual	57.2	39.00

* Period of Record 1951-1980

Climatological information summarizing the annual frequency distribution of wind direction from the United States Marine Corp, Quantico, Virginia observation station is shown in Table E-3-2. This station is located approximately 6 miles west of the IHDIVNAVSURFWARCEN. The wind frequency distribution is based on hourly observations collected during the 1969-1971 and 1973-1978 annual periods. The maximum wind velocity reported at National Airport is 60 miles per hour from the northwest during the winter season. The average wind speed for the area is 9 miles per hour.

E-3-1e Existing Air Quality

Information was obtained from the Maryland Department of Environment, Air Management Administration, to characterize the air quality in the vicinity of the IHDIVNAVSURFWARCEN facility. The IHDIVNAVSURFWARCEN is located in Charles County which is part of Air Quality Control Area V. In 1995, the County was in attainment for the pollutants PM10 (inhalable particulate less than 10 mm in diameter), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and carbon monoxide (CO). Charles County is nonattainment for ozone (O_3).

The State of Maryland does not operate an extensive air quality monitoring network in Charles County to determine the attainment status for pollutants regulated by the National Ambient Air Quality Standards (NAAQS). For the annual period 1995, the State of Maryland operated only one air quality monitoring site within Charles County. This site is located in the city of Hughesville, which is 21 miles east-southeast of the IHDIVNAVSURFWARCEN. In 1995, the Hughesville monitoring station collected 1-hour concentration data for the pollutant O_3 (ozone). The site reported 1, 1-hour concentrations greater than the 235 mg/m^3 NAAQS.

A summary of the 1991 air quality data for the Charles County monitoring sites is given in Table E-3-3.

E-3-2 STANDARDS AND HEALTH CRITERIA

The principal objective of the air pathways assessment is to develop environmental performance standards for OB operations that are designed to prevent adverse effects on human health and the environment. The regulations contained with 40 CFR 264 Subpart X provides for the prevention of any air pathway releases that would have an adverse effect on human health and the environment. For the purpose of this assessment, it was assumed that adverse effects would occur if relevant ambient air criteria for short and long term averaging periods were exceeded and that human health based criteria are also protective of the environment. The environmental performance standards developed in this assessment are based on state and Federal health criteria for various short- and long-term periods.

TABLE E-3-2

SUMMARY OF THE ANNUAL WIND FREQUENCY DISTRIBUTION FOR USE AT THE HDIVNAVSURFWARCEN* INDIAN HEAD, MARYLAND

Direction	Annual Frequency (%)
NNE	2.5
NE	3.2
ENE	2.8
E	2.6
ESE	2.0
SE	3.6
SSE	5.8
S	12.7
SSW	5.1
SW	2.2
WSW	2.1
W	4.4
WNW	8.1
NW	12.6
NNW	9.5
N	5.5
CALM	14.9
TOTAL	**100.0**

* Observation station is located at Quantico, Virginia.

* Period of record 1969-1971 and 1973-1978 which includes a total of 20,811 observations.

TABLE E-3-3

**AMBIENT AIR QUALITY DATA COLLECTED
IN CHARLES COUNTY, MARYLAND FOR
THE 1995 ANNUAL PERIOD
INDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND**

Criteria Pollutant (Averaging Period)	Maximum Concentration (mg/m^3)	Maryland Standard (mg/m^3)	Federal Standard (mg/m^3)
Ozone (1-hour)	249	235*	235*

* Not to exceed on more than an average of one day per year for a three (3) year period.

A summary of Federal, state and other non-regulatory health criteria that are applicable to OB operations at IHDIVNAVSURFWARCEN are shown in Tables E-3-4 through E-3-6. These criteria were used to evaluate the potential impacts for pollutants specific to IHDIVNAVSURFWARCEN OB operations.

Table E-3-4 is a master list of Federal air quality criteria and standards associated with the National Ambient Air Quality Standards (NAAQS) and proposed Resource Conservation and Recovery Act (RACA) Subpart S Action Levels. The contaminants listed in Table E-3-5 were taken from the State of Maryland's ambient air quality standards (COMAR 26.11.03) and screening levels for toxic air pollutants (TAPs) found in COMAR 26.11.15. Table E-3-6 contains calculated reference concentrations for specific energetic compounds. Only those pollutant releases applicable to IHDIVNAVSURFWARCEN and having available Federal, state or other nonregulatory health criteria were utilized in this air pathway assessment to develop environmental performance standards for OB operations.

Potential emissions released to the environment from the IHDIVNAVSURFWARCEN OB operation were assumed to include the following:

- Unreacted energetic compounds
- Products of combustion
- Metals/inorganic compounds

The list of the potential air contaminants associated with OB treatment compounds at the IHDIVNAVSURFWARCEN were gathered from energetic composition data, waste composition data and predicted emissions information obtained from the POLU-11 model which estimates products of combustion at various material-to-air ratios.

Once the list of potential emitted compounds was developed, applicable Federal and state regulatory and nonregulatory air quality criteria were determined. These criteria came from the National Ambient Air Quality Standards (NAAQS), Resource Conservation and Recovery Act (RCRA) Action Levels, State of Maryland Air Pollution Control Regulations and calculated health criteria for energetic compounds.

The information to follow in Section E-3-2a discusses the applicable Federal, state and non-regulatory health criteria regulations or guidelines in greater detail.

TABLE E-3-4

MASTER LIST OF FEDERAL HEALTH CRITERIA CONCENTRATIONS FOR POTENTIAL OB COMBUSTION PRODUCTS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Combustion Products	Federal Criteria	
	NAAQS[(1)] (μg/m³)	RCRA Action Levels[(2)]
		Air (μg/m³)
Metals		
Barium		0.4
Lead	1.5 (Quarterly)	
Gaseous Constituents		
Carbon monoxide	10,000 (8-hr) 40,000 (1-hr)	
Nitrogen dioxide	100 (Annual)	
Ozone	235 (1-hr)	
Particulates (PM10)	50 (Annual)	
Sulfur dioxide	80 (Annual) 365 (24-hr) 1300 (3-hr)	

(1) National Ambient Air Quality Standards. Averaging periods are shown in parenthesis.

(2) Proposed Resource Conservation and Recovery Act Subpart S Action Levels (U.S. EPA, July 27, 1990). These levels are intended to represent annual average air concentrations.

TABLE E-3-5

MASTER LIST OF MARYLAND TOXIC AIR POLLUTANT SCREENING LEVEL CONCENTRATIONS FOR POTENTIAL EMISSIONS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Exposure Period Concentration (ug/m^3)		
	1-Hour	8-Hour	Annual
TAP			
Carbon dioxide		288,000	–
Carbon monoxide		290	–
Ozone	4	1	–
Nitrogen dioxide	94	56	–
Ammonia	240	170	–
Copper	–	2	–
Lead	–	0.5	–
Butane	–	19,000	–
Formaldehyde	3.7		0.77
Aluminum oxide	–	100	–
Hydrogen cyanide	50	–	–
Sulfur dioxide	130	52	–
Hydrogen sulfide	210	140	–
Carbon disulfide	–	310	–
Potassium hydroxide	20	–	–
Zirconium	100	50	–
Sodium cyanide	50	–	–
Hydrogen fluoride	26	–	–
Fluorine	31	16	–
Carbonyl fluoride	130	54	–
Barium	–	5	–
Boron oxide	–	100	–
Silicon carbide	–	100	–
Chlorine	29	15	–
Carbon tetrachloride	630	310	0.6666
Hydrogen chloride	75		–
Titanium dioxide	–	100	–
Antimony	–	5	–
Benzoyl peroxide	–	50	–

Date: April 5,1996

	Exposure Period Concentration (ug/m^3)		
	1-Hour	8-Hour	Annual
TAP (continued)			
Tetryl	–	15	–
Dinitrotoluene	–	1.5	–
Cyclonite (RDX)	–	15	0.3182
Diethylphthalate	–	50	–
Resorcinol	900	450	–
Diphenylamine	–	100	–
Carbon black	–	35	–
Nitroglycerin	–	4.6	–
Dibutylphthalate	–	50	–
Trinitrotoluene	–	5	1.17
Ethanol	–	18,800	–
Methanol	3,280	2,620	–
Isopropanol	12,300	9,830	–
Acetone	23,800	17,800	–
Butanol	1,520	–	–
Methyl ethyl ketone	8,850	5,900	–
Methyl isobutyl ketone	3,070	2,050	–
Hexane	–	1,760	–
Heptane	20,500	16,400	–
Toluene		1,880	–
Trichloroethylene	5,370	2,690	5.83
Methylene chloride	–	1,740	34
Ethylene glycol	1,000	–	–
Sulfuric acid	30	10	–
Nitric acid	100	52	–
Xylene	6,510	4,340	–
1,2-dichloroethane	–	400	385
Chloroform	–	490	0.4350
1,1,2-trichloroethane	–	550	0.625
Nitric Oxide	100	52	–

TABLE E-3-6

MASTER LIST OF CALCULATED REFERENCE CONCENTRATIONS FOR POTENTIAL ENERGETIC CHEMICALS OF CONCERN IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Potential Chemical of Concern	Noncarcinogenic Effects[1]	Carcinogenic Effects[2]
	Air ($\mu g/m^3$)	Air ($\mu g/m^3$)
RDX	6.9×10^{-1}	1.6×10^{-2}
TNT	1.0×10^{0}	7.0×10^{-1}
DNT	2.1×10^{0}	3.2×10^{-3}
NQ	3.5×10^{2}	--
Tetryl	2.1×10^{1}	--
HMX	1.0×10^{1}	--

(1) Reference concentrations based on a target Hazard Quotient (Dose/Reference Dose) of 0.99. To determine the Hazard Quotient, multiply ratio of measured concentration/reference concentration by 0.99.

(2) Reference concentration based on a target Incremental Cancer Risk of 10^{-6} (B Carcinogens) or 10^{-5} (C Carcinogens). To determine the Incremental Cancer Risk, multiply ratio of measured concentration/reference concentration by either 10^{-6} or 10^{-5}, as appropriate.

E-3-2a Federal Standards

National Ambient Air Quality Standards (NAAQS)

National Ambient Air Quality Standards (NAAQS) have been established by U.S. EPA to define maximum acceptable concentration levels for selected atmospheric pollutants over specified averaging periods (40 CFR 50). These maximum concentrations are based upon the latest scientific information regarding all identifiable effects a pollutant may have on public health and welfare relative to short and long term averaging periods.

Two classes of NAAQS were established: primary and secondary. Primary standards are designed to protect the public health by providing an adequate safety margin in the pollutant levels. Secondary standards define levels for protecting the environment, e.g. soils, vegetation, and wildlife. The primary standards are considered to be most protective of health and were used in this assessment.

A listing of the Federal primary NAAQS for OB emission products are given in Table E-3-4.

E-3-2b Maryland Standards

Various rules and regulations of the State of Maryland establish standards for various constituents of OB emissions. These are as follows:

1. Maryland Air Quality Standards

   The Maryland Ambient Air Quality Standards and Guidelines are contained in COMAR 26.11.03. The State of Maryland has adopted the NAAQS given in Table E-3-4.

2. Maryland Toxic Air Pollutants

   The State of Maryland has promulgated regulation COMAR 26.11.15 to control the emissions of toxic air pollutants (TAPs). The regulation is applicable to installations or sources that discharge Class I or Class II TAPs into the ambient air. These sources are also required to obtain a permit or approval under COMAR 26.11.02.03. COMAR 26.11.15 contains a listing of the Class I and Class II TAPs. TAP emissions applicable to OB thermal treatment activities at the IHDIVNAVSURFWARCEN are given in Table E-3-5. Exemptions apply for certain source types or premises discharging small quantities of Class I and Class II TAPs.

Ambient impact demonstrations are required for new and existing sources of the TAPs given in COMAR 26.11.15.12. The demonstration must show that total allowable emissions from the installation of each TAP will not unreasonably endanger human health. To demonstrate compliance with this regulation, the source may use either a screening analysis, a second tier analysis, request a special permit, or use other options provided by the regulation.

The air pathway assessment discussed in this permit application for the IHDIVNAVSURFWARCEN was conducted using a screening analysis technique and the applicable TAP screening level concentrations. This protocol is considered to meet the requirements of COMAR 26.11.15.12. The screening level concentrations are pollutant specific and apply to 1-hour, 8-hour or annual averaging periods. Methodology regarding the derivation of the various screening level concentrations is given in COMAR 26.11.15.08 and in the screening level TAP database available from the Maryland Department of Environment (MDE). The Screening Level TAPs that are applicable to the OB operations at the IHDIVNAVSURFWARCEN are listed in Table E-3-5. Demonstrations of compliance with the TAP screening levels for the IHDIVNAVSURFWARCEN are discussed in Sections E-3-12 through E-3-16 of this permit application.

3. Other Applicable State Rules and Regulations

   1. The State of Maryland Regulation for the control of open fires or open burning is contained in COMAR 26.11.07. Permissible opening burning is regulated by State of Maryland Air Quality Control Area (AQCA).

E-3-2c **RCRA Action Levels**

The RCRA Action Levels for air quality in Table E-3-4 were taken from U.S. EPA's Criteria for Corrective Action proposed on July 27, 1990 (55 Fed. Reg. 30789). These health-based levels represent U.S. EPA's estimates of concentrations in environmental media. If these levels are exceeded, evaluations of the need for corrective measure may be required. Below these levels, generally no evaluation or corrective measures are required. Above these levels, a risk assessment and evaluation of the need for corrective measures should take place. Such evaluations may result in the determination that no corrective measures are required.

U.S. EPA derived these concentrations based on consideration of four criteria (55 Fed. Reg. 30789). First, the concentrations were derived in a manner consistent with principles and procedures set forth in Agency guidelines for assessing the health risks of environmental pollutants, which were published in the Federal Register on September 24, 1986 (51 Fed. Reg. 33992, 34006, 34014, 34028, 1986). Second, toxicology studies used to derive action levels were conducted in accordance with the Good Laboratory Practice Standards (40 CFR 792), or the equivalent. Third, concentrations used as action levels (for carcinogens) were associated with a 1×10^{-5} upperbound excess cancer risk for Class A and Class B carcinogens, and a 1×10^{-6} upperbound excess cancer risk for Class C carcinogens. Finally, for systemic toxicants (referring to toxic chemicals that cause effects other than cancer or mutations), the action levels were concentrations to which the human population (including sensitive subgroups) could be exposed on a daily basis that is likely to be without appreciable risk of adverse effects during a lifetime.

The RCRA Action levels in Table E-3-4 are intended to represent annual average air concentrations in μ $\mu g/m^3$ and were used as such in the air pathway assessment to develop the environmental performance standards for various energetic compounds.

E-3-2d Reference Concentrations for Energetic Compounds

The U.S. EPA Office of Drinking Water has published health advisories for eleven compounds classified as energetics. Reference concentrations for ambient air were developed based on information in these health advisories. Six of these energetics are present in materials thermally treated at IHDIVNAVSURFWARCEN and are given below:

- Cyclotrimethylenetrinitramine (RDX)
- Cyclotetramethylenetetranitramine (HMX)
- Trinitrotoluene (TNT)
- 1,2-dinitrotoluene and 1,3-dinitrotoluene (DNT)
- Nitroguanidine (NQ)
- Trinitrophenylmethylnitramine (Tetryl)

The derivation of ambient air reference concentrations was conducted based on standard U.S. EPA methodology. The reference concentrations were calculated to be protective of human receptors from both noncarcinogenic and carcinogenic effects. These concentrations are applicable to annual average air quality concentrations and were used as such to develop annual environmental performance standards for these energetic compounds. Appendix E-2-1 describes the methodology and calculation procedure for each reference concentration.

E-3-3 AIR PATHWAY ASSESSMENT PROTOCOL

The air pathway assessment was conducted to predict the potential air quality impact of air emissions from IHDIVNAVSURFWARCEN OB units. The assessment contains three principal components:

- Estimates of OB source emissions
- Air dispersion modeling demonstrations for each OB treatment scenario
- Development of environmental performance standards

Source emission parameters for the various treatment scenarios and representative meteorological data were used as input to atmospheric dispersion models to calculate air quality dispersion factors for receptors at or beyond the site boundary. Maximum 1-hour dispersion factors from the modeling results were then compared to health and environmental criteria presented in Section E-3-2 to characterize the potential impacts of OB emissions and develop environmental performance standards.

Prior to the start of the air pathway assessment, protocols were developed for estimating OB source parameters, OB emission products, and the air dispersion modeling demonstrations. It is important to note that these protocols include numerous conservative assumptions for estimating emission parameters, emission factors, health criteria, and air quality dispersion modeling. These conservative assumptions result in conservatively high estimates of OB treatment impact. In particular, the most stringent air quality health criteria was applied to each OB scenario. In reviewing all of the air quality health criteria presented in Section E-3-2a, it was determined that the most stringent criteria is contained within the State of Maryland Air Toxics regulation. These conservative assumptions were used to ensure that emissions and impacts from the IHDIVNAVSURFWARCEN were not underestimated and represent worst case operating conditions for each OB scenario.

The information to follow within Sections E-3-3 through E-3-11 discusses the methodology used to derive source emission parameters for each OB treatment scenario, the dispersion modeling protocol, and the procedures to develop environmental performance standard demonstrations for each OB scenario.

E-3-3a **OB Treatment Scenarios**

A wide variety of waste materials are treated at the various units. The OB treatment scenarios evaluated in the air pathway assessment were grouped into five emission scenarios based upon the type of materials treated and emission release period. These are as follows:

- Strauss Avenue Main Thermal Treatment Point (SAMTTP) - short-term events at the 1.1 and 1.3 pans.
- Strauss Avenue Main Thermal Treatment Point (SAMTTP) - long-term events at the Slum Pan
- Strauss Avenue Auxiliary Thermal Treatment Point (SAATTP) - short-term events at the Solvent Vessel, Thrust Block and the Igniter Vessel.
- Strauss Avenue Auxiliary Thermal Treatment Point (SAATTP) - long-term events at the Unlined Pans.
- Strauss Avenue Auxiliary Thermal Treatment Point (SAATTP) - short-term events at the Clay Pad.

Each of these treatment scenarios have either different source characteristics or release periods and therefore required separate air modeling demonstrations. Air modeling demonstrations for each of the 5 treatment scenarios are addressed individually in Sections E-3-12 through E-3-16. A discussion of the general methodology used to develop emission parameters, emission products, conduct modeling demonstrations, and develop environmental performance standards for each treatment scenario is described in the following sections.

E-3-3b **OB Emission Products**

The air pathway assessment considered primary and secondary sources of air emissions from OB treatment processes. The primary air emissions from OB treatment operations are products of combustion, which typically include the following:

- Carbon monoxide
- Carbon dioxide
- Nitrogen and nitrogen oxides
- Water
- Sulfur dioxide

- Methane
- Ammonia

Secondary air emissions include other products of combustion which can include untreated energetic materials, TAPs, organics and trace metals. The methods used to estimate emissions from OB treatment include the POLU-11 combustion products model which is discussed in Section E-3-3c, the assumption of a 99.99% Destruction Removal Efficiency (DRE) to estimate the emission of untreated organics and the assumption that all metals in the wastes treated are emitted (i.e., metals in, metals out).

Incomplete combustion may occur during OB due to treatment of oxygen deficient material or insufficient entrainment of ambient oxygen during treatment. In either case, the mass balance of percentage of carbon dioxide decreases while the percentages of carbon monoxide and organic carbon increase. Currently, the only method of quantifying emissions of organics for OB is through direct measurement. The U.S. Army has recently completed field testing of several propellants and explosives including 2,4,6-trinitrotoluene, the most oxygen deficient military explosive, and therefore, the most likely to produce significant quantities of products of incomplete combustion. The results of the study have been evaluated to produce default emission factors for the significant organics detected, which are summarized below:

Contaminant	Pound/Pound Emission Factor
Napthalene	1.5E-06
Benzo(a)pyrene	9.0E-07
Phenol	8.0E-06
Diphenylamine	3.1E-07
Benzene	1.6E-05

These contaminant emission factors are orders of magnitude smaller than the emission factors which have been used to calculate the environmental performance standards for each of the five emission scenarios listed in Section E-3-3a. As a result, treatment at quantities presented in the environmental performance standards would produce relatively small quantities of organics emissions.

A master list of reactive waste items, which are currently allowed to be treated at SATTP, is included as Appendix C-2. Appendix C-2 also contains the type of waste material and any burn limitations for each item. Appendix C-4 describes the waste material, and chemical or energetic constituents and percent composition for waste items listed in Appendix C-2. The IHDIVNAVSURFWARCEN has evaluated and approved the treatment of all 534 items in Appendix C-2, however, treatment activities over the past few years has been limited to less than 100 of the 534 approved items. Better than 80 percent of materials treated, by weight, occurs at the Main Treatment Point.

It is important to note that only 60 items, or 10 percent of the 534 listed items in Appendix C-2 were evaluated for potential combustion products in this permit application. However, these 60 items represent better than 95 percent of the weight of materials treated at the IHDIVNAVSURFWARCEN over the past 2 years. At the present time, it is assumed that the composition of the remaining 480 items are very similar to the 60 waste items evaluated in this permit application. The Master List of Acceptable Treatment Materials is revised on a continual basis as new wastes requiring treatment are generated from IHDIVNAVSURFWARCEN activities. Sections E-3-12i, E-3-13i, E-3-14i, E-3-15i, and E-3-16i contain a discussion of the representativeness of the items chemically characterized for each treatment scenario.

E-3-3c POLU-11 Combustion Products Modeling

This air pathway analysis used the POLU-11 combustion products model to calculate the emission factors for OB items treated at IHDIVNAVSURFWARCEN. Information on the ingredients of each item are required in order to run the model.

The POLU-11 model is designed to operate with up to 9 chemical constituents per run. Only one of the treatment items in Appendix C-2 contains more than 9 constituents. In this case, the 9 constituents having the highest percentage of composition were assumed to be the sole components of the item. The ingredient constituent data for all of the treatment items evaluated by the POLU-11 model, listed in the Master Treatment List in Appendix C-2, are presented in Appendix C-4.

The POLU-11 model was developed by the U.S. Navy to estimate air emissions from OB and OD operations which treat energetic materials (Baroody and Tominack, 1987). The POLU-11 model includes a file of heat capacity coefficients and enthalpy/entropy constants for numerous potential combustion products. Currently, there are over 1,400 chemical species in the file. In the case where the chemical species are not contained within the file, the user is required to input specific information regarding the heat of formation, density, and the elemental count of each element in the species.

When used for OB predictions, the POLU-11 model calculates combustion products based on the energetic material first being mixed with air and then burned to form atmospheric pollutants. The necessary thermodynamic data for the material's ingredients and air, weight ratios of material/air and two pressure values (1,000 and 14.7 psia), are read into the program as input data. The flame temperature, combustion products, moles of gas, entropy and other pertinent data are calculated for the material/air mixtures under a pressure of 1,000 psia. The pressure of the combustion products is then lowered to 14.7 psia, which causes the temperature of the products to drop and the volume increase. At this lower temperature, referred to as the "frozen temperature" of the gas, the products have a different composition than at 1,000 psia. The program goes through a similar routine to recalculate the combustion products, flame temperature, and other variables that were changed due to the expansion. The combustion products calculated at 14.7 psia are then reported in the output data.

Even though the calculations are conducted at 1,000 and 14.7 psia, the energetic material does not have to be thermally treated at these conditions in order to predict the pollutants. The calculations are performed at these conditions based on the following assumptions:

- These pressures simulate the drop in temperature as the gases cool to ambient conditions.

- The combustion products "freeze" in composition before they reach ambient temperature.

- The combustion products of energetic materials formed during combustion calorimeter test are in good agreement with the products predicted by POLU-11.

- The heats of explosion calculated from the program closely approximate the actual values determined from the calorimetric data.

When specific chemical information for a constituent is not available or an element is not included in the combustion products library, that constituent is not input into the POLU-11 model. If a constituent's information is not input into the model, a chemically similar constituent may be substituted in its place to best model the item's combustion products or a constituents metal specie may be calculated separately on a metals-in/metals-out basis. All constituents input to the POLU-11 model have their weight percents normalized to 100 percent, if necessary, so that a direct comparison of combustion products of various items may be made. The constituent chemical information and weight percents for each of the 60 items evaluated by the POLU-11 model may be found in Appendix E-3-2.

The model chooses the compounds to consider in the combustion calculations based on the elemental composition of the energetic material burned or detonated. If the energetic material burned or detonated contains the elements carbon, hydrogen, oxygen or nitrogen, the program considers the possible combustion products. The total number of combustion products considered for each calculation is listed in the output data. This combustion product library contains most of the species formed from energetic materials that are used by the Navy.

For most energetic materials, complete oxidation occurs at 60 to 70 percent air intake (i.e., material-to-air ratios of 40:60 and 30:70). This conclusion was reached based on a preliminary onsite evaluation of the POLU-11 program at the Dugway Proving Grounds, in Utah, on May 22, 1986. This evaluation was based on burning waste Navy explosives in 5,000- and 2,500-pound sections. A helicopter passing through the gaseous clouds formed from these burns sampled two major indicator gases, carbon monoxide and hydrogen chloride. The measured carbon monoxide concentration fell between the POLU-11 predicted values for the 40:60 and 30:70 material-to-air ratios. It has, therefore, been theorized that somewhere within this range, the energetic materials were completely oxidized.

The POLU-11 model is only intended for use with propellants and explosives. Any other use of the model with combustible materials should be evaluated and interpreted in a manner different from that used for propellants and explosives. The 40:60 and 30:70 material-to-air ratios provide the best source of emission factor data for energetics. These materials typically contain oxygen in sufficient quantities to maintain combustion at the 40:60 and 30:70 ratios. The key to efficient combustion is to have sufficient oxygen to convert most or all of the carbon to carbon dioxide.

The highest emission factors calculated by the POLU-11 model for the 40:60 and 30:70 material-to-air ratios were used for all propellants and explosives evaluated in this assessment. Use of the model with contaminated solvents presents some problems because many of the solvents are burning inefficiently due to low oxygen levels. For this reason, the emission factors for solvents will be taken from the 90:10 through 30:70 material-to-air ratios.

Additional technical information on the POLU-11 model is presented in Appendix E-3-2.

E-3-4 DISPERSION MODELING

An air quality dispersion modeling study was conducted to evaluate the potential impacts associated with OB treatment emissions from the IHDIVNAVSURFWARCEN OB operations. The dispersion modeling study was conducted in conformance with the following standard U.S. EPA guidance:

- Guidance on Air Quality Models (Revised) U.S. EPA, 1987, 1990, 1993.
- INPUFF 2.3 - A Multiple Source Gaussian Puff Dispersion Algorithm User's Guide (U.S. EPA, 1986).
- User's Guide for the Industrial Source Complex (ISC2) Dispersion Models, Volume I - User Instructions.

E-3-4a **Modeling Protocol**

The air quality modeling analysis for OB operations at the SATTP was conducted using a specific modeling protocol. Two air quality models were required because of the varying duration of the OB treatment events at IHDIVNAVSURFWARCEN.

The objective of the protocol was to use the most representative dispersion model to calculate the worst-case 1-hour air dispersion factors, commonly known as chi/q, that would occur at or beyond the IHDIVNAVSURFWARCEN installation boundary for each OB treatment operation. The chi/q dispersion factor for this assessment is expressed as micrograms per cubic meter - pound per hr ($\mu g/m^3$-lb/hr). The meteorological database for all model calculations was developed from the SATTP Standard Operating Procedures (SOPs) which limit OB treatment activities to certain meteorological conditions. Receptor networks were established directly downwind of the source to determine the distance and meteorological conditions associated with the worst case impact for each OB treatment scenario.

All model calculations were made for a 1-hour averaging period. Maximum 1-hour dispersion factor (chi/q) was then scaled to other applicable averaging periods for later use with health criteria and OB emission factors to determine the environmental performance standards. Specific details of the modeling protocol are discussed in the following sections.

E-3-4b **Air Quality Models**

As stated above, two air quality dispersion models were chosen to estimate the worst-case impact of emissions from OB treatment operations. OB treatment operations are conducted at either the Main or Auxiliary Points. Each point conducts OB operations, that on average, last for 1 minute or 3 hours. The 1 minute OB emission events are considered as semi-instantaneous and were simulated using the INPUFF model. The 3-hour OB emission events were treated as constant release emission events and were simulated with the ISC2 dispersion model.

INPUFF Model

The INPUFF model is designed to calculate short-term concentrations from semi-instantaneous source releases such as OB. The INPUFF dispersion model was used to simulate all OB source release scenarios that were expected to have a duration of approximately 1 minute. The INPUFF model simulates dispersion from semi-instantaneous point sources over a spatially and temporarily variable wind field. The dispersion modeling approach is based on Gaussian puff assumptions. Three dispersion algorithms are incorporated within the model to account for initial dispersion, short-travel-time dispersion, and long-travel-time dispersion.

Short-term dispersion is based either on the use of standard Pasquill-Gifford dispersion factors or onsite meteorological data. No onsite data was available for the IHDIVNAVSURFWARCEN site, therefore, the short-term Pasquill-Gifford dispersion option was used in this modeling assessment.

Source emission parameters for each OB emission scenario were developed independently and based on specific details associated with each scenario. All OB scenarios were modeled as a buoyant point source using the standard Briggs equation.

All INPUFF model runs used a database of meteorological conditions that must exist in order for OB treatment operations to be conducted at the Strauss Avenue Thermal Treatment Point. These meteorological conditions are identified within the SATTP SOPs. Thermal treatment operations can only take place during daylight hours and at wind speeds of between 3 and 15 mph, however with special permission treatment can proceed at a wind speed of 20 mph. Wind direction was assumed to be prevailing and invariant along the receptor direction during the entire 1-hour calculation period. OB dispersion calculations assumed a semi-instantaneous 1-minute release at the start of the hour and no emissions the remainder of the hour.

The details of each INPUFF modeling demonstration are described below for each OB emissions scenario at the Main and Auxiliary treatment points.

ISC2 Model

The Industrial Source Complex Short-Term (ISCST) model is a steady-state Gaussian plume model that can be used to assess short or long term pollutant concentrations. The ISCST model was originally developed in 1979, however, it has undergone revisions over the past 3 years. In June of 1992, the U. S. EPA released the completely reprogrammed ISCST2 model which includes an updated source code, a modified data entry system, and technical changes related to building downwash. The model was revised to correct previously identified "bugs". In addition, ISCST2 includes an EVENT model for performing culpability analyses for user-specified combinations of source groups, averaging periods, data periods and receptor locations.

The model can account for the following elements relative to an emitting source: settling and dry deposition of particulates; stack and building downwash; point, line, and area sources; plume rise as a function of downwind distance; the separation of point sources; and limited terrain adjustment up to the plume release height.

In the air pathway analysis, the ISCST2 model was used specifically for OB events that were conducted for periods greater than 1 hour. At the IHDIVNAVSURFWARCEN, the emission period is generally about 3-hours for the Slum Pan and the Unlined Pan burns that occur on the Main and Auxiliary points, respectively. All OB scenarios were modeled individually as a buoyant point source using the regulatory default option. In this mode, the model accounts for the following features: final plume rise at all receptor locations; stack-tip downwash; buoyancy-induced dispersion; wind profile coefficients (rural for this analysis); and default vertical potential temperature gradients.

Meteorological input for ISCST2 included hourly estimates of wind speed, wind direction, temperature, stability category, mixing height, wind profile exponent, and vertical temperature gradient. The stability and wind speed data was confined to the permissible operating conditions that are given in the SATTP SOPs. The meteorological database is discussed in more detail in Section E-3-7. Wind direction was invariant and remained along the prevailing downwind direction of the receptor network during the entire 3-hour calculation period.

A discussion of the Slum Pan and Unlined Pans modeling scenarios are discussed below for the Main and Auxiliary point modeling demonstrations.

E-3-5 AIR DISPERSION MODEL INPUT PARAMETERS

Model input data for each emission scenario were developed on the basis of data collected from onsite visits and POLU-11 model output. Specific source data is discussed within each OB emissions scenario modeling demonstration.

E-3-6 RECEPTOR LOCATIONS

The SATTP is located at the extreme southwestern edge of the IHDIVNAVSURFWARCEN on an 1,100-foot-long peninsula extending into the Mattawoman Creek. At this position, the treatment point is adjacent to the public waterway and represents the site's most immediate point of impact for locations beyond the site boundary.

The receptor network for each OB modeling demonstration used a plume center line radial of receptors that started at 50 meters from the source and generally extended outward to 1,500 meters. In cases where model calculations indicated that the maximum impact may occurred beyond 1,500 meters, additional modeling was conducted to determine the distance of the highest 1-hour dispersion factor (chi/q). Maximum 1-hour dispersion factors (chi/q) were determined by positioning downwind receptors along the plume center line every 100 meters. This line of receptors was always directly downwind of the source emissions during the entire modeling period. All receptor elevations were assumed to be at the same height as the OB source.

E-3-7 METEOROLOGICAL DATA

OB treatment at the SATTP must be conducted in accordance with the site's SOPs. Within the SOPs are restrictions that permit OB treatment only during certain meteorological conditions. For the purpose of this air pathway assessment, the permissable meteorological conditions for OB treatment include the following atmospheric stability classes, wind speeds and conditions:

- Stability classes A through D (unstable and neutral)
- Wind speed range: 1.3 to 8.9 m/sec (3 to 20 mph)
- Cloud ceiling heights greater than 1,000 feet

At the start of the work shift, the treatment supervisor is required to call for an area forecast to determine if these conditions will prevail during the shift. If conditions are questionable or if the wind speed is expected to exceed 20 mph during the shift, the supervisor must contact the division director for permission to proceed.

Each treatment scenario was evaluated with a series of dispersion model runs that calculated air quality dispersion factors for 20 combinations of wind speed and stability class. These 20 combinations were derived from the 4 stability classes (A-D) and 5 wind speed categories that include 1.3, 3.3, 5.4, 6.7, and 8.9 m/sec. It so happens that this range of wind speed categories and stability classes is also found in the U.S. EPA screening analysis procedures. Each model demonstration conducted for this permit application used the 20 combinations of stability classes and wind speed to determine the maximum 1-hour (short-term treatment) or 3-hour (long-term treatment) dispersion factor (chi/q). Each meteorological combination of stability class and wind speed was maintained during the calculation period. The maximum 1-hour dispersion factor (chi/q) for each treatment unit was then extrapolated to longer averaging periods. Representative prevailing wind direction annual frequency data found in Table E-3-2 was also used in the extrapolation procedure for the long-term dispersion factor (chi/q).

E-3-8 OB SOURCE RELEASE SCENARIOS

OB Scenario

Air releases from OB treatment operations can take place over very short (seconds) or extended (hours) periods of time and will vary from site to site. In the case of the SATTP, treatment event durations are, on average, either 60 seconds for wastes composed principally of energetics or 3 hours for the treatment of contaminated or poorly ignitable waste products which result from the production process. For this assessment, 60 second OB events were considered as "short-term" events, whereas, 3-hour events were considered as "long-term" events. The SATTP short term and long term have been identified previously in Section E-3-3a.

The OB modeling emission parameters used for each treatment scenario are provided within the Main Point and Auxiliary model demonstrations discussed below in Sections E-3-12 through E-3-16. All OB source treatment scenarios were simulated as a buoyant point source in both models. The stack height and diameter release parameters were obtained from the height and dimensions of the containment system holding the material. The exit gas temperature for each treatment scenario was obtained from the POLU-11 model output containing the lowest OB frozen temperature for all items associated with that treatment activity. The minimum temperature in either the 40/60 or 30/70 material to air ratio category was selected. A low temperature decreases plume rise which in turn increases receptor dispersion factors (chi/q).

Plume exit velocities for each treatment scenario were developed by reviewing video tapes of OB treatment of several operations and estimating the initial velocity of the plume rise. A nearby object of known dimensions was used to create a reference distance through which the plume was timed to calculate its velocity. If exit velocity data was not available a default exit velocity of 1.0 m/sec was assumed. A 1.0 meter/second exit velocity is considered less than what might be measured directly above the OB flame. Therefore, the 1.0 meter/second assumption results in a conservative plume rise calculation.

E-3-9 AIR QUALITY MODEL CALCULATIONS

The minimum calculation period for all air quality modeling demonstrations was the 1-hour averaging period. This corresponds to the minimum exposure period for the health criteria used in this study. In addition, long term treatment events, such as the Slum Pan and Unlined Pans, included a 3-hour average dispersion factor (chi/q) calculation to correspond with the anticipated duration of these events.

Other health criteria used in this study involved 3-hour, 8-hour, 24-hour and annual average exposure concentrations. Model dispersion factors for 1-hour and 3-hour averaging periods were taken directly from the model output. For averaging periods not having direct calculations, it was necessary to use the worst case 1-hour model dispersion factor to extrapolate dispersion factors for the longer exposure periods. Dispersion factor (chi/q) estimates for these exposure periods were estimated considering zero emissions after the initial 1 minute or 3-hour emission periods. The worst case averaging period dispersion factors for 1-hour, 3-hour, 8-hour, 24-hour and annual average periods, based on a 1 pound per event emission rate, were then used along with applicable exposure period health criteria to calculate allowable emission quantities for each averaging period.

E-3-10 ENVIRONMENTAL PERFORMANCE STANDARDS

Environmental performance standards for OB treatment events were developed using health criteria information, emission factor data and dispersion modeling results to calculate allowable treatment quantities. Allowable emission quantities from treatment operations for various averaging periods were calculated as follows using health criteria and worst case dispersion model results:

$$EQ_{it} = \frac{HC_{it}}{DF_{it}}$$

where:

EQ_{it} = Allowable air emission quantity per event for contaminant of interest "i" and exposure period of interest "t" (lb)

HC_{it} = Air pathway health criteria available for the contaminant of interest "i" and the exposure period of interest "t" ($\mu g/m^3$)

DF_{it} = Maximum OB dispersion factor (chi/q), assuming a release of 1 pound for the exposure period of interest "t" ($\mu g/m^3$-lb)

As an example, in the case of the contaminant aluminum oxide (Al_2O_3) resulting from the treatment of Item No. 19 (AA-6) at the 1.1 or 1.3 Pans, the Maryland TAP 8-hour Screening Level health criteria (HC_{it}) for Al_2O_3 is 100 μg/m. The 8-hour maximum dispersion factor (DF_{it}) for the 1.1 and 1.3 Pans is 0.1231 $\mu g/m^3$-lb). The total allowable Al_2O_3 emissions (EQ_{it}) are then equal to ((100 μg/m)/(0.1231)) or 812 lbs in an 8 hour period.

Calculated allowable emission quantities for each of the five emission scenarios are presented in Tables E-3-12, E-3-19, E-3-28, E-3-29, E-3-37, and E-3-43.

The air pathway health criteria for the constituents associated with each OB treatment scenario are listed in each model demonstration. In all cases, treatment quantities for short-term and annual periods were compared to determine if calculated allowable annual treatment quantities would exceed short-term SOP limits, assuming 260 treatment days annually. If allowable annual treatment quantities exceeded annual quantities calculated by extrapolating short-term SOP limits, the annual air criteria was not used to evaluate environmental performance standards for that pollutant.

Air quality dispersion factors (chi/q) were derived for short- and long- term OB emission scenarios from the maximum 1-hour dispersion factors (chi/q) calculated with air quality dispersion models on the basis of a 1 pound/hour unit emission rate. The emission quantity, Q', for all emission constituents of interest is 1 pound.

Once the allowable contaminant emission quantities are known, the maximum amount of treated materials emitting less than the applicable emission quantity can be calculated for any OB item using its corresponding contaminant emission factor. Allowable treatment quantities of energetic material items were estimated based on the following:

$$TQ_{it} = \frac{EQ_{it}}{EF_i}$$

where:

TQ_{it} = Allowable treatment quantity based on contaminant of interest "i" and exposure period of interest "t" (lb)

EQ_{it} = Allowable emission quantity based on contaminant of interest "i" health critieria for exposure period of interest "t" (lb)

EF_i = Most restrictive emission factor for contaminant of interest "i" (lbs/lb treated)

In the example given above, the allowable emissions (TQ_{it}) of AlO_3 for a 8 hour period were calculated to be 812 lbs. The most restrictive emission factor (EF_i) for Al_2O_3 from the POLU-11 model is 0.02832 lbs of Al_2O_3 per lb. treated. Therefore, the allowable treatment quantity (TQ_{it}) is ((812 lbs)/(0.02832 lbs/lb)), or 28,684 lbs over an 8 hour period.

The allowable treatment quantities, when calculated in total pounds per exposure period, are the performance standards for OB treatment operations. The performance standards are based on worst case POLU-11 model calculations, metals composition, and energetic constituent emission factors and are relative to the emission contaminants and energetic materials given in Appendix E-3-2. Emission factors for metals were determined on a metals-in/metals-out basis. Emission factors for constituent organic materials are based on a DRE of 99.99 percent for the OB process.

The allowable treatment quantities calculated for each OB emission point represent worst case treatment quantities and demonstrate at what levels materials can be treated at the IHDIVNAVSURFWARCEN without adverse impacts to air quality, provided their emission factors or emission quantities do not exceed the emission factors for those items and contaminants. Calculated allowable treatment quantities are presented in Tables E-3-13, E-3-14, E-3-20, E-3-30, E-3-31, E-3-38, and E-3-44.

E-3-11 OB MODELING DEMONSTRATIONS AND ENVIRONMENTAL PERFORMANCE STANDARDS

The environmental performance standards for the air pathway analysis assessment were established by POLU-11 emissions modeling, air dispersion modeling and comparison to relevant air standards. Because the treatment operations conducted at the SATTP are complex, it was necessary to group the OB treatment activities for the air pathway assessment. The complexity of the OB operations are due to the variety of treatment units (1.1 pans, 1.3 pans, Solvent Vessel, Unlined Pans, etc.), treatment durations, as well as, the variations in the quantities and chemical compositions of the wastes treated. This necessitated 5 separate modeling demonstrations based upon similarities in emission characteristics. The 5 modeling demonstrations are identified as follows:

Scenario 1: Short-term 1.1 and 1.3 pans

Scenario 2: Long-term slum pans

Scenario 3: Short-term solvent vessel, igniter vessel, JATO block

Scenario 4: Short-term clay pad

Scenario 5: Long-term hog-out pans

Sections E-3-12 through E-3-16 provide separate discussions of each of these modeling scenarios. Each discussion includes the same topics under the same subheadings. These subheadings are as follows:

(a) Health Criteria
(b) Emission Factors
(c) Dispersion Modeling
(d) Emission Parameters
(e) Receptor Locations
(f) Meteorological Data
(g) Dispersion Modeling Methodology
(h) Dispersion Modeling Results
(i) Environmental Performance Standards

The general discussion in Sections E-3-3 through E-3-10 describes general information and methodology used to develop modeling scenarios and to conduct the detailed demonstrations for each scenario. Appendix E-3-3 contains the worst case INPUFF and ISC2 modeling results.

E-3-12 SATTP MAIN POINT SHORT-TERM RELEASE EVENTS - 1.1 AND 1.3 PANS

This section presents a discussion of the air pathway assessment that was performed for short-term OB treatment events conducted in the 1.1 and 1.3 pans at the SAMTTP. These events will involve the specific list of major and minor energetic items shown in Table E-3-7. Major treatment items involve those items treated most often, whereas, minor treatment items are those which are treated on an

TABLE E-3-7

A SUMMARY OF MAJOR MODEL AND MINOR TREATMENT ITEMS MODELED BY THE POLU-11 FOR THE SAMTTP* IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Major Items Treated at the 1.3 Pans	
Nomenclature	**Item Number**
AA-2	18
AA-6	19
LOVA	239
N-5	402

Minor Items Treated at the 1.1 and 1.3 Pans		
Nomenclature	**Item Number** [1]	**Location**
BKNO3	71	1.3
DNT	147	1.1
HMX	215	1.1
Lead Azide	234	1.1
Lead Styphanate	235	1.1
PBXN 103	424	1.1
PBXN 106	426	1.1
PETN	437	1.1
Tetracene	496	1.1
TiFeO Ignition Mix	501	1.1
TNT	506	1.1
16" Gun Propellant	3	1.1 and 1.3
50/50 Ignition Mix	10	1.1 and 1.3
A1A Ignition Mix	16	1.1 and 1.3
ABL-705 (AHH)	32	1.1 and 1.3
Bullseye Scrap	79	1.1 and 1.3
Cannon Powder	82	1.1 and 1.3
H8 Scrap	180	1.1 and 1.3
HES Scrap	196	1.1 and 1.3
HES 5354	198	1.1 and 1.3
HPC-87	216	1.1 and 1.3

Minor Items Treated at the 1.1 and 1.3 Pans (continued)		
Nomenclature	**Item Number [1]**	**Location**
HPC-95	217	1.1 and 1.3
I-109 Ignition Mix	221	1.1 and 1.3
Infallible Scrap	224	1.1 and 1.3
M10 Scrap	240	1.1 and 1.3
M2 Scrap	252	1.1 and 1.3
M6 Grains	271	1.1 and 1.3
M9 Grains	277	1.1 and 1.3
NACO Scrap	403	1.1 and 1.3

1 Item No. as listed in Appendix C-4
* Based on items treated in the period June 1991 through June 1992.

infrequent basis. The emission release period for these treatment events is 60 seconds. Applicable criteria, input data, and the modeling protocol for conducting the analysis are discussed in the sections below.

E-3-12a Health Criteria - 1.1 and 1.3 Pans

The relevant air pathway health criteria for the SAMTTP short-term treatment scenario are given in Table E-3-8. These criteria were extracted from the state, Federal and calculated reference criteria given in Tables E-3-4 through E-3-6 and represent only those constituents and combustion products which will be emitted from short-term treatment burns at the 1.1 and 1.3 pans. In cases where two or more criteria existed for the same averaging period and contaminant, the most restrictive value was used to evaluate the potential impacts for pollutants specific to the SAMTTP. Treatment quantities for short-term and annual periods were compared to determine if calculated allowable annual treatment quantities would exceed short-term SOP limits, assuming 260 treatment days annually. If calculated allowable annual treatment quantities exceeded annual quantities calculated by extrapolating short-term SOP limits, the annual air criteria was not used to evaluate environmental performance standards for that pollutant. The comparisons of air criteria were made based on operating periods for the SAMTTP which are 8 hrs/day, 5 days/week and 260 days/yr.

E-3-12b Emission Factors - 1.1 and 1.3 Pans

Combustion product emission factors were developed for a subset of the energetic items treated in the 1.1 and 1.3 pans. This information on the products of combustion was obtained from the POLU-11 model using energetic waste composition information provided in Appendix C-4. The treatment items assigned to the SAMTTP were classified as either major items or minor items on the basis of their annual treatment quantities. If an item was treated in large quantities over the annual period, it was classified as major item, otherwise it was considered as a minor item. The examination of the SAMTTP treatment records for the annual period June 1991 through June 1992 indicated that only a few of the potentially hundreds of items approved for treatment at the SAMTTP can be considered as major items and that they were treated at the 1.3 pans.

A listing of the major and minor item groups for the 1.1 and 1.3 pans at the SAMTTP are shown in Table E-3-7. The listing of all items treated at the the 1.1 and 1.3 pans is given in the Locations Table found in Appendix E-3-1. For the 12-month period, the major item group accounted for approximately 80 percent of the propellants and explosives treated at the SAMTTP. Due to the similarities in the chemical composition, the items modeled by POLU-11 are comparable to other items in Table E-3-7, but at this time a full comparison has not been conducted.

TABLE E-3-8

SUMMARY OF AIR CRITERIA CONCENTRATIONS FOR SHORT-TERM TREATMENT EVENTS AT THE SAMTTP 1.1 AND 1.3 PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Exposure Period Concentrations ($\mu g/m^3$)		
	1-Hour[a]	8-Hour[a]	Annual[b]
TAP Combustion Products			
Carbon dioxide		288,000	--
Carbon monoxide	40,000	290	--
Ozone	4	1	--
Nitrogen dioxide	94	56	--
Ammonia	240	170	--
Copper	--	2	--
Lead	--	0.5	--
Butane	--	19,000	--
Formaldehyde	3.7	--	0.77
Aluminum oxide	--	100	--
Hydrogen cyanide	50	--	--
Sulfur dioxide	130	52	--
Hydrogen sulfide	210	140	--
Carbon disulfide	--	310	--
Potassium hydroxide	20	--	--
Zirconium	100	50	--
Sodium cyanide	150	--	--
Hydrogen fluoride	26	--	--
Fluorine	31	16	--
Carbonyl fluoride	130	54	--
Barium	--	5	--
Boron oxide	--	100	--
Silicon carbide	--	100	--
Chlorine	29	15	--
Carbon tetrachloride	630	310	0.6666
Hydrogen chloride	75	--	--
Titanium dioxide	--	100	--

TAP Constituents (con't)			
Benzoyl peroxide	--	50	--
Tetryl	--	15	--
Dinitrotoluene	--	1.5	3.20E-03
Cyclonite (RDX)	--	15	0.3182
Diethylphthalate	--	50	--
Resorcinol	900	450	--
Diphenylamine	--	100	--
Carbon black	--	35	--
Nitroglycerine	--	4.6	--
Dibutylphthalate	--	50	--
Nitroguanidine	--	--	350
Trinitrotoluene	--	5	0.70
HMX	--	--	10

a 1-hour, 8-hour, and annual concentrations for formaldehyde and carbon tetrachloride were taken from the State of Maryland Air Toxics Regulation for screening analysis demonstrations (See Table E-3-5).

b With the exception of formaldehyde and carbon tetrachloride, annual exposure period concentrations were taken from calculated reference concentrations for energetic emissions (See Table E-3-6).

Emission factors for the SAMTTP, in pounds emitted/pound treated, were obtained from the POLU-11 model for combustion products or by assuming a 99.99% destruction efficiency for treated item constituents. The highest combustion product emission factor calculated in either the 40:60 or 30:70, material-to-air ratio categories by the POLU-11 model was selected as the emission factor for this permit application. Only combustion products and item constituents associated with the 1.1 and 1.3 treatment pans were evaluated in this demonstration. Emission factors for metals were calculated on the basis of a metals-in/metals-out assumption (i.e., the DRE is 0.0%). For the minor group category, a query was done on the treatment item ingredient master data base (See Appendix C-4) to identify the highest metal containing item, even though the item was not evaluated by the POLU-11 model. A listing of all emission factors for the SAMTTP are given in Table E-3-9.

E-3-12c **Dispersion Modeling - 1.1 and 1.3 Pans**

The INPUFF model was used to estimate the worst case impact of emissions from treatment at the 1.1 and 1.3 treatment pans. The modeling analysis was conducted using a specific protocol that incorporated U.S. EPA and State of Maryland recommended modeling guidelines and conditions specified in the SAMTTP SOPs. Each aspect of the modeling protocol is described below in Sections E-3-12d to E-3-12g.

E-3-12d **Emission Parameters - 1.1 and 1.3 Pans**

A summary of the INPUFF modeling source parameters for short-term OB events at the 1.1 and 1.3 pans are given in Table E-3-10. The OB events were considered as a buoyant point source having a release height of 1 meter. A video tape of various OB events conducted at the 1.1 and 1.3 pans indicates that, on

average, the duration of an OB event is about 60 seconds. This emission release period was used in the model for the release of all emissions associated 1.1 and 1.3 treatment events. The stack diameter was set at 4.35 meters, which is the equivalent radius of a rectangular treatment pan.
The source temperature was assumed as 1049°K. This temperature was obtained from a POLU-11 model calculation for the item treated in the largest quantity at the SAMTTP, which is AA2. The material was assumed to have 10 percent moisture, because it is often treated when wet. This results in a more conservative (lower) burn temperature. The 40:60 and 30:70 material-to-air ratios were used to determine the minimum burn temperature for the major items (AA2, AA6, N5, LOVA). Only the major items were used to determine the exit temperature because they represent the largest percentage of materials treated at the SAMTTP.

TABLE E-3-9

SUMMARY OF MAXIMUM AIR EMISSION FACTORS FOR COMBUSTION PRODUCTS OR ITEM CONSTITUENTS AT THE SAMTTP 1.1 AND 1.3 PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Major Items (EF)	Item No. [1]	Minor Items (EF)	Item No. [1]
TAP Combustion Products				
Carbon Dioxide	1.02500	402	1.08700	271
Carbon Monoxide	0.142600	402	0.599400	147
Ozone	0.000002	All	0.000002	B
Nitrogen Dioxide	0.000002	All	0.000003	215
Ammonia	0.000001	All	0.000065	496
Copper	0.00610	18	0.007630	194
Lead	0.01020	402	0.01460	B
Butane	0.000002	All	0.000002	B
Formaldehyde	0.000001	All	0.000001	B
Aluminum Oxide	0.028300	19	0.510100	424
Hydrogen Cyanide	0.000001	All	0.000002	147
Sulfur Dioxide	--	--	0.00449	403
Hydrogen Sulfide	--	--	0.00231	403
Carbon Disulfide	--	--	0.000003	A
Potassium Hydroxide	--	--	0.00831	277
Zirconium	--	--	0.01000	57
Sodium Cyanide	--	--	0.000006	82
Hydrogen Fluoride	--	--	0.00148	82
Fluorine	--	--	0.000001	82
Carbonyl Fluoride	--	--	0.000002	82
Barium	--	--	0.01050	198
Boron Oxide	--	--	0.45880	71
Silicon Carbide	--	--	0.000003	10
Chlorine	--	--	0.0252500	199
Carbon Tetrachloride	--	--	0.000005	424
Hydrogen Chloride	--	--	0.12110	424
TAP Constituent*				
Benzoyl Peroxide	--	--	0.00010	70
Tetryl	--	--	0.00010	500

TABLE E-3-9
SUMMARY OF MAXIMUM AIR EMISSION FACTORS
FOR COMBUSTION PRODUCTS OR ITEM CONSTITUENTS
AT THE SAMTTP 1.1 AND 1.3 PANS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

Date: April 5, 1996

TAP Constituent* (continued)				
Dinitrotoluene	--	--	0.00010	147
Cyclonite (RDX)	0.000076	239	0.00010	456
Diethylphthalate	0.0000105	402	0.0000059	398
Resorcinol	--	--	0.000001	213
Diphenylamine	--	--	0.000001	2
Carbon Black	--	--	0.000003	218
Nitroglycerine	0.000039	19	0.0000750	A
Dibutylphthalate	--	--	0.000004	140
Nitroguanidine	--	--	0.00010	185
Trinitrotoluene	--	--	0.00010	506
HMX	--	--	0.000095	431

* Energetic Constituent Emission Factors Based on 99.99% Destruction Efficiency.

A - Several

B - Numerous

Major Items - AA2, AA6, N5, LOVA

Minor Items - Items treated in smaller quantities than major items.

1 Item No. as listed in Appendix C-4.

TABLE E-3-10

INPUFF MODEL INPUT PARAMETERS FOR SHORT-TERM OB EVENTS AT THE SAMTTP 1.1 AND 1.3 PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Source Type	Point
Source Height (m)	1
Source Diameter (m)	4.35
Source Velocity (m/s)	4.57
Source Temperature (°K)	1049
Ambient Temperature (°K)	287
Dispersion Option	Pasquill-Gifford
Downwash Option	No
Buoyancy-Induced Dispersion	Yes
Release Duration (s)	60
Mixing Height (m)	3000

Mixing height, which is the depth through which atmospheric pollutants are typically mixed by dispersion processes, was assumed to be 3,000 meters.

An exit velocity of 4.57 m/s was estimated from video tapes of prior treatment events as described in Section E-3-8.

E-3-12e Receptor Locations - 1.1 and 1.3 Pans

The INPUFF modeling analysis assumed that the wind direction was invariant over the course of the 1-hour calculation period. The receptor network was restricted to a series of receptors located along a straight line downwind of the OB source. Each receptor was assumed to have the same elevation as the emission height (1 meter). This is a valid assumption because the closest non-precluded receptor direction extends outward from the Main Point along the Mattawoman Creek. Individual receptor points along the downwind radial were spaced at 50 m intervals in order to locate the magnitude and distance of the maximum impact resulting from the 60 second emission event.

E-3-12f Meteorological Data - 1.1 and 1.3 Pans

Meteorological conditions for this modeling scenario were assumed to be consistent with the SOP limitations and criteria described above in Section E-3-7. Wind speeds were evaluated over the range of 1.3 m/sec (3 mph) to 8.9 m/sec. Atmospheric stabilities were limited to the unstable and neutral classes A through D, which occur principally during the daylight hours. Each stability class and wind speed range value was modeled to determine the worst case 1-hour dispersion factor (chi/q). Stability class/wind speed group scenarios were based on those recommended by the U.S. EPA for determining worst-case impacts in the screening guidance and SOP limitations. These stability/wind speed groupings included: Stability A (1.3 m/sec to 3.3 m/sec); Stability B (1.3 m/sec to 5.4 m/sec); and Stabilities C & D (1.3 m/sec to 8.9 m/sec).

E-3-12g Dispersion Modeling Methodology - 1.1 and 1.3 Pans

Treatment events at the SAMTTP are typically conducted on an individual pan basis with each OB event lasting for an average of 60 seconds. All OB source emission events were modeled at a unit emission rate of 1 pound for the first minute of the hour, then assumed zero emissions over the remaining 59 minutes. Wind speed, direction and stability class remained invariant over the hourly period. The receptor network was positioned on a straight line directly downwind of the emission point. Individual model runs were made for each wind speed and stability group, with source parameters remaining constant.

E-3-12h **Modeling Results - 1.1 and 1.3 Pans**

The worst case 1-hour dispersion factor (chi/q) and location for each stability class and associated wind speed are summarized below:

Stability Class/Wind Speed m/sec	Max 1 Hr Dispersion Factor ($\mu g/m^3$- lb/hr)	Distance (m)
A/3.3	0.1019	750
B/5.4	0.1065	1050
C/8.9	0.1231*	1250
D/8.9	0.0628	3200

* Maximum value

The maximum 1-hour dispersion factor (chi/q) for stability class C was extrapolated to longer averaging periods. Dispersion factors (chi/q) and calculation methods for averaging periods ranging from 1-hour to annual are summarized in Table E-3-11. These dispersion factors were used in conjunction with the health criteria (Table E-3-8) and emission factors (Table E-3-9) to develop environmental performance standards for the SAMTTP short-term burn scenario.

E-3-12i Environmental Performance Standards - 1.1 and 1.3 Pans

Environmental performance standards for short-term events at the SAMTTP were developed using health criteria given in Table E-3-8, emission factor data given in Table E-3-9 and dispersion factors (chi/q) in Table E-3-11. Maximum allowable emissions and treatment quantities were developed using the procedure described above in Section E-3-10 and are summarized in Tables E-3-12 through E-3-14.

As stated earlier, the evaluation of emissions from short-term treatment of reactive materials at the SAMTTP 1.1 and 1.3 pans was divided into two groups. Treatment items were designated as major or minor based on the actual quantity of items treated from June 1991 to June 1992. The 4 major items represent approximately 80 percent, by weight, of the material treated during this period. The evaluation

TABLE E-3-11

SUMMARY OF AIR DISPERSION FACTORS* FOR SHORT-TERM OB EVENTS AT THE SAMTTP 1.1 AND 1.3 PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Averaging Period	Dispersion Factor ($\mu g/m^3$-lb/hr)	Calculation Method
1-Hour	0.1231	Model Output
3-Hour	4.10E-02	1-Hour Conc./3
8-Hour	1.54E-02	1-Hour Conc./8
24-Hour	5.13E-03	1-Hour Conc. /24
Quarterly	7.14E-06	Annual Conc. x 4
Annual	1.78E-06	(1-Hour Conc./24)/365 x 0.127**

* Refer to Section E-3-9 for a discussion of the development and use of dispersion factors (chi/q).

** The maximum annual wind distribution frequency is 12.7% as shown in Table E-3-2.

for these items is straightforward in that emission factors for the major item combustion products are based on a review of the POLU-11 model results.

Table E-3-13 indicates 3,140 pounds of Item 402 as the maximum allowable treatment quantity for an 8 hour period based on the worst case emission factor for lead from the major items group. This quantity is less than the SOP limit of 9,000 pounds, therefore, treatment of Item 402 is restricted to 3,140 pounds per 8 hour period. It should be noted that to treat 9,000 pounds of energetic material in one treatment event, all six pans designated for 1.3 or 1.1 materials would be required. As a result, only the Slum Pan could be used at the SAMTTP for additional treatment the remainder of the day.

The evaluation of minor items is more complicated since not all treated items were evaluated with the POLU-11 model. Various items were not included in the evaluation due to established treatment limits that are already defined in the Master List of Acceptable Materials (Appendix C-2). For example, items such as methylene chloride and chloroform are treated at a maximum of 20 pounds/event. This limit is well below the allowable treatment quantities calculated for chlorine in Table E-3-14.

A representative set of minor items was modeled with POLU-11. These items exhibit a wide range of weight percents of the major elemental constituents: hydrogen, carbon, nitrogen, and oxygen, and are representative of the worst case combustion products for all the items containing these elements. Items containing various weight percents of other constituents (i.e., aluminum) were also modeled with POLU-11. These constituents were run at the maximum weight percent for all items treated at the Main Point (1.1 and 1.3 pans). The resulting minor item emission factors for combustion products represent the worst case condition and produced the most restrictive allowable treatment quantity for items associated with these pollutants.

It was possible to calculate emission factors for metal constituents that were not modeled with POLU-11. Emission factors for these constituents were calculated on a metals-in metals-out basis. To evaluate all the items that may be treated at the SAMTTP 1.1 and 1.3 pans, a database was created which includes chemical characterization data for each item. A review of the database resulted in the following analysis of emission factors for each element that is a TAP combustion product.

Lead Containing Items

The maximum weight percent of lead in all items is for lead azide which has an emission factor of 0.711 pounds of lead per pound of lead azide treated. Using this emission factor, an allowable treatment quantity of 45 pounds per 8-hour period is calculated for lead azide. Lead azide has a treatment limit of 2

TABLE E-3-12

SUMMARY OF ALLOWABLE AIR EMISSIONS QUANTITIES FOR SHORT-TERM OB EVENTS AT THE SAMTTP 1.1 AND 1.3 PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Allowable Air Emissions (lbs)		
	1-Hour	8-Hour	Annual
TAP Combustion Products			
Carbon dioxide		18,716,491	--
Carbon monoxide	325,000	18,831	--
Ozone	32	65	--
Nitrogen dioxide	764	3,636	--
Ammonia	1,950	11,039	--
Copper	--	130	--
Lead	--	32	--
Butane	--	1,234,768	--
Formaldehyde	30	--	431,453
Aluminum oxide	--	6,494	--
Hydrogen cyanide	406	--	--
Sulfur dioxide	1,056	3,377	--
Hydrogen sulfide	1,706	9,091	--
Carbon disulfide	--	20,130	--
Potassium hydroxide	162	--	--
Zirconium	812	3,247	--
Sodium cyanide	1,219	--	--
Hydrogen Fluoride	211	--	--
Fluorine	252	1,040	--
Carbonyl fluoride	1,056	3,506	--
Barium	--	325	--
Boron oxide	--	6,494	--
Silicon carbide	--	6,494	--
Chlorine	236	974	--
Carbon tetrachloride	5,118	20,130	373,515
Hydrogen chloride	609	--	--
Titanium dioxide	--	6,494	--
Antimony		325	

TABLE E-3-12
SUMMARY OF ALLOWABLE AIR EMISSIONS QUANTITIES
FOR SHORT-TERM OB EVENTS AT THE SAMTTP 1.1 AND 1.3 PANS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

Date: April 5, 1996

	Allowable Air Emissions (lbs)		
	1-Hour	8-Hour	Annual
TAP Combustion Products			

	Allowable Air Emissions (lbs)		
	1-Hour	8-Hour	Annual
TAP Constituents			
Benzoyl peroxide	--	3,247	--
Tetryl	--	974	--
Dinitrotoluene	--	97	1.7930E+03
Cyclonite (RDX)	--	974	8.9652E+03
Diethylphthalate	--	3,247	--
Resorcinol	7,311	29,221	--
Diphenylamine	--	6,494	--
Carbon black	--	2,273	--
Nitroglycerine	--	299	--
Dibutylphthalate	--	3,247	--
Nitroguanidine	--	--	1.9611E+08
Trinitrotoluene	--	325	3.9330E+05
HMX	--	--	5.6033E+06

TABLE E-3-13

SUMMARY OF MAXIMUM ALLOWABLE TREATMENT QUANTITIES (LBS/AVERAGING PERIOD) FOR MAJOR ITEMS AT THE SAMTTP 1.1 AND 1.3 PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

		Treatment Quantities (lbs)		
	Item No.[1]	1-Hour	8-Hour	Annual
TAP Combustion Products				
Carbon dioxide	402		1.83E+07	--
Carbon monoxide	402	2.28E+06	1.84E+04	--
Ozone	All	1.67E+07	3.25E+07	--
Nitrogen dioxide	All	3.82E+08	1.82E+09	--
Ammonia	All	1.95E+09	1.10E+10	--
Copper	18	--	2.13E+04	--
Lead	402	--	3.14E+03	--
Butane	All	--	6.17E+11	--
Formaldehyde	All	3.00E+07		4.31E+11
Aluminum oxide	19	--	2.30E+05	--
Hydrogen cyanide	All	4.06E+08	--	--
TAP Constituents				
Cyclonite (RDX)	456	--	1.69E+05	1.18E+08
Diethylphthalate	402	--	3.095E+08	--
Nitroglycerine	409	--	7.691E+06	--

1 Item No. as listed in Appendix C-4.

TABLE E-3-14

SUMMARY OF MAXIMUM ALLOWABLE AIR TREATMENT QUANTITIES (LBS/AVERAGING PERIOD) FOR MINOR ITEMS AT THE SAMTTP 1.1 AND 1.3 PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

		Treatment Quantities (lbs)		
	Item No. [1]	1-Hour	8-Hour	Annual
TAP Combustion Products				
Carbon dioxide	271		1.72E+07	–
Carbon monoxide	147	5.42E+05	3.14E+04	–
Ozone	B	8.12E+06	3.25E+07	–
Nitrogen dioxide	215	2.55E+08	1.21E+09	–
Ammonia	496	3.00E+07	1.70E+08	–
Copper	194	–	1.70E+04	–
Lead	B	–	2.19E+03	–
Butane	B	–	6.17E+11	–
Formaldehyde	B	3.00E+07		4.31E+11
Aluminum oxide	424	–	1.27E+04	–
Hydrogen cyanide	147	2.03E+08	–	–
Sulfur dioxide	403	2.35E+05	7.53E+05	–
Hydrogen sulfide	403	7.38E+05	3.94E+06	–
Carbon disulfide	A	–	6.72E+9	–
Potassium hydroxide	227	1.96E+04	–	–
Zirconium	57	8.12E+04	3.25E+05	–
Sodium cyanide	82	2.02E+08		–
Hydrogen fluoride	82	1.43E+05	–	–
Fluorine	82	2.52E+08	1.04E+09	–
Carbonyl fluoride	82	5.28E+08	1.75E+09	–
Barium	198	–	3.09E+04	–

TABLE E-3-14
SUMMARY OF MAXIMUM ALLOWABLE TREATMENT QUANTITIES (LBS/AVERAGING PERIOD)
FOR MINOR ITEMS AT THE SAMTTP 1.1 AND 1.3 PANS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

Date: April 5, 1994

		Treatment Quantities (lbs)		
	Item No. [1]	1-Hour	8-Hour	Annual
Boron oxide	71	--	1.42E+04	--
Silicon carbide	10	--	2.17E+09	--
Chlorine	199	9.35E+03	3.86E+03	--
Carbon tetrachloride	424	1.02E+09	4.03E+09	7.47E+10
Hydrogen chloride	424	5.03E+03	--	--
TAP Constituents				
Benzoyl peroxide	70	--	3.25E+07	--
Tetryl	500	--	9.75E+06	--
Dinitrotoluene	147	--	9.70E+05	1.79E+07
Cyclonite (RDX)	456	--	9.75E+06	1.79E+09
Diethylphthalate	398	--	5.51E+08	--
Resorcinol	213	7.31E+09	2.92E+10	--
Diphenylamine	2	--	6.50E+09	--
Carbon black	218	--	7.58E+08	--
Nitroglycerine	A	--	3.99E+06	--
Dibutylphthalate	140	--	8.12E+08	--
Nitroguanidine	185	--	--	1.96E+12
Trinitrotoluene	506	--	3.25E+06	3.92E+09
HMX	431	--	--	5.90E+10

A - Several

B - Numerous

[1] - Item No. as listed in Appendix C-4.

pounds per event in the master list, which is far below the calculated treatment quantity. Therefore, the metals-in/metals-out emission factors for lead azide and lead styphnate were not used to calculate allowable treatment quantities in Table E-3-14.

Other lead containing constituents that are treated include lead oxide, lead-a-resorcylate, basic lead carbonate, lead beta resorcylate, lead-2-ethylhexoate, lead chromate, lead nitrate, lead salicylate, lead stearate, and lead tribasic maleate monohydrate. Of these items containing lead, five have high weight percents ranging from 20-55 percent of the lead containing constituents. These items are delay, primer, and ignition mixes. The primer and ignition mixes are restricted to 2 pounds per event in the master list. The delay mixture which contains 55 percent of a lead containing constituent is limited to 10 pounds per burn by the master list.

As in the case of 100 percent lead azide and lead styphnate, the treatment limits required by the master list are well below the allowable treatment quantity calculated for lead azide, the worst case item. Again, the emission factors for these items were not used to calculate treatment quantities for minor items at the Main Point. Of the remaining minor items which contain lead, the maximum weight percent of lead is 1.46 percent which was calculated from an item containing 3 percent lead beta resorcylate, which is 48.8 percent lead. The pound per pound emission factor for lead used in the emission factor table is .0146 and represents the worst case emission of lead for minor items treated at the Main Point based on the preceding discussion.

Barium Containing Items

The constituents containing barium are used mainly in primer and delay mixes which have from 2 to 10 pound burn limits. The chemical compounds having the largest weight percent of barium are barium nitrate and barium styphnate. These items are laboratory chemicals which are contaminated with explosive contaminants and are generated and treated in small quantities. Of the remaining barium containing items, those having neither an explicit weight limit nor are generated in small quantities, the largest weight percent is 2 percent in Item 198 (HES 5354). The emission factor for this item (0.0105 pound barium per pound of HES 5354 treated) was used to calculate the allowable treatment quantity for 1.1 and 1.3 pan minor items. The emission factors for the items with larger percentages of barium were not used in the evaluation, based on a comparison of the treatment limits set in the master list, or knowledge of very low treatment quantities being available for OB treatment.

Copper Containing Items

The item containing the largest weight percent of copper is HEN 12 SCRAP which contains 2.5 percent monobasic cupric salicylate which is 30 percent copper by weight. This item produces the maximum emission factor for copper (.00763 pound per pound of material treated) which was used to evaluate the allowable treatment quantity limits in Table E-3-14.

Boron Containing Items

The item containing the largest percentage of boron is the titanium/boron delay mix which may contain up to 90 percent boron. This item has a 10 pound limit per burn set in the Master List (Appendix C-2). The emission factor for this item was not used to calculate treatment quantities because of the 10 pound limit and the calculated allowable emission quantity for boron oxide of 6,494 pounds/8-hour period in Table E-3-12.

The item with the next largest percentage of boron is $BKNO_3$ (boron potassium nitrate) which was modeled with POLU-11 and represents the worst-case emission scenario of boron oxide at the 1.1 and 1.3 pans. $BKNO_3$ has a 100 pound limit per burn set in the Master List but was used to represent SAMTTP emissions of boron oxide. The allowable treatment quantity based on boron oxide emissions in Table E-3-14 is 14,200 pounds per 8-hour period which is well above the SOP treatment limits.

Titanium Containing Items

The minor items containing titanium range in weight percents from 100 percent for titanium powder to 10 percent for titanium boron delay mix. All of the items have treatment limits set in the Master List (Appendix C-2) that range from 2 pounds to 20 pounds per event. These limits are well below the calculated allowable emission quantity for titanium dioxide in Table E-3-12. Due to all items containing titanium having acceptable treatment limits set in the Master List, no further evaluation is required.

Zirconium Containing Items

The large majority of items containing zirconium are either ignition, primer or delay mixtures which have treatment limits of 2 to 20 pounds set in the Master List (Appendix C-2). These limits are well below the calculated allowable emission quantity for zirconium as calculated in Table E-3-12. As a result, items having treatment limits of 2-20 pounds were not used to establish the allowable treatment quantities for the SAMTTP 1.1 and 1.3 pans. The largest weight percent of zirconium in an item which doesn't have a treatment limit in the master list is 1 percent in AMRAAM (Item 57). The resulting emission factor for this item was used to calculate the worst case allowable treatment quantities for emissions of zirconium from the 1.1 and 1.3 pans at the SAMTTP.

Other Metals

Metals such as nickel, manganese, tungsten, and antimony are found in primer, ignition, and delay mixes and must be treated in quantities ranging from 2 to 20 pounds per event. TLV based screening levels for these metals would result in allowable metal emissions greater than 864 pounds for an 8-hour period, which was calculated for antimony, the metal with the lowest TLV. Although soluble nickel compounds had a lower TLV, the expected nickel combustion products are nickel oxides, which are insoluble in water. Due to the small quantities of these metals available for treatment at the SAMTTP, no further evaluation was conducted.

Summary

The calculated allowable treatment quantities in Tables E-3-13 and E-3-14 for the 1.1 and 1.3 pans show that items can be treated at SOP and Master List limits with the exception of those items which contain chlorine and lead. The item used to evaluate chlorine emissions contained 87 percent ammonium perchlorate (AP). The only item with a larger chlorine content was pure ammonium perchlorate, which has a 500 pound limit set in the master list. Potassium perchlorate (KP), which has a lower percent chlorine than AP, has a 20 pound per burn limit in the Master Table. Based on an evaluation of the items containing AP or KP the following items will be treated at a maximum of 930 pounds per 1-hour period and 3,800 pounds per 8-hour period. Air bag, MK 82/90 grains, AAAM, AMRAAM, ASRM, CTBN SCRAP, HES 5800 series scrap, MK104 Booster/Sustainer scrap, MK111 scrap and MK18 scrap. Items containing lead may be treated at the master list limits or no greater than 6,680 pounds per day without additional evaluation.

E-3-13 SAMTTP LONG TERM RELEASE EVENTS - SLUM PAN

This section presents a modeling demonstration for long-term OB treatment events that are conducted at the Slum Pan. The materials treated at the Slum Pan includes material (principally sawdust) saturated with explosive contaminated liquids, principally solvents. Input data and modeling protocol for conducting the demonstration are discussed in the sections below.

TABLE E-3-15

SUMMARY OF AIR PATHWAY HEALTH CRITERIA CONCENTRATIONS FOR LONG-TERM TREATMENT EVENTS AT THE SAMTTP SLUM PAN IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Exposure Period Concentration ($\mu g/m^3$)			
	1-Hour[a]	8-Hour[a]	24-Hour	Annual
TAP Combustion Products				
Carbon dioxide		288,000	--	--
Carbon monoxide	40,000	290	--	--
Ozone	2	--	--	--
Nitrogen dioxide	94	56	--	--
Ammonia	240	170	--	--
Butane	--	19,000	--	--
Formaldehyde	3.7	--	--	0.77[a]
PM10	--	--	150[b]	50[b]
Hydrogen cyanide	50	--	--	--
Sulfur dioxide	--	--	365	80
TAP Constituents				
Trinitrotoluene	--	5	--	0.70[c]
Acetone	23,800	17,800	--	--
Dibutylphthalate	--	50	--	--
Ethylene glycol	1,000	--	--	--
Hexane	--	1,760	--	--
Methanol	3,280	2,620	--	--

TABLE E-3-15 (Continued)
SUMMARY OF AIR PATHWAY HEALTH CRITERIA CONCENTRATIONS FOR LONG-TERM TREATMENT EVENTS AT THE SAMTTP SLUM PAN
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

	Exposure Period Concentration ($\mu g/m^3$)			
	1-Hour[a]	8-Hour[a]	24-Hour	Annual
TAP Constituents (continued)				
Methylethyl ketone	8,850	5,900	--	--

a 1-hour, 8-hour concentrations and the annual concentration for formaldehyde were taken from the State of Maryland Air Toxics Regulation for screening analysis demonstrations (See Table E-3-5).
b The 24-hour and annual concentrations for PM10 were taken from the National Ambient Air Quality Primary Standards.
c The annual concentration for trinitrotoluene was taken from calculated reference concentrations for energetic emissions (See Table E-3-6).

E-3-13a Health Criteria - Slum Pan

The air pathway health criteria for the Slum Pan treatment scenario are given in Table E-3-15. These criteria were extracted from the state, Federal and calculated reference criteria given in Tables E-3-4 through E-3-6 and are applicable to only those combustion products associated with long-term treatment events at the slum pan. All of the health criteria given in Table E-3-15 are either toxic air pollutants (TAPs) regulated by the State of Maryland or criteria pollutants regulated by the National Ambient Air Quality Standards (NAAQS). In cases where two or more criteria existed for the same averaging period and contaminant, the most restrictive value was used to evaluate the potential impacts for pollutants specific to the slum pan. All of the TAP criteria are screening levels and are generally more restrictive than the other pollutants regulated by the NAAQS. The comparisons of air criteria were made based on operating periods of 8 hr/day, 5 days/week and 260 days/yr.

E-3-13b Emission Factors - Slum Pan

Combustion product emission factors were developed for the slum materials saturated with contaminated solvents and trinitrotoluene. The slum material is most frequently saturated with the solvents isopropanol, ethanol, butanol, and heptane. These solvents were assumed to be contaminated at the 10 percent level, by weight, with the explosives RDX, PNC or EDDN. Each of these solvent/contaminant scenarios were modeled with the POLU-11 combustion products model. Two materials and five solvents were modeled as noncontaminated with POLU-11 to represent emissions from solvents treated with less frequency. These materials included dibutylphthalate and ethyl centralite and the solvents ethylene glycol, methyl ethyl ketone, acetone, hexane, and methanol. Solvents with treatment limits of 20 pounds set in the Master List (Appendix C-2) were not included in the evaluations.

Combustion product emission factors for the Slum Pan treatment process are given in Table E-3-16 in pounds emitted/pound solvent-contaminant treated. These factors were calculated by the POLU-11 model in the 90:10 through 30:70 material-to-air ratio categories and represent the contribution from the energetic or the solvent and contaminant.

The contaminated solvents are adsorbed onto sawdust prior to being thermally treated. The combustion of the sawdust material can result in emissions of PM10, SO_2, NO_x, and CO according to information contained in Section 1.6 on Wood Waste Combustion in the U. S. EPA emission factor document AP-42. Emission factors for these combustion products are given below:

TABLE E-3-16

SUMMARY OF MAXIMUM EMISSION FACTORS FOR THE SAMTTP SLUM PAN IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

TAP Combustion Products	Emission Factor (lbs/lb)	Solvent/Contaminant*
Carbon Dioxide	8.54E-01	TNT
Carbon Monoxide	5.26E-01	TNT
Ozone	2.0E-06	All Combinations
Nitrogen Dioxide	2.0E-06	All Combinations
Ammonia	7.27E-04	Hexane
Butane	2.0E-06	All Combinations
Formaldehyde	1.0E-06	All Combinations
PM10	6.30E-01	Ethyl Centralite
Hydrogen Cyanide	1.0E-06	All Combinations
Sulfur Dioxide	7.50E-05	Sawdust
TAP Constituents		
Trinitrotoluene	1.0E-04	Trinitrotoluene
Acetone	1.0E-04	Acetone
Dibutylphthalate	1.0E-04	Dibutylphthalate
Ethylene Glycol	1.0E-04	Ethylene Glycol
Hexane	1.0E-04	Hexane
Methanol	1.0E-04	Methanol
Methyl Ethyl Ketone	1.0E-04	Methyl Ethyl Ketone

* Assuming 10% by weight contamination level.

Sawdust Emission Factors (lbs/lb)	
PM10	3.6E-3
SO_2	7.50E-5
NO_x(As NO_2)	3.40E-4
CO	1.10E-2

The sawdust emission factors for PM10, NO_2, and CO are much smaller than their counterparts in Table E-3-16 and were not considered as worst case emission factors for Slum Pan treatment. The POLU-11 model did not calculate an SO_2 emission factor for the OB treatment of contaminated solvents. However, in order to account for all possible emission products from the slum pan treatment, the sawdust emission factor for SO_2 was included in this demonstration.

E-3-13c Dispersion Modeling - Slum Pan

The ISC2 model was used to estimate the worst case impact of long term OB events at the Slum Pan. The modeling analysis was conducted using the modeling protocol discussed in Section E-3-4 and incorporated EPA and State of Maryland recommended modeling guidelines and procedures, as well as conditions specified in the SAMTTP SOPs. The modeling demonstration conducted for the Slum Pan treatment scenario is discussed below.

E-3-13d Emission Parameters - Slum Pan

A summary of the ISC2 modeling source parameters for the Slum Pan long term OB events are given in Table E-3-17. The Slum Pan treatment process is considered a buoyant point source having a release height of 0.5 meters. The average duration of the slum pan events are generally 3 hours. Emissions were assumed to be continuous over the entire 3-hour period. The stack diameter was set at 6.83 meters, which is based on the equivalent area of the slum pan.

The source temperature was assumed as 683°K, which represents the lowest temperature found in the 40:60/30:70 material-to-air ratios for all of the contaminated solvent treatment scenarios evaluated by the POLU-11 model.

The Slum Pan treatment process generally requires 3 hours for completion. During this time period the initial exit velocity may decrease over the course of the burn as the contaminated solvent material is being destructed. As a result, a conservatively lower initial exit velocity of 1.0 m/s was assumed for the Slum Pan.

TABLE E-3-17

ISC2 MODEL SOURCE PARAMETERS FOR LONG-TERM TREATMENT AT THE SAMTTP SLUM PAN IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Source Type	Point
Source Height (m)	0.50
Source Diameter (m)	6.83
Source Velocity (m/s)	1
Source Temperature (°K)	683
Ambient Temperature (°K)	287
Dispersion Option	Pasquill-Gifford
Stack Downwash Option	Yes
Buoyancy-Induced	Yes
Release Duration (hrs)	3
Mixing Height (m)	3000

E-3-13e Receptor Locations - Slum Pan

The ISC2 modeling analysis assumed that the wind direction was invariant over the course of the 3-hour calculation period and therefore restricted the receptor network to a series of receptors located along a straight line downwind of the OB source. Each receptor was assumed to have the same elevation as the emission height (0.5 meter). This is a valid assumption because the closest installation boundary receptor point is located a short distance from the treatment point and extends outward along the Mattawoman Creek.

Individual receptor points along the downwind radial were spaced at 50 m intervals in order to locate the magnitude and distance of the maximum impact resulting from the 3-hour emission event.

E-3-13f Meteorological Data - Slum Pan

Meteorological conditions for this modeling scenario were assumed to be consistent with the SOP limitations and meteorological criteria described above in Section E-3-7. Wind speeds were evaluated over the range of 1.3 m/sec to 8.9 m/sec. Atmospheric stabilities were limited to the unstable and neutral classes A through D, which occur principally during the daylight hours.

Each stability class and wind speed range value was modeled for a 3-hour period to determine the worst-case ambient 1-hour and 3-hour dispersion factor (chi/q). Only the maximum 1-hour dispersion factor (chi/q) was used in this air pathway analysis because there are no 3-hour health criteria for the Slum Pan combustion products. The stability class/wind speed group scenarios were based on those recommended by the U. S. EPA for determining worst-case impacts in the screening guidance and SOP limitations. These stability/wind speed groupings included: Stability A (1.3 m/sec to 3.3 m/sec); Stability B (1.3 m/sec to 5.4 m/sec); and Stabilities C & D (1.3 m/sec to 8.9 m/sec).

E-3-13g ISC2 Modeling Methodology - Slum Pan

Long-term treatment events at the Slum Pan are assumed to occur once a day with each event lasting for an average of 3 hours. All source emission events were modeled at a continuous unit emission rate of 0.0416 g/sec for 3 consecutive hours which is equivalent to a 3 hour emission rate of 1 lb. Modeling results were then presented as 1-hour dispersion factors (chi/q) based on 1 pound of material treated. Wind speed, direction and stability class remained invariant over the 3-hour period. The receptor network was positioned on a straight line directly downwind of the emission point. Individual model runs were made for each wind speed and stability group, with source parameters remaining constant.

E-3-13h **Dispersion Modeling Results - Slum Pan**

Worst-case 1-hour dispersion factors (chi/q) for each stability class and associated wind speed for the SAMTTP Slum Pan are summarized below:

Stability Class/Wind Speed (m/sec)	Max 1-Hr Dispersion Factor ($\mu g/m^3$-lb/hr)	Distance (m)
A/3.0	0.1261	550
B/5.0	0.1436	600
C/8.9	0.2362*	550
D/8.9	0.1883	850

* Maximum value

The maximum 1-hour dispersion factor (chi/q) for stability class C was used to extrapolate calculate dispersion factors for longer averaging periods. Dispersion factors for averaging periods ranging from 1-hour to annual are summarized in Table E-3-18. These dispersion factors were used in conjunction with the health criteria and emission factors to develop environmental performance standards for the slum pan treatment scenario.

E-3-13i **Environmental Performance Standards - Slum Pan**

Environmental performance standards for treatment activities at the Slum Pan were developed using health criteria in Table E-3-15, emission factor data in Table E-3-16 and dispersion modeling factors in Table E-3-18. Maximum allowable emissions and treatment quantities were developed using the procedure described in Section E-3-10. Allowable emission quantities in pounds/averaging period for the Slum Pan are given in Table E-3-19.

Maximum allowable treatment quantities for the Slum Pan are presented in Table E-3-20. Maximum allowable treatment quantities are based on the worst case item emission factors and represent the maximum amount of material that can be treated for the worst case item and still be in compliance with the applicable air criteria. The SOP limit for treatment at the Slum Pan is 1,000 pounds of energetic material per event.

TABLE E-3-18

**SUMMARY OF AIR DISPERSION FACTORS*
FOR THE SAMTTP SLUM PAN
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND**

Averaging Period	Dispersion Factor ($\mu g/m^3$/0.3lb***/hr)	Calculation Method
1-Hour	0.2362	Model Output
3-Hour	0.2362	Model Output
8-Hour	8.86E-02	(3 x 1-hr Conc) / 8
24-Hour	2.95E-02	(3 x 1-hr Conc) ,/24
Quarterly	4.11E-05	Annual Conc. x 4
Annual	1.03E-05	(1 hr Conc./24 hr Conc.) / 365 x (0.127)**

* Refer to Section E-3-9 for a discussion of the development and use of dispersion factors (Chi/q).
** The maximum annual wind distribution frequency is 12.7 percent as shown on Table E-3-2.
*** This dispersion factor was based on a 0.33 pound/hour emission rate in the model calculations. This equals to a total of 1.0 pound for the 3-hour OB treatment event.

TABLE E-3-19

SUMMARY OF ALLOWABLE AIR EMISSIONS FOR THE SAMTTP SLUM PAN IHDIVSURFWARCEN INDIAN HEAD, MARYLAND

	Allowable Air Emissions (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
TAP Combustion Products				
Carbon dioxide	--	3,251,482	--	--
Carbon monoxide	169,00	3,273	--	--
Ozone	17	11	--	--
Nitrogen dioxide	398	632	--	--
Ammonia	1,016	1,919	--	--
Butane	--	214,447	--	--
Formaldehyde	16	--	--	74,758
PM10	--	--	5,080	4,854,469
Hydrogen cyanide	212	--	--	--
Sulfur dioxide	--	--	12,373	7,766,990
TAP Constituents				
Trinitrotoluene	--	56	--	68,139
Acetone	100,762	200,902	--	--
Dibutylphthalate	--	564	--	--
Ethylene glycol	4,234	--	--	--
Hexane	--	19,870	--	--
Methanol	13,887	29,579	--	--
Methyl ethyl ketone	37,468	66,591	--	--

TABLE E-3-20

SUMMARY OF MAXIMUM ALLOWABLE TREATMENT QUANTITIES FOR THE SAATTP SLUM PAN IHDIVSURFWARCEN INDIAN HEAD, MARYLAND

	Maximum Allowable Treatment Quantities (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
TAP Combustion Products				
Carbon dioxide		3.81E+06	--	--
Carbon monoxide	3.22E+05	6.20E+03	--	--
Ozone	8.25E+06	5.50E+06	--	--
Nitrogen dioxide	1.99E+08	3.16E+08	--	--
Ammonia	1.40E+06	2.64E+06	--	--
Butane	--	1.07E+11	--	--
Formaldehyde	1.60E+07		--	7.50E+10
PM10	--	--	8.06E+03	7.72E+06
Hydrogen cyanide	2.12E+08	--	--	--
Sulfur dioxide	--	--	1.65E+08	1.04E+11
TAP Constituents				
Trinitrotoluene	--	5.64E+05	--	6.81E+08
Acetone	1.01E+09	2.01E+09	--	--
Dibutylphthalate	--	5.64E+06	--	--
Ethylene glycol	4.23E+07	--	--	--
Hexane	--	1.99E+08	--	--
Methanol	1.39E+08	2.96E+08	--	--
Methyl ethyl ketone	3.75E+08	6.66E+08	--	--

Table E-3-20 shows that the treatment limits for the Slum Pan are well in excess of the SOP limit for this point. This indicates that treatment activities can be conducted at the Slum Pan SOP treatment limit and will result in impacts that are significantly below the applicable health criteria levels. Because the energetic materials are originally in solvent solution and are then allowed to be absorbed in slum (sawdust) material, the actual weight of energetic is unlikely to be at the SOP limit of 1,000 pounds.

E-3-14 SAATTP SHORT-TERM RELEASE EVENTS - SOLVENT VESSEL, THRUST BLOCK, AND IGNITER VESSEL

This section presents a modeling demonstration for short-term OB treatment events that are conducted at the SAATTP. This demonstration considered events and materials treated at the Solvent Vessel, Thrust Block, and the Igniter Vessel. Input data and modeling protocol for conducting the analysis are discussed in the sections below.

E-3-14a Health Criteria - Solvent Vessel, Thrust Block and Igniter Vessel

The air pathway health criteria for the short-term treatment scenario at the Solvent Vessel, Thrust Block, and the Igniter Vessel are given in Table E-3-21. These criteria were extracted from the state, Federal and calculated reference criteria given in Tables E-3-4 through E-3-6 and are applicable to only those constituents and combustion products associated with these treatment scenarios. All of the health criteria given in Table E-3-21 are toxic air pollutants (TAPs) regulated by the State of Maryland, with the exception of PM10 which is regulated by the Federal NAAQS. In cases where two or more criteria existed for the same averaging period and contaminant, the most restrictive value was used to evaluate the potential impacts for pollutants specific to the SAATTP. All of the TAP criteria are screening levels and are more restrictive than the other pollutants regulated by the NAAQS. The comparisons of air criteria were made based on operating periods of 8 hr/day, 5 days/week and 52 weeks/year.

E-3-14b Emission Factor - Solvent Vessel, Thrust Block and Igniter Vessel

Combustion product emission factors were developed for energetic or contaminated materials treated at the Solvent Vessel, Thrust Block or the Igniter Vessel. A listing of the material or items evaluated in this air pathway demonstration for each of these treatment units is given in Table E-3-22. Appendix E-3-1 lists all the items treated in these units.

TABLE E-3-21

SUMMARY OF AIR PATHWAY HEALTH CRITERIA CONCENTRATIONS FOR SHORT-TERM OB EVENTS AT THE SAATTP SOLVENT VESSEL, THRUST BLOCK, AND IGNITER VESSEL TREATMENT UNITS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Exposure Period Concentration ($\mu g/m^3$)			
	1-Hour[a]	8-Hour[a]	24-Hour	Annual
TAP Combustion Products				
Carbon Dioxide		288,000	--	--
Carbon Monoxide	40,000	290	--	--
Ozone	4	1	--	--
Nitrogen Dioxide	94	56	--	--
Ammonia	240	170	--	--
Lead	--	0.5	--	--
Butane	--	19,000	--	--
Formaldehyde	3.7	--	--	0.77[a]
Aluminum Oxide	--	100	--	--
Hydrogen Cyanide	50	--	--	--
Sulfur Dioxide	130	52	--	--
Hydrogen Sulfide	210	140	--	--
Carbon Disulfide	--	310	--	--
Potassium Hydroxide	20	--	--	--
Hydrogen Fluoride	26	--	--	--
Fluorine	31	16	--	--
Carbonyl Fluoride	130	54	--	--
Chlorine	29	15	--	--
Carbon Tetrachloride	630	310	--	0.6666[a]
Hydrogen Chloride	75	--	--	--
PM10	--	--	150[b]	50[b]
TAP Constituents				
Ethanol	--	18,800	--	--
Methanol	3,280	2,620	--	--
Isopropanol	12,300	9,830	--	--
Acetone	23,800	17,800	--	--
Butanol	1,520	--	--	--

TABLE E-3-21
SUMMARY OF AIR PATHWAY HEALTH CRITERIA CONCENTRATIONS
FOR SHORT-TERM OB EVENTS AT THE SAATTP
SOLVENT VESSEL, THRUSTBLOCK, AND IGNITER VESSEL TREATMENT UNITS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

	Exposure Period Concentration ($\mu g/m^3$)			
	1-Hour[a]	8-Hour[a]	24-Hour	Annual
Methyl Ethyl Ketone	8,850	5,900	--	--
Dibutylphthalate	--	50	--	--
Methyl Isobutyl Ketone	3,070	2,050	--	--
Hexane	--	1,760	--	--
Heptane	20,500	16,400	--	--
Carbon Tetrachloride	--	310	--	0.6666[a]
Toluene		1,880	--	--
Trichloroethylene	5,370	2,690	--	6[a]
Methylene Chloride	--	1,740	--	21[a]
Ethylene Glycol	1,000	--	--	--
Sulfuric Acid	30	10	--	--
Nitric Acid	100	52	--	--
Xylene	6,510	4,340	--	--
1,2-Dichloroethane	--	400	--	0.39[a]
Chloroform	--	490	--	0.4346[a]
1,1,2-Trichloroethane	--	550	--	0.625[a]

a 1-hour, 8-hour, and all annual exposure period concentrations, with the exception of PM10, were taken from the State of Maryland Air Toxics Regulation for screening analysis demonstrations (See Table E-3-5).

b The 24-hour and annual concentrations for PM10 were taken from the National Ambient Air Quality Standards.

The Solvent Vessel is used to treat solvent liquids that become contaminated with energetic materials during the production and testing activities at IHDIVNAVSURFWARCEN. The Thrust Block and Igniter Vessel are used to treat specific energetic items. A description of the combustion products and associated emission factors for the Solvent Vessel, Thrust Block and Igniter Vessel are given in Tables E-3-23 through E-3-25.

Emission factors are given in pounds emitted/pound treated, and were obtained from the POLU-11 model for combustion products and/or by assuming a 99.99% destruction efficiency for item constituents. The highest combustion product emission factor calculated in either the 40:60 or 30:70, material to air ratio categories for energetics or the 90:10 through 50:50 ratios for solvents by the POLU-11 model was selected as the emission factor for the product of combustion. Only combustion products and item constituents with applicable air criteria were evaluated for this scenario. Emission factors for metals were calculated on the basis of a metals-in/metals-out assumption.

Solvent Vessel

A listing of the solvents and potential energetic contaminants that were evaluated for the Solvent Vessel are given in Table E-3-22. The POLU-11 model was used to develop emission factors for uncontaminated and contaminated solvents. Contaminated solvents were assumed to have a maximum energetic contaminant content of 10 percent, by weight. The most widely used solvents were identified as acetone, isopropanol and toluene. These solvents, along with their most abundant contaminants, were modeled with POLU-11. The uncontaminated solvents were modeled without specific contaminants due to the lower levels of contamination and treatment expected for these solvents.

Certain solvents were not evaluated for OB with the POLU-11 model because thermochemistry data was not available or the item could not be evaluated by the POLU-11 model. Emission factors for these solvents were developed on the assumption that they would experience a 99.99% destruction efficiency for the OB treatment process. The solvents listed in Table E-3-22 which were not evaluated by the POLU-11 model are nitric acid, sulfuric acid and methyl isobutyl ketone.

In addition, chlorinated solvents were not used to determine the Solvent Vessel treatment limits. They are generally non-combustible and would therefore be dispersed as aerosols by the fuel oil combustion gases. Comparing the allowable emission quantities for each solvent in Table E-3-28 with the 20 pound treatment limit for these solvents set in the master list results in the conclusion that applicable air criteria will not be exceeded.

TABLE E-3-22

LIST OF THE MATERIALS OR ENERGETIC ITEMS ASSOCIATED WITH SHORT-TERM TREATMENT EVENTS AT THE SOLVENT VESSEL, THRUST BLOCK AND IGNITER VESSEL IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Solvent Vessel			
Uncontaminated Solvents/Materials			
Acetone	Butanol	Glycerin	Sulfuric Acid
Carbon Tetrachloride	Heptane	Hexane	Nitric Acid
Chloroform	Methylene Chloride	Isopropanol	
Dibutyl Phthalate	Xylene	Methanol	
Ethyl Centralite	1,2-Dichloroethane	Methyl Ethyl Ketone	
Ethanol	1,1,2-Trichloroethane	Toluene	
Ethylene Glycol	Methyl Isobutyl Ketone	Trichloroethylene	

Solvents and Compatible Contaminants		
Acetone	Isopropanol	Toluene
HMX	LOVA	IDP
NC		PBXN103
NG		PBXN106
TMETN		PBXN110
NQ		PBXN5
Otto Fuel		NC
		M10 Scrap
		M6 Grains
		16" Gun Propellant
		NACO Scrap

Thrust Block
Item 476 (SR-121 Grain)

Igniter Tank
Item 459 (Sagger Motors)

TABLE E-3-23

SUMMARY OF MAXIMUM AIR EMISSION FACTORS FOR SHORT-TERM THERMAL TREATMENT EVENTS AT THE SAATTP SOLVENT VESSEL IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Emission Factor (lb/lb)	Item No. [1]
TAP Combustion Products		
Carbon dioxide	0.89180	178
Carbon monoxide	0.182800	507*
Ozone	0.000002	A
Nitrogen dioxide	0.000002	A
Ammonia	0.000727	207
Lead	0.000775	507**
Butane	0.000002	A
Formaldehyde	0.000001	A
Aluminum oxide	0.051000	507*
Hydrogen cyanide	0.000001	A
Sulfur dioxide	0.000003	507**
Hydrogen sulfide	0.000223	507**
Carbon disulfide	0.000003	507**
Potassium hydroxide	0.000768	507**
Hydrogen fluoride	0.003460	507***
Fluorine	0.000001	507***
Carbonyl fluoride	0.000002	507***
Chlorine	0.000002	507*
Carbon tetrachloride	0.000005	507*
Hydrogen chloride	0.012400	507*
PM10	0.7702	507

TABLE E-3-23
SUMMARY OF MAXIMUM AIR EMISSION
FACTORS FOR SHORT-TERM THERMAL TREATMENT
EVENTS AT THE SAATTP SOLVENT VESSEL
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

Date: April 5, 1994

	Emission Factor (lb/lb)	Item No. [1]
TAP Energetic Constituents		
Ethanol	0.000100	159
Methanol	0.000100	287
Isopropanol	0.000100	228
Acetone	0.000100	42
Butanol	0.000100	80
Methyl ethyl ketone	0.000100	288
Dibutylphthalate	0.000100	140
Methyl isobutyl ketone	0.000100	289
Hexane	0.000100	207
Heptane	0.000100	195
Carbon tetrachloride	0.000100	84
Toluene	0.000100	507
Trichloroethylene	0.000100	513
Methylene chloride	0.000100	290
Ethylene glycol	0.000100	163
Sulfuric acid	0.000100	480
Nitric acid	0.000050	292
Xylene	0.000100	529
1,2-dichloroethane	0.000100	141
Chloroform	0.000100	120
1,1,2-trichloroethane	0.000100	512

A - Several Items

* Toluene contaminated with 10 percent PBXN 103

** Toluene contaminated with 10 percent NACO Scrap

*** Toluene contaminated with 10 percent PBXN 5

1 Item No. as listed in Appendix C-4.

TABLE E-3-24

SUMMARY OF MAXIMUM AIR EMISSION FACTORS FOR SHORT-TERM TREATMENT EVENTS AT THE SAATTP THRUST BLOCK*
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

TAP Combustion Products	Emission Factor (lb/lb)	Item No. [1]
Carbon dioxide	0.33300	476
Carbon monoxide	0.000125	476
Ozone	0.000002	476
Nitrogen dioxide	0.000002	476
Ammonia	0.000001	476
Butane	0.000002	476
Formaldehyde	0.000002	476
Aluminum oxide	0.343800	476
Hydrogen cyanide	0.000001	476
Sulfur dioxide	0.000001	476
Carbon tetrachloride	0.000005	476
Hydrogen chloride	0.212000	476
PM10	0.211900	476

* Only treatment Item 476 (SR-121 Grain) was evaluated for the Thrust Block.

1 Item No. as listed in Appendix C-4.

TABLE E-3-25

SUMMARY OF MAXIMUM AIR EMISSION FACTORS FOR SHORT-TERM TREATMENT EVENTS AT THE SAATTP IGNITER VESSEL* IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Emission Factor (lb/lb)	Item No.[1]
TAP Combustion Products		
Carbon dioxide	0.730700	459
Carbon monoxide	0.110200	459
Ozone	0.000002	459
Nitrogen dioxide	0.000002	459
Ammonia	0.000005	459
Butane	0.000002	459
Formaldehyde	0.000001	459
Hydrogen cyanide	0.000001	459
Chlorine	0.001810	459
Carbon tetrachloride	0.000005	459
Hydrogen chloride	0.229700	459

* Only treatment item 459 (Sagger Motors) was evaluated for the igniter tank.
1 Item No. as listed in Appendix C-4.

Thrust Block and Igniter Vessel

Although several items are treated at the Thrust Block and Igniter Vessel locations, only 1 item from each treatment scenario was evaluated by the POLU-11 model. Insufficient data was available for the remaining items. Item 476 (SR121) was evaluated for the Thrust Block and Item 459 (Sagger motor) was evaluated for the Igniter Vessel. The corresponding emission factors for these two emission points are found in Tables E-3-23 and E-3-25.

E-3-14c Dispersion Modeling - Solvent Vessel, Thrust Block and Igniter Vessel

The INPUFF model was used to estimate the worst case impact of short-term OB events from the SAATTP. The modeling analysis was conducted using the modeling protocol discussed in Section E-3-4 and that incorporated EPA and State of Maryland recommended modeling guidelines and procedures, as well as conditions specified in the SOPs. Due to a significant difference between the emission parameters for the Solvent Vessel and Thrust Block/Igniter Vessel, separate modeling demonstrations were conducted for these treatment operations.

E-3-14d Emission Parameters - Solvent Vessel, Thrust Block and Igniter Vessel

A summary of the INPUFF modeling source parameters for short-term OB events at the Solvent Vessel, Thrust Block and Igniter Vessel are given in Table E-3-26. Because the source parameters were assumed to be the same for the Thrust Block and the Igniter Vessel, impacts from these units were calculated in one modeling demonstration. All 3 of these treatment events were considered as buoyant point sources with each having a release height of 1 meter. The average duration of OB events at the Solvent Vessel, Thrust Block and Igniter Vessel is generally 60 seconds, however burn events for the Solvent Vessel and Igniter Vessel can occur as long as 20 minutes.

INPUFF model calculations were made for 1 pound quantities being treated for 60 second and 20 minute periods to determine which release period gave the largest 1-hour dispersion factor (chi/q). The result of the comparison concluded that for the exposure periods of interest, both release scenarios result in the same average dispersion factor (chi/q). This is due to all pollutants passing the worst case receptor within the 1 hour period.

The stack diameter was set at 1.22 and 1.97 meters, which is based on the average area of the Solvent Vessel and the Igniter Vessel, respectively. The Thrust Block was assumed to have the same diameter the Solvent Vessel.

TABLE E-3-26

INPUFF MODEL INPUT PARAMETERS FOR THE SAATTP SOLVENT VESSEL, THRUST BLOCK, AND IGNITER VESSEL IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Treatment Unit	Thrust Block/Igniter Vessel	Solvent Vessel
Source Type	Point	Point
Source Height (m)	1	1
Source Diameter (m)	1.97	1.22
Source Velocity (m/s)	5.49	2.29
Source Temperature (°K)	1190	512
Ambient Temperature (°K)	287	287
Dispersion Option	Pasquill-Gifford	Pasquill-Gifford
Downwash Option	No	No
Buoyancy-Induced Dispersion	Yes	Yes
Release Duration (s)	60	60
Mixing Height (m)	3,000	3,000

The source temperature was assumed as 1190°K for the Thrust Block and Igniter Vessel and 512°K for the Solvent Vessel. These temperatures were the lowest temperature found in the 40:60, 30:70 material-to-air ratios for all items and solvents modeled with the POLU-11 model for each treatment scenario.

The initial exit velocity for each treatment scenario was calculated using the videotape method described in Section E-3-8.

E-3-14e Receptor Locations - Solvent Vessel, Thrust Block and Igniter Vessel

The INPUFF modeling analysis assumed that the wind direction was invariant over the course of the 1-hour calculation period and therefore restricted the receptor network to a series of receptors located along a straight line downwind of the OB source. Each receptor was assumed to have the same elevation as the emission height (1 meter). This is a valid assumption because the closest nonprecluded receptor direction extends outward from the Auxiliary Point along the Mattawoman Creek.

Individual receptor points along the downwind radial were spaced at 50 meter intervals in order to locate the magnitude and distance of the maximum impact resulting from the 60 second emission event.

E-3-14f Meteorological Data - Solvent Vessel, Thrust Block and Igniter Vessel

Meteorological conditions for this modeling scenario were assumed to be consistent with the SOP limitations and criteria described above in Section E-3-7. Wind speeds were evaluated over the range of 1.3 m/sec to 8.9 m/sec. Atmospheric stabilities were limited to the unstable and neutral classes A through D, which occur principally during the daylight hours. Each stability class and wind speed range value was modeled to determine the worst-case 1-hour dispersion factor (chi/q). Stability class/wind speed group scenarios were based on those recommended by the U. S. EPA for determining worst-case impacts in the screening guidance and SOP limitations. These stability/wind speed groupings included: Stability A (1.3 m/sec to 3.3 m/sec); Stability B (1.3 m/sec to 5.4 m/sec); and Stabilities C & D (1.3 m/sec to 8.9 m/sec).

E-3-14g Dispersion Modeling Methodology - Solvent Vessel, Thrust Block and Igniter Vessel

Treatment events at the Solvent Vessel, Thrust Block and the Igniter Vessel are typically conducted on an individual unit basis with each OB event lasting for an average of 60 seconds and in exceptional cases 20 minutes. All OB source emission events were modeled at a unit emission rate of 1 pound for each simulated burn period, then assumed no emissions over the remainder of the hour. Wind speed, wind direction and stability class remained invariant over the hourly period. The receptor network was positioned on a straight line directly downwind of the emission point. Individual model runs were made for each wind speed and stability group, with source parameter remaining constant.

E-3-14h Modeling Results - Solvent Vessel, Thrust Block and Igniter Vessel

The worst case 1-hour dispersion factors (chi/q) for each stability class and associated wind speed for the the Solvent Vessel and Thrust Block/Igniter Vessel are summarized below:

Solvent Vessel

Stability Class/Wind Speed (m/sec)	Max 1-Hr Dispersion Factor (g/m^3-lb/hr)	Distance (m)
A/1.3	1.87	500
B/1.3	3.64	500
C/1.3	3.87	500
D/8.9	5.78*	500

*Maximum value

Distances to the worst case receptor have been limited to 500 meters and greater for the Solvent Vessel modeling scenario. Actual worst case impacts are estimated to occur at 50 meters from the solvent vessel. Limiting the receptor grid to those points greater than 500 meters can be justified by two separate scenarios. The first is for site personnel to create an exclusion zone in Mattawoman Creek which is adjacent to the Auxiliary Point. No boats would be allowed within 500 meters of the Auxiliary Point. The second scenario would be to suspend treatment at the Solvent Vessel when the wind is blowing towards areas of public access.

Thrust Block/Igniter Vessel

Stability Class/Wind Speed (m/sec)	Max 1-Hr Dispersion Factor (g/m^3-lb/hr)	Distance (m)
A/3.3	0.5564	500
B/5.4	0.5252	500
C/8.9	0.7172*	500
D/8.9	0.4167	1050

*Maximum value

The maximum 1-hour dispersion factors (chi/q) were extrapolated to longer averaging periods. Dispersion factors (chi/q) for averaging periods ranging from 1-hour to annual are summarized in Table E-3-27.

These dispersion factors (chi/q) were used in conjunction with the health criteria and emission factors to develop environmental performance standards for the Thrust Block and Igniter Vessel.

E-3-14i Environmental Performance Standards - Solvent Vessel, Thrust Block and Igniter Vessel

Environmental performance standards for short-term treatment events at the Solvent Vessel, Thrust Block and Igniter Vessel were developed using health criteria in Table E-3-21, emission factor data in Tables E-3-23 through E-3-25 and dispersion modeling results in Table E-3-27. Maximum allowable emissions and treatment quantities were calculated using the procedure described in Section E-3-10. Allowable emission quantities in pounds/averaging period for short-term emission points are given in Table E-3-28 and Table E-3-29.

Maximum allowable treatment quantities for the Solvent Vessel, Thrust Block and Igniter Vessel are presented in Tables E-3-30 through E-3-32, respectively. Maximum allowable treatment quantities are based on the worst-case treatment item and represent the maximum amount of material that can be treated for the worst-case item and still be in compliance with the applicable air criteria.

TABLE E-3-27

SUMMARY OF AIR DISPERSION FACTORS*
($\mu g/m^3$-lb/hr)
FOR SHORT-TERM TREATMENT EVENTS AT THE SAATTP SOLVENT VESSEL, THRUST BLOCK, AND IGNITER VESSEL EMISSION POINTS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

	Dispersion Factor ($\mu g/m^3$ - 1 lb/hr)		
Averaging Period	**Solvent Vessel**	**Thrust Block/Igniter Vessel**	**Calculation Method**
1-Hour	5.78	0.7172	Model Output
3-Hour	1.93	0.2391	1-Hour Conc. / 3
8-Hour	0.723	8.97E-02	1-Hour Conc. / 8
24-Hour	0.241	2.99E-02	1-Hour Conc. / 24
Quarterly	3.35×10^{-4}	4.16E-05	Annual Conc. x 4
Annual	8.38×10^{-5}	1.04E-05	(1-Hour Conc. / 24) / 365 x (0.127**)

* Refer to Section E-3-9 for a discussion of the development and use of dispersion factors.

** The maximum annual wind distribution frequency is 12.7 percent as shown on Table E-3-2.

Solvent Vessel

Table E-3-30 shows the Solvent Vessel allowable treatment quantities relative to toxic air pollutant combustion products and solvent constituents. The most restrictive quantity is 809 pounds for the 24-hour period and is associated with PM10. Combustion product treatment quantities are based on the emission factors calculated by the POLU-11 model. Treatment quantities for the solvent constituents are based on the assumption of a 99.99% destruction efficiency.

The SOP treatment limit for the Solvent Vessel is 150 gallons with the exception of certain solvents which have a 20 pound limit per event as specified in the Master List of Acceptable Materials found in Appendix C-2. The solvents having 20 pound limits are chloroform, methylene chloride, butanol, methyl isobutyl ketone, dichloroethane, carbon tetrachloride, xylene, sulfuric acid, and nitric acid. The exception to the preceding statement is 1,1,2-trichloroethane, which does not have a 20 pound limit set in the Master List (Appendix C-2) for treatment items. To be consistent with the precedent set in the Master List (Appendix C-2) for treatment items, all chlorinated solvents shall not be treated at amounts greater than 20 pounds per event. It is important to note that the use of chlorinated solvents is being discontinued and that only residual amounts will remain on site.

With the exception of the restricted solvents, all contaminated solvents can be treated at the SOP limit, but may not exceed 800 pounds in weight. As noted in Section E-3-14b, certain solvents were not run with the POLU-11 model, and therefore, are not accounted for in the combustion products segment of Table E-3-30.

The three solvents not evaluated by the POLU-11 (MIBK, sulfuric acid, and nitric acid) have 20 pound limits set in the Master List (Appendix C-2) for treatment items. By comparing the elemental composition of these items to the modeled items, it is safe to assume that treatment at 20 pounds per event would not result in the exceedance of an air criteria, since the SOP limit cannot result in emissions above applicable allowable treatment quantities.

Thrust Block

Of the 5 grains treated at the Thrust Block, the SR121 grain is treated in the largest quantity, based on the period June 1991 to June 1992. The major constituent of SR121 is ammonium perchlorate (AP). AP is also the major constituent of CKU5A and CKU7A grains, which together with the SR121 grain, compose approximately 90 percent of the waste treated at the Thrust Block for the period evaluated. As shown in

TABLE E-3-28

SUMMARY OF ALLOWABLE AIR EMISSION QUANTITIES FOR THE SAATTP SOLVENT VESSEL AT THE SAATTP IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Allowable Emission Quantities (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
TAP Combustion Products				
Carbon dioxide	--	398,616	--	--
Carbon monoxide	6,920	401	--	--
Ozone	1	1	--	--
Nitrogen dioxide	16	78	--	--
Ammonia	42	235	--	--
Lead	--	1	--	--
Butane	--	26,299	--	--
Formaldehyde	1	--	--	9,189
Aluminum oxide	--	138	--	--
Hydrogen cyanide	9	--	--	--
Sulfur dioxide	22	72	--	--
Hydrogen sulfide	36	194	--	--
Carbon disulfide	--	429	--	--
Potassium hydroxide	3	--	--	--
Hydrogen fluoride	4	--	--	--
Fluorine	5	22	--	--
Carbonyl fluoride	22	75	--	--
Chlorine	5	21	--	--
Carbon tetrachloride	109	429	--	7,955
Hydrogen chloride	13	--	--	--
PM10	--	--	623	596,659
TAP Constituents				
Ethanol	--	26,003	--	--
Methanol	567	3,626	--	--
Isopropanol	2,128	13,606	--	--
Acetone	4,118	24,637	--	--
Butanol	263	--	--	--
Methyl ethyl ketone	1,531	8,160	--	--

TABLE E-3-28
SUMMARY OF ALLOWABLE AIR EMISSIONS QUANTITIES
FOR THE SAATP SOLVENT VESSEL AT THE SAATTP
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

Date: April 5, 1996

	Allowable Emission Quantities (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
Dibutylphthalate	--	69	--	--
Methyl isobutyl ketone	531	2,835	--	--
Hexane	--	2,436	--	--
Heptane	3,547	22,699	--	--
Carbon tetrachloride	109	429	--	7,955
Toluene	--	2,600	--	--
Trichloroethylene	929	3,723	--	71,602
Methylene chloride	--	2,408	--	250,597
Ethylene glycol	173	--	--	--
Sulfuric acid	5	14	--	--
Nitric acid	17	72	--	--
Xylene	1,126	6,007	--	--
1,2-dichloroethane	--	554	--	--
Chloroform	--	678	--	--
1,1,2-trichloroethane	--	761	--	--

TABLE E-3-29

**SUMMARY OF ALLOWABLE AIR EMISSION QUANTITIES
FOR THE SAATTP THRUST BLOCK AND IGNITER VESSEL TREATMENT UNITS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND**

	Allowable Emission Quantities (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
TAP Combustion Products				
Carbon dioxide	--	3,210,702	--	--
Carbon monoxide	55,772	3,233	--	--
Ozone	6	11	--	--
Nitrogen dioxide	131	625	--	--
Ammonia	335	1,896	--	--
Lead	--	6	--	--
Butane	--	211,935	--	--
Formaldehyde	5	--	--	74,038
Aluminum oxide	--	1,115	--	--
Hydrogen cyanide	70	--	--	--
Sulfur dioxide	181	580	--	--
Hydrogen sulfide	293	1,562	--	--
Carbon disulfide	--	3,458	--	--
Potassium hydroxide	28	--	--	--
Hydrogen fluoride	36	--	--	--
Fluorine	43	178	--	--
Carbonyl fluoride	181	602	--	--
Chlorine	40	167	--	--

TABLE E-3-29 (Continued)
SUMMARY OF ALLOWABLE AIR EMISSION QUANTITIES
FOR THE SAATTP THRUST BLOCK AND IGNITER VESSEL TRETMENT UNITS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

	Allowable Emission Quantities (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
TAP Combustion Products (continued)				
Carbon tetrachloride	878	3,458	--	64,110
Hydrogen chloride	105	--	--	--
PM10	--	--	5,020	4,808,727

TABLE E-3-30

SUMMARY OF MAXIMUM ALLOWABLE TREATMENT QUANTITIES FOR SHORT-TERM TREATMENT AT THE SAATTP SOLVENT VESSEL IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Treatment Quantities (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
TAP Combustion Products				
Carbon dioxide	--	4.47E+05	--	--
Carbon monoxide	3.79E+04	2.19E+03	--	--
Ozone	5.00E+05	5.00E+05	--	--
Nitrogen dioxide	8.13E+06	3.88E+07	--	--
Ammonia	5.71E+04	3.24E+05	--	--
Lead	--	1.29E+03	--	--
Butane	--	1.31E+10	--	--
Formaldehyde	1.00E+06	--	--	9.19E+09
Aluminum oxide	--	2.71E+03	--	--
Hydrogen cyanide	9.00E+06	--	--	--
Sulfur dioxide	7.50E+06	2.40E+07	--	--
Hydrogen sulfide	1.63E+05	8.69E+05	--	--
Carbon disulfide	--	1.43E+08	--	--
Potassium hydroxide	4.51E+03	--	--	--
Hydrogen fluoride	1.30E+03	--	--	--
Fluorine	5.36E+06	2.21E+07	--	--
Carbonyl fluoride	1.12E+07	3.74E+07	--	--
Chlorine	2.51E+06	1.04E+07	--	--
Carbon tetrachloride	2.18E+07	8.58E+07	--	1.59E+09
Hydrogen chloride	1.05E+03	--	--	--
PM10	--	--	8.09E+02	7.75E+05
TAP Constituents				
Ethanol	--	2.60E+08	--	--
Methanol	5.67E+06	3.63E+07	--	--
Isopropanol	2.13E+07	1.36E+08	--	--
Acetone	4.12E+07	2.46E+08	--	--
Butanol*	1.90E+07	--	--	--
Methyl ethyl ketone	1.53E+07	8.17E+07	--	--

	Treatment Quantities (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
Dibutylphthalate	--	6.92E+05	--	--
Methyl isobutyl ketone*	5.31E+06	2.84E+07	--	--
Hexane	--	2.44E+07	--	--
Heptane	3.55E+07	2.27E+08	--	--
Toluene	--	2.60E+07	--	--
Trichloroethylene	9.29E+06	3.72E+07		7.16E+08
Methylene Chloride		2.41E+07		2.51E+09
Ethylene glycol	1.73E+06	--	--	--
Sulfuric acid*	5.00E+04	1.38E+05	--	--
Nitric acid*	3.46E+05	1.44E+06	--	--
Xylene	1.13E+07	6.01E+07	--	--

* These solvents were not run with the POLU-11 model to determine their OB combustion products.

Table E-3-31, the most restrictive pollutant emissions are due to the hydrogen chloride produced as a combustion product of the AP.

The SOP limit for treatment of SR121 grains is 9 whole grains per event, which is equivalent to a total weight of 544 pounds of propellant. This value exceeds the 1 hour quantity shown in Table E-3-31 of 494 pounds. To comply with the calculated treatment quantity, 8 SR121 grains per event will become the 1 hour treatment limit, with treatment events separated by a minimum of 1-hour. Treatment limits for other grains will be calculated when detailed characterization data becomes available.

Igniter Vessel

Item 459 (Sagger Motor) was modeled with POLU-11 to represent items treated at the Igniter Vessel. Sagger Motors contain 74 percent ammonium perchlorate (AP) and produced the most restrictive combustion product. The most restrictive treatment limits for the Igniter Vessel are associated with hydrogen chloride. For a 1 hour period treatment is limited to 455 pounds. A review of available characterization data confirmed that Sagger Motors contain the largest percentage of AP in the items treated at the Igniter Vessel and would be the most restrictive item based on combustion products of chlorine.

A thorough examination of emissions from items other than Sagger Motors was not completed due to incomplete chemical characterization data. Based on a review of available characterization data and POLU-11 output for other items modeled, it is not believed that an allowable treatment quantity of less than 183 pounds per treatment event would be calculated for any item designated for treatment at the igniter pan.

E-3-15 SAATTP SHORT TERM RELEASE EVENTS - CLAY PAD

This section discusses the modeling demonstration and development of environmental performance standards for short term treatment events conducted at the SAATTP Clay Pad. This location is used principally for the treatment of rocket motors that are too large for treatment at other Strauss Avenue treatment sites.

TABLE E-3-31

SUMMARY OF MAXIMUM ALLOWABLE TREATMENT QUANTITIES FOR SHORT-TERM TREATMENT AT THE SAATTP THRUST BLOCK* IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Treatment Quantities (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
TAP Combustion Products				
Carbon dioxide	--	9.65E+06	--	--
Carbon monoxide	4.46E+08	5.09E+07	--	--
Ozone	3.00E+06	5.50E+06	--	--
Nitrogen dioxide	6.55E+07	3.12E+08	--	--
Ammonia	3.35E+08	1.90E+09	--	--
Butane	--	1.06E+11	--	--
Formaldehyde	2.50E+06	--	--	3.70E+10
Aluminum oxide	--	3.24E+03	--	--
Hydrogen cyanide	7.00E+07	--	--	--
Sulfur dioxide	--1.81E+08	5.80E+08	--	--
Chlorine	1.29E+04	5.33E+04	--	--
Carbon tetrachloride	1.76E+08	6.92E+08	--	1.282E+10
Hydrogen chloride	4.94E+02	--	--	--
PM10	--	--	23,690	2.30E+07

* These treatment limits only pertain to treatment item 476 (SR-121 grains).

TABLE E-3-32

SUMMARY OF MAXIMUM ALLOWABLE TREATMENT QUANTITIES FOR SHORT-TERM TREATMENT AT THE SAATTP IGNITER VESSEL* IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Treatment Quantities (lbs)		
	1-Hour	8-Hour	Annual
TAP Combustion Products			
Carbon dioxide	--	4.40E+06	--
Carbon monoxide	5.06E+05	2.93E+04	--
Ozone	3.00E+06	5.50E+06	--
Nitrogen dioxide	6.55E+07	3.12E+08	--
Ammonia	6.69E+07	3.79E+08	--
Butane	--	1.06E+11	--
Formaldehyde	5.00E+06		7.405E+10
Hydrogen cyanide	7.00E+07	--	--
Chlorine	2.23E+04	9.24E+04	--
Carbon tetrachloride	1.76E+08	6.92E+08	1.282E+10
Hydrogen chloride	4.55E+02	--	--

* These treatment units only pertain to treatment item 459 (Sagger Motors).

E-3-15a Health Criteria - Clay Pad

The applicable air pathway health criteria for the Clay Pad treatment scenario are given in Table E-3-33. These criteria were obtained from the state, Federal and calculated reference criteria given in Tables E-3-4 through E-3-6 and are applicable to only those constituents and combustion products associated with short-term treatment events at the Clay Pad. All of the health criteria given in Table E-3-33 are toxic air pollutants (TAPs) regulated by the State of Maryland. In cases where two or more criteria existed for the same averaging period and contaminant, the most restrictive value was used to evaluate the potential impacts for pollutants specific to the Clay Pad. All of the TAP criteria are screening levels and are more restrictive than the other pollutants regulated by the NAAQS. The comparisons of air criteria were made based on operating periods of 8 hr/day, 5 days/week and 260 days/yr.

E-3-15b Emission Factors - Clay Pad

Combustion product or item constituent emission factors were developed for the following 3 items at the Clay Pad:

- Item 484 - Talos Grains
- Item 494 - Terrier Grains
- Item 377 - MK 73 Grains

These items are rocket motors that are too large to place in a burn pan for thermal treatment.

Combustion emission factors for these items are given in Table E-3-34, in pounds emitted/pound treated. These factors were calculated by the POLU-11 model in either the 40:60 or 30:70 material to air ratio categories. Emission factors for the constituents carbon black and nitroglycerine were calculated by assuming a 99.99% destruction efficiency per pound of constituent. Only combustion products and item constituents with applicable air criteria and association with the Clay Pad treatment scenario were evaluated for this scenario.

E-3-15c Dispersion Modeling - Clay Pad

The INPUFF model was used to estimate the worst case impact of OB events at the SAATTP Clay Pad. The modeling analysis was conducted using the modeling protocol discussed in Section E-3-4 and incorporated EPA and State of Maryland recommended modeling guidelines and procedures, as well as conditions specified in the Strauss Avenue SOPs.

TABLE E-3-33

SUMMARY OF AIR PATHWAY HEATLH CRITERIA FOR
SAATTP CLAY PAD
INDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

	Exposure Period Concentrations ($\mu g/m^3$)		
	1-Hour	8-Hour	Annual
TAP Combustion Products			
Carbon Dioxide	--	288,000	--
Carbon Monoxide	40,000	290	--
Ozone	4	1	--
Nitrogen Dioxide	94	56	--
Ammonia	240	170	--
Lead	--	0.5	--
Butane	--	19,000	--
Formaldehyde	3.7	--	0.77
Aluminum Oxide	--	100	--
Hydrogen Cyanide	50	--	--
TAP Constituents			
Carbon Black	--	35	--
Nitroglycerine	--	4.60	--

TABLE E-3-34

SUMMARY OF MAXIMUM AIR EMISSION FACTORS FOR THE SAATTP CLAY PAD IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Emission Factor (lb/lb)	Item No. [1]
TAP Combustion Products		
Carbon Dioxide	0.93930	377
Carbon Monoxide	0.041400	494
Ozone	0.000002	All
Nitrogen Dioxide	0.000002	All
Ammonia	0.000001	All
Lead	0.016500	494
Butane	0.000002	All
Formaldehyde	0.000001	All
Aluminum Oxide	0.068600	494
Hydrogen Cyanide	0.000001	All
TAP Constituents		
Carbon Black	1.60E-07	494
Nitroglycerine	0.000036	484

1 Item No. as listed in Appendix C-4.

TABLE E-3-35

**INPUFF MODEL SOURCE PARAMETERS
FOR THE SAATTP CLAY PAD
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND**

Source Type	Point
Source Height (m)	1
Source Diameter (m)	4.86
Source Velocity (m/s)	5.18
Source Temperature (°K)	1078
Ambient Temperature (°K)	287
Dispersion Option	Pasquill-Gifford
Downwash Option	No
Buoyancy-Induced Dispersion	Yes
Release Duration (s)	60
Mixing Height (m)	3000
Sigma X (m)	3.05
Sigma Z (m)	3.05

E-3-15d Emission Parameters - Clay Pad

A summary of the INPUFF modeling source parameters for the Clay Pad short-term OB events are given in Table E-3-35. The Clay Pad OB events were considered as a buoyant point source in the model having a release height of 1 meter. The average duration of an OB event at the Clay Pad is 60 seconds. This time period was used in the model for the release of all emissions. The stack diameter was set at 4.86 meters, which is based on the area of the Clay Pad.

The source temperature was assumed as 1,078°K, which represents the lowest temperature found in the 40:60, 30:70 material to air ratios for the Talos grains.

An initial exit velocity of 5.18 m/s was calculated using the videotape method described in Section E-3-8.

Each motor is placed horizontally on the clay pad and exhausts at both ends parallel to the ground during the OB. This causes the exhaust gases to move horizontally for a short period of time, then rise quite rapidly. This exhaust characteristic of the motor, creates either a narrow or wide initial plume depending on the wind trajectory. An initial plume width (sigma x) value of 3 m was used in the modeling analysis. The value for sigma x is based on observations of the Clay Pad plume. This results in a narrow initial plume width that produces a higher downwind dispersion factor (chi/q). Sigma z was set equal to sigma x because the initial plume shape is circular.

E-3-15e Receptor Locations - Clay Pad

The INPUFF modeling analysis assumed that the wind direction was invariant over the course of the 1-hour calculation period and therefore restricted the receptor network to a series of receptors located along a straight line downwind of the OB source. Each receptor was assumed to have the same elevation as the Clay Pad release height (1 meter). This is a valid assumption because the closest installation boundary receptor point is located a short distance from the treatment point and extends outward along the Mattawoman Creek.

Individual receptor points along the downwind radial were spaced at 50 m intervals in order to locate the magnitude and distance of the maximum impact resulting from the 60 second emission event.

E-3-15f Meteorological Data - Clay Pad

Meteorological conditions for this modeling scenario were assumed to be consistent with the SOP limitations and criteria described above in Section E-3-7. Wind speeds were evaluated over the range of

1.3 m/sec to 8.9 m/sec. Atmospheric stabilities were limited to the unstable and neutral classes A through D, which occur principally during the daylight hours. Each stability class and wind speed range value was modeled to determine the worst case 1-hour dispersion factor (chi/q). Stability class/wind speed group scenarios were based on those recommended by the U. S. EPA for determining worst-case impacts in the screening guidance and SOP limitations. These stability/wind speed groupings included: Stability A (1.3 m/sec to 3.3 m/sec); Stability B (1.3 m/sec to 5.4 m/sec); and Stabilities C & D (1.3 m/sec to 8.9 m/sec).

E-3-15g **INPUFF Modeling Methodology - Clay Pad**

Treatment events at the Clay Pad are typically conducted once or twice a day with each event lasting for an average of 60 seconds. All source emission events were modeled at a unit emission rate of 1 pound for the first minute of the hour, then assumed no emissions over the remaining 59 minutes. Wind speed, direction and stability class remained invariant over the hourly period. The receptor network was positioned on a straight line directly downwind of the emission point. Individual model runs were made for each wind speed and stability group, with source parameters remaining constant.

E-3-15h **Modeling Results - Clay Pad**

Worst case 1-hour dispersion factors (chi/q) for each stability class and associated wind speed for the SAATTP Clay Pad are summarized below:

Stability Class/Wind Speed (m/sec)	Max 1-Hr Dispersion Factor ($\mu g/m^3$-lb/hr)	Distance (M) (m)
A/3.3	0.0746	850
B/5.4	0.0724	1350
C/8.9	0.0808*	1550
D/8.9	0.0400	3500

* Maximum value

The maximum 1-hour dispersion factor (chi/q) was extrapolated to longer averaging periods. Dispersion factors for averaging periods ranging from 1-hour to annual are summarized in Table E-3-36. These dispersion factors were used in conjunction with the health criteria and emission factors to develop environmental performance standards for the Clay Pad treatment scenario.

E-3-15i Environmental Performance Standards - Clay Pad

Environmental performance standards for treatment activities at the Clay Pad were developed using health criteria given in Table E-3-33, emission factor data given in Table E-3-34, and dispersion modeling results in Table E-3-36. Maximum allowable emissions and treatment quantities were developed using the procedure described in Section E-3-10. Allowable emission quantities in pounds/averaging period for the Clay Pad are given in Table E-3-37.

Maximum allowable treatment quantities for the Clay Pad are presented in Table E-3-38. Maximum allowable treatment quantities are based on the worst-case treatment item and represent the largest amount of material that can be treated and still be in compliance with the applicable air criteria. The SOP limits for the Talos (Item 484) and Terrier (Item 494) grains are 9,000 pounds per event. The individual weight of the Talos and Terrier grains are 2,960 and 1,250 pounds, respectively. This equates to a limit of 3 Talos and 7 Terrier grains per event. Table E-3-38 shows that all 1 hour treatment quantities are well in excess of the 9,000 pound SOP limit.

However, in the case of the 8 hour treatment period, treatment associated with the contaminant lead is restricted to only 3,030 pounds. This equates to a restricted limit of only 1 Talos or 2 Terrier grains per 8 hour period.

E-3-16 SAATTP LONG-TERM RELEASE EVENTS - UNLINED PANS

This section presents a modeling demonstration for long term OB treatment events that are conducted at the Unlined Pans. The material treated at this unit is composed principally of ammonium perchlorate and carboxyl-terminated polybutadiene. The material is usually delivered to the site wet and requires an initiator fuel (No. 2 fuel oil) to facilitate the open burning process. Input data and modeling protocol for conducting the analysis are discussed in the sections below.

TABLE E-3-36

SUMMARY OF AIR DISPERSION FACTORS* FOR THE SAATTP CLAY PAD IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Averaging Period	Dispersion Factor ($\mu g/m^3/lb/hr$)	Calculation Method
1-Hour	0.0808	Model Output
3-Hour	0.0269	1-hr Conc. / 3
8-Hour	1.01E-02	1-hr Conc. / 8
24-Hour	3.37E-03	1-hr Conc. / 24
Quarterly	4.69E-06	Annual Conc. x 4
Annual	1.17E-06	1-hr Conc. / 24 / 365 x (0.127)**

* Refer to Section E-3-9 for a discussion of the development and use of dispersion factors.

** The maximum annual wind distribution frequency is 12.7% as shown on Table E-3-2.

TABLE E-3-37

SUMMARY OF ALLOWABLE AIR EMISSIONS FOR THE SAATTP CLAY PAD IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Allowable Emissions (lbs)		
	1-Hour	8-Hour	Annual
TAP Combustion Products			
Carbon dioxide		28,514,851	--
Carbon monoxide	495,100	2.87E+04	--
Ozone	50	99	--
Nitrogen dioxide	1,163	5,545	--
Ammonia	2,970	16,832	--
Lead	--	50	--
Butane	--	1,881,188	--
Formaldehyde	46	1,188	657,324
Aluminum oxide	--	9,901	--
Hydrogen cyanide	619	--	--
TAP Constituents			
Carbon black	--	3,465	--
Nitroglycerine	--	455	--

TABLE E-3-38

SUMMARY OF MAXIMUM ALLOWABLE TREATMENT QUANTITIES FOR THE SAATTP CLAY PAD IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Treatment Quantities (lbs)		
	1-Hour	8-Hour	Annual
TAP Combustion Products			
Carbon dioxide	--	3.04E+07	--
Carbon monoxide	1.20E+07	6.93E+05	--
Ozone	2.50E+07	4.95E+07	--
Nitrogen dioxide	5.82E+08	2.77E+09	--
Ammonia	2.97E+09	1.68E+10	--
Lead	--	3.03E+03	--
Butane	--	9.41E+11	--
Formaldehyde	4.60E+07	--	6.57E+11
Aluminum oxide	--	1.44E+05	--
Hydrogen cyanide	6.19E+08	--	--
TAP Constituents			
Carbon black	--	2.17E+10	--
Nitroglycerine	--	1.26E+07	--

E-3-16a Health Criteria - Unlined Pans

The air pathway health criteria for the Unlined Pans treatment scenario are given in Table E-3-39. These criteria were extracted from the state, Federal and calculated reference criteria given in Tables E-3-4 through E-3-6 and are applicable to only those combustion products associated with long-term treatment events at the Unlined Pans. All of the health criteria given in Table E-3-39 are either toxic air pollutants (TAPs) regulated by the State of Maryland or criteria pollutants regulated by the National Ambient Air Quality Standards (NAAQS). In cases where two or more criteria existed for an averaging period for a particular contaminant, the most restrictive value was used to evaluate the potential impacts for pollutants specific to the Unlined Pans. All of the TAP criteria established by the State of Maryland are screening levels and are generally more restrictive than the other pollutants regulated by the NAAQS. The comparisons of air criteria were made based on operating periods of 8 hr/day, 5 days/week and 260 days/yr.

E-3-16b Emission Factors - Unlined Pans

Combustion product emission factors were developed for the material treated at the Unlined Pans. This material initially contains 80 percent ammonium perchlorate, 14 percent carboxyl-terminated polybutadiaene and 6 percent miscellaneous materials prior to being wet with water in the manufacturing process. Much of the ammonium perchlorate present in the waste material is dissolved and carried away with the machining water. The ammonium perchlorate could range as low as 10 percent after the machining process. The other ingredients are essentially fixed within the polymeric binder and do not leach out.

The before and after machining chemical composition of the waste material was used as input into the POLU-11 model, along with #2 fuel oil which is used as an initiator for the OB process. POLU-11 model calculations assumed four different waste treatment scenarios for the Unlined Pans: (1) undiluted material (80 percent ammonium perchlorate); (2) diluted material (10 percent ammonium perchlorate); (3) 60 percent fuel oil and 40 percent undiluted waste material and; (4) 60 percent fuel oil and 40 percent diluted waste material. The 60 percent/40 percent ratio of fuel oil/waste material is based on SOP limits of 200 gallons of fuel oil (1,500 weight equivalent) and 1,000 pounds of Unlined Pan material. The treatment scenario having the worst case emission factor for each TAP combustion product was used to establish the environmental performance standards for the Unlined Pans treatment process. Worst-case combustion product emission factors for the Unlined Pans treatment process are given in Table E-3-40, in

TABLE E-3-39

SUMMARY OF AIR PATHWAY HEALTH CRITERIA CONCENTRATIONS FOR THE SAATTP UNLINED PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Exposure Period Concentration (μg/m³)			
	1-Hour[a]	8-Hour[a]	24-Hour	Annual
TAP Combustion Products				
Carbon dioxide	--	288,000	--	--
Carbon monoxide	40,000	290	--	--
Ozone	4	1	--	--
Nitrogen dioxide	94	56	--	--
Ammonia	240	170	--	--
Butane	--	19,000	--	--
Formaldehyde	3.7	--	--	0.77[a]
Aluminum oxide	--	100	--	--
Hydrogen cyanide	50	--	--	--
Sulfur dioxide	130	52	--	--
Hydrogen sulfide	210	140	--	--
Carbon disulfide	--	310	--	--
Chlorine	29	15	--	--
Carbon tetrachloride	630	310	--	0.6666[a]
Hydrogen chloride	75	--	--	--
PM10	--	--	150[b]	50[b]
Titanium dioxide	--	100	--	--

a 1-hour, 8-hour and all annual period concentrations, with the exception of PM10 and carbon monoxide, were taken from the State of Maryland Air Toxics Regulations for screening analysis demonstrations (See Table E-3-5).

b The 24-hour and annual period concentrations for PM10 were taken from the National Ambient Air Quality Standards.

pounds emitted/pound waste material treated. These factors were calculated by the POLU-11 model in either the 40:60 or 30:70 material-to-air ratio categories and represent the worst case emission factors for the Unlined Pans waste material.

E-3-16c Dispersion Modeling - Unlined Pans

The ISC2 model was used to estimate the worst-case impact of long term OB events at the Unlined Pans. The modeling analysis was conducted using the modeling protocol discussed in Section E-3-4 and incorporated EPA and State of Maryland recommended modeling guidelines and procedures, as well as conditions specified in the SOPs.

E-3-16d Emission Parameters - Unlined Pans

The ISC2 model source parameters for the Unlined Pans are given in Table E-3-41. The Unlined Pans treatment event was considered as a buoyant point source in the model having a release height of 0.5 meters. The average duration of a treatment event is generally 3 hours. Emissions were assumed to be continuous over the entire 3-hour period. The stack diameter was set at 7.20 meters, which is based on the equivalent area of the Unlined Pan.

The source temperature was assumed as 778°K, which represents the lowest temperature found in the 40:60, 30:70 material to air ratios for the 10 percent (diluted) Unlined Pan treatment scenario.

The default exit velocity of 1.0 m/s was assumed for the Unlined Pans treatment process.

E-3-16e Receptor Locations - Unlined Pans

The ISC2 modeling analysis assumed that the wind direction was invariant over the course of the 3-hour calculation period and therefore restricted the receptor network to a series of receptors located along a straight line downwind of the OB source. Each receptor was assumed to have the same elevation as the

TABLE E-3-40

SUMMARY OF MAXIMUM AIR EMISSION FACTORS (EF)
POUND OF CONTAMINANT PER POUND OF MATERIAL TREATED
SAATTP UNLINED PANS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

	Emission Factor (lb/lb)	Item No.
TAP Combustion Products		
Carbon dioxide	0.50590	3
Carbon monoxide	0.364100	2
Ozone	0.000002	1-4
Nitrogen dioxide	0.000002	1-4
Ammonia	0.000427	4
Butane	0.000002	1-4
Formaldehyde	0.000001	1-4
Aluminum oxide	0.146600	2
Hydrogen cyanide	0.000002	2
Sulfur dioxide	0.000002	3,4
Hydrogen sulfide	0.003170	4
Carbon disulfide	0.000003	1-4
Chlorine	0.027730	1
Carbon tetrachloride	0.000005	1-4
Hydrogen chloride	0.243200	1
PM10	0.594300	4
Titanium dioxide	0.055300	2

Item Number Designation:

1 Unlined Pan material (undiluted) - 80 percent Ammonium Perchlorate

2 Unlined Pan material (diluted) - 10 percent Ammonium Perchlorate

3 60 percent fuel oil/40 percent Unlined Pan material (undiluted)

4 60 percent fuel oil/40 percent Unlined Pan material (diluted)

TABLE E-3-41

ISC2 MODEL INPUT PARAMETERS FOR THE SAATTP UNLINED PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

Source Type	Point
Source Height (m)	0.50
Source Diameter (m)	7.20
Source Velocity (m/s)	1.0
Source Temperature (°K)	778
Ambient Temperature (°K)	287
Dispersion Option	Pasquill-Gifford
Stack Downwash Option	Yes
Regulatory Option	Yes
Buoyancy-Induced Dispersion	Yes
Release Duration (hours)	3
Mixing Height (m)	3000

emission height (0.5 meter). This is a valid assumption because the closest nonprecluded receptor direction extends outward from the Main Point along the Mattawoman Creek.

Individual receptor points along the downwind radial were spaced at 50 meter intervals in order to locate the magnitude and distance of the maximum impact resulting from the 3-hour emission event.

E-3-16f **Meteorological Data**

Meteorological conditions for this modeling scenario were assumed to be consistent with the SOP limitations and criteria described above in Section E-3-7. Wind speeds were evaluated over the range of 1.3 m/sec to 8.9 m/sec. Atmospheric stabilities were limited to the unstable and neutral classes A through D, which occur principally during the daylight hours. Each stability class and wind speed range value was modeled for a 3-hour period to determine the worst-case ambient 1-hour and 3-hour dispersion factors (chi/q). The stability class/wind speed group scenarios were based on those recommended by the U. S. EPA for determining worst-case impacts in the screening guidance and the SOP limitations. These stability/wind speed groupings included: Stability A (1.3 m/sec to 3.3 m/sec); Stability B (1.3 m/sec to 5.4 m/sec); and Stabilities C & D (1.3 m/sec to 8.9 m/sec).

E-3-16g **ISC2 Modeling Methodology**

Long term treatment events at the Unlined Pans are typically conducted once per day, 3 days per week, with each event lasting for an average of 3 hours. The treatment process was modeled at a unit emission rate of 0.042 g/sec (0.33 lb/hr) for 3 consecutive hours to calculate 1-hour and 3-hour dispersion factors (chi/q). Wind speed, direction and stability class remained invariant over the 3-hour period. The receptor network was positioned on a straight line directly downwind of the emission point. Individual model runs were made for each wind speed and stability group, with source parameters remaining constant.

E-3-16h **Modeling Results**

Worst-case 1-hour dispersion factors (chi/q) for each stability class and associated wind speed for the Unlined Pans treatment process are summarized below:

Stability Class/Wind Speed (m/sec)	**Max 1-Hr Dispersion Factor ($\mu g/m^3$-lb/hr)**	**Distance (M) (m)**
A/3.0	0.1058	600
B/5.0	0.1168	700
C/8.9	0.1883*	600
D/8.9	0.1395	850

* Maximum value

The maximum 1-hour dispersion factor (chi/q) for stability class C was used to extrapolate dispersion factors for longer averaging periods. Dispersion factors for averaging periods ranging from 1-hour to annual are summarized in Table E-3-42. These dispersion factors were used in conjunction with the health criteria and emission factors to develop environmental performance standards for the Unlined Pan treatment scenario.

E-3-16i Environmental Performance Standards

Environmental performance standards for treatment activities at the Unlined Pans were developed using health criteria in Table E-3-39, emission factor data in Table E-3-40 and dispersion modeling factors in Table E-3-42. Maximum allowable emissions and treatment quantities were developed using the procedure described in Section E-3-10. Allowable emission quantities in pounds per averaging period for the Unlined Pans are given in Table E-3-43. Maximum allowable treatment quantities for the Unlined Pans are presented in Table E-3-44. Maximum allowable treatment quantities are based on the worst case item emission factors and represent the maximum amount of material that can be treated for the worst case item and still be in compliance with the applicable air criteria. The SOP limit for treatment at the Unlined Pans is 1,000 pounds of energetic material per event.

Table E-3-44 shows that the calculated 1-hour treatment limits for the Unlined Pans exceed the 1,000 pound SOP limit and therefore indicate that treatment activities can be conducted at the Unlined Pans SOP treatment limit and will result in impacts that are below the applicable helath criteria levels.

TABLE E-3-42

SUMMARY OF OB AIR DISPERSION FACTORS*
FOR THE SAATTP UNLINED PANS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

	Dispersion Factor ($\mu g/m^3$ - 0.33 lb/hour)***	Calculation Method
1-Hour	0.1883	Model Output
3-Hour	0.1883	Model Output
8-Hour	7.06E-02	1-hr Conc. / 8
24-Hour	2.35E-02	1-hr Conc. / 24
Quarterly	3.28E-05	Annual Conc. x 4
Annual	8.19E-06	24 Conc. / 365 x (0.127)**

* Refer to Section E-3-9 for a discussion of the development and use of dispersion factors.

** The maximum annual wind distribution frequency is 12.7 percent as shown on Table E-3-2.

*** These dispersion factors are based on a 0.33 pound/hour emission rate. This equals to a total of 1.0 pound of for the 3-hour OB treatment event.

TABLE E-3-43

SUMMARY OF ALLOWABLE AIR EMISSION QUANTITIES FOR OB OPERATIONS AT THE SAATTP UNLINED PANS IHDIVNAVSURFWARCEN INDIAN HEAD, MARYLAND

	Allowable Air Emissions (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
TAP Combustion Products				
Carbon Dioxide	--	4,114,286	--	--
Carbon Monoxide	2.12E+05	4.11E+03	--	--
Ozone	21	14	--	--
Nitrogen Dioxide	499	800	--	--
Ammonia	1,275	2,429	--	--
Butane	--	271,429	--	--
Formaldehyde	20	--	--	94,020
Aluminum Oxide	--	1,429	--	--
Hydrogen Cyanide	266	--	--	--
Sulfur Dioxide	690	743	--	--
Hydrogen Sulfide	1,115	2,000	--	--
Carbon Disulfide	--	4,429	--	--
Chlorine	154	214	--	--
Carbon Tetrachloride	3.35E+03	4,429	--	81,394
Hydrogen Chloride	159	142	--	--
PM10	--	--	6,373	6,105,006
Titanium Dioxide	--	1,429	--	--

TABLE E-3-44

**SUMMARY OF ALLOWABLE TREATMENT QUANTITIES
FOR OB OPERATIONS AT THE
SAATTP UNLINED PANS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND**

	Allowable Treatment Quantities (lbs)			
	1-Hour	8-Hour	24-Hour	Annual
TAP Combustion Products				
Carbon dioxide	--	8.13E+06	--	--
Carbon monoxide	5.82E+05	1.13E+04	--	--
Ozone	1.05E+07	7.00E+06	--	--
Nitrogen dioxide	2.50E+08	3.97E+08	--	--
Ammonia	2.98E+06	5.64E+06	--	--
Butane	--	1.35E+11	--	--
Formaldehyde	2.00E+07	--	--	9.40E+10
Aluminum oxide	--	9.75E+03	--	--
Hydrogen cyanide	1.33E+08	--	--	--
Sulfur dioxide	3.45E+08	3.68E+08	--	--
Hydrogen sulfide	3.52E+05	6.25E+05	--	--
Carbon disulfide	--	1.46E+09	--	--
Chlorine	5.55E+03	7.66E+03	--	--
Carbon tetrachloride	6.70E+08	8.78E+08	--	1.63E+10
Hydrogen chloride	1.64E+03	--	--	--
PM10	--	--	1.07E+04	1.03E+07
Titanium dioxide	--	2.56E+04	--	--

E-3-17 Summary of Maximum Impact Receptors Locations for All Treatment Units

The results of the air quality modeling demonstrations conducted for each of the SAMTTP and SAATTP OB treatment units indicates that the location of maximum impact for each unit will vary according to the treatment unit's source release parameters. The point of maximum impact for each treatment unit is summarized below and in Figure E-3-2.

Treatment Unit	Receptor Distance (meters)
1.1 and 1.3 Pans	1,250
Slum Pans	550
Solvent Vessel	500
Thrust Block	500
Igniter Vessel	500
Clay Pad	1,550
Unlined Pans	600

It is important to note that in the case of the Solvent Vessel, the actual worst case impact was modeled to occur at a distance of 50 meters from the Solvent Vessel. However, a distance of 500 meters has been proposed as maximum impact point in order to facilitate the treatment of materials at the present SOP limits. The 500 meter distance is contingent on the fact that the IHDIVNAVSURFWARCEN can maintain an exclusion zone of 500 meters or suspend treatment at the Solvent Vessel when the wind is blowing towards areas of public access during Solvent Vessel treatment events. If the 50 receptor were to be used to establish environmental performance standards for the Solvent Vessel, it would significantly reduce the amount of waste material that could be treated at the Solvent Vessel,.on a per event basis.

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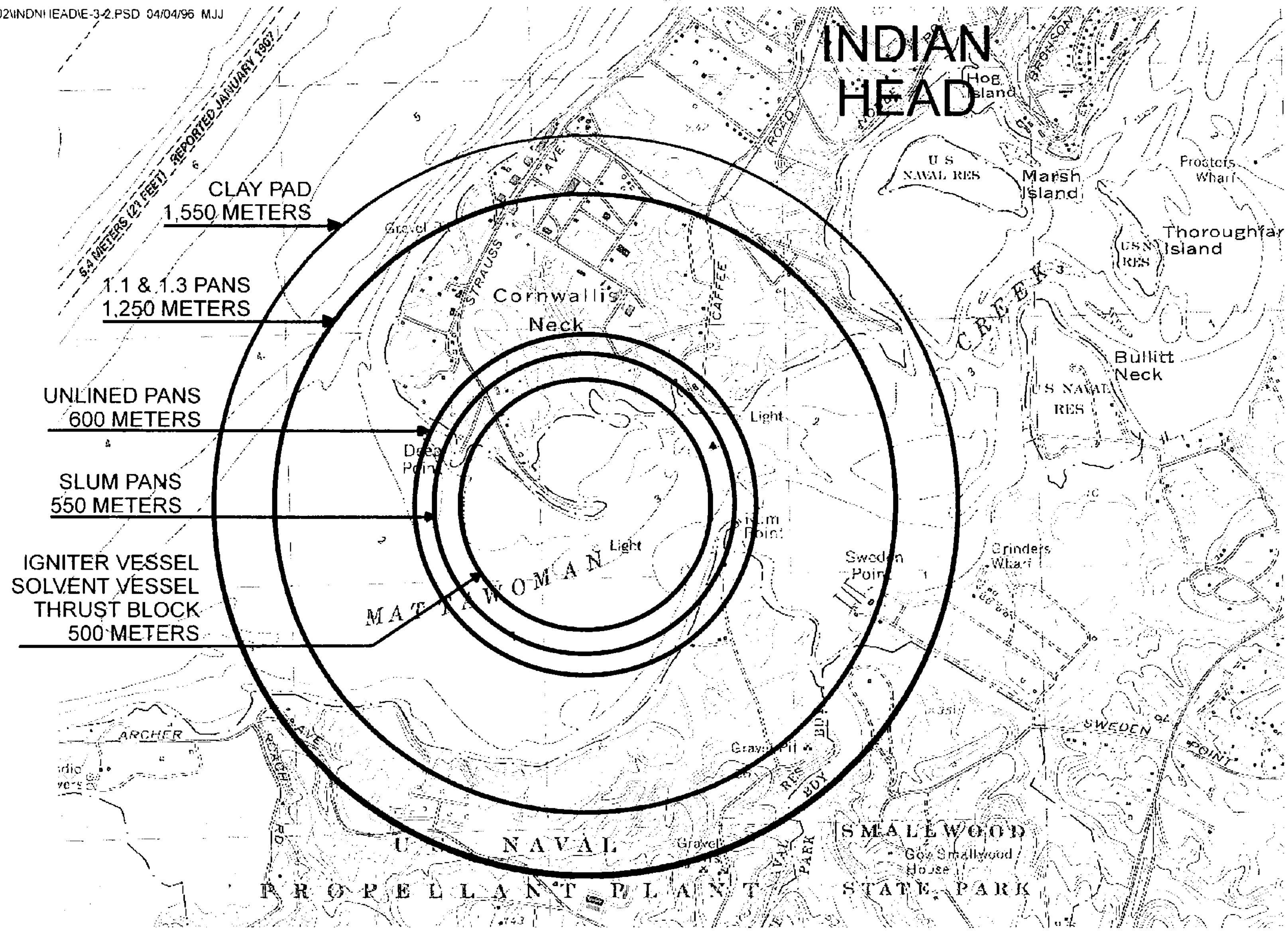

RADIUS OF MAXIMUM IMPACT FOR SATTP TREATMENT UNITS IHDIVNAVSURFWARCEN, INDIANHEAD, MARYLAND

0 2000 4000
SCALE IN FEET

FIGURE E-3-2

Brown & Root Environmental

SECTION E-4

GROUNDWATER MONITORING

E-4 GROUNDWATER MONITORING [40 CFR 264, SUBPART F AND COMAR 26.13.05.06]

E-4-1 EXEMPTION FROM GROUNDWATER PROTECTION REQUIREMENTS [40 CFR 270.14 and COMAR 26.13.05]

The Indian Head Division, Naval Surface Warfare Center (IHDIVNAVSURFWARCEN) does not request an exemption from the groundwater monitoring requirements of 40 CFR 270.14 and COMAR 26.13.05.06.

E-4-1a Waste Piles

This section is not applicable because IHDIVNAVSURFWARCEN will not operate a waste pile.

E-4-1b Landfill

This section is not applicable because IHDIVNAVSURFWARCEN will not operate a landfill.

E-4-1c No Migration

This section is not applicable because IHDIVNAVSURFWARCEN does not wish to demonstrate that there is no potential for migration of liquid from the regulated unit to the uppermost aquifer during the active life of the unit and the post-closure care period.

E-4-2 INTERIM STATUS GROUNDWATER MONITORING DATA [40 CFR 270.14(c)(1) and COMAR 26.13.05.06A]

An Interim Status Groundwater Monitoring Program has not yet been initiated for the Strauss Avenue Thermal Treatment Point (SATTP) at IHDIVNAVSURFWARCEN. Therefore, interim status data is not available at this time.

E-4-2a Description of Wells

A detailed description of the proposed detection monitoring well system for the SATTP is contained in Section E-4-7b.

E-4-2b Description of Sampling and Analysis Procedure

A detailed description of the sampling and analysis procedures for the proposed monitoring well systems to be installed at the SATTP is contained in Section E-4-7b.

E-4-2c Monitoring Data

IHDIVNAVSURFWARCEN has not yet installed detection monitoring wells at the SATTP. Therefore, interim status groundwater monitoring data is not available at this time.

E-4-2d Statistical Procedures

Section E-4-7d(3) describes the statistical procedures to be used to evaluate data from the proposed detection monitoring well network at the SATTP.

E-4-3 GENERAL HYDROGEOLOGICAL INFORMATION [40 CFR 270.14(c)(2) and COMAR 26.13.07.02(F)(2)]

E-4-3a Physiography

The IHDIVNAVSURFWARCEN is located at Indian Head, Maryland in the west-central portion of Charles County, approximately 25 miles south of Washington, D.C. The site is located on a peninsula formed by the confluence of the Potomac River and Mattawoman Creek, and is situated on approximately 2,000 acres of land. The location of Indian Head is illustrated in Figure E-4-1.

The SATTP is located at the southwest portion of the base on a narrow, 1,100-foot-long peninsula which extends from Indian Head into Mattawoman Creek, a tidal tributary of the Potomac River. The SATTP is located within the floodplain of the Potomac River. The location is shown on Figure E-4-1.

The Indian Head peninsula lies within the Atlantic Coastal Plain Physiographic Province. General topography of the area consists of rolling terrain, marshlands, swamps, and shoreline of the Potomac River and Mattawoman Creek. The maximum elevation on the Indian Head peninsula is approximately 100 feet above sea level.

E-4-3b **Surface Water**

The SATTP is located on a long, narrow point (1,000 feet long) projecting into Mattawoman Creek, a tidal estuary of the Potomac River, from the main peninsula. Any runoff from the SATTP will flow into Mattawoman Creek, and eventually into the Potomac River.

E-4-3c **Geology and Stratigraphy**

E-4-3c(1) **Geologic Setting**

This area is underlain by the Potomac Group, which consists of (in descending order), the Patapsco, Arundel, and Patuxent Formations. The Patapsco Formation is a sequence of gently dipping, unconsolidated layers of marine and coastal clay, silt, sand and gravel deposits. The average thickness of the Patapsco Formation is approximately 200 to 300 feet (Tech International, 1988; Aware, 1982). Figure E-4-2 shows a generalized cross section for the area.

The Patapsco Formation is underlain by the Patuxent-Arundel Formations, which consist of clays and sandy to silty clays with occasional, thin sand layers. These thin sand units within the clay dominated formation are not laterally continuous, and generally pinch out within 2 miles or less (Tech International, 1988). The average thickness of the Patuxent-Arundel in the vicinity of Indian Head is approximately 300 feet.

The Coastal Plain sediments dip to the southeast, at a slope of approximately 50 feet per mile. The total thickness of the Cretaceous units (Patapsco through Patuxent-Arundel Formations) is approximately 500 to 600 feet (Tech International, 1988).

In some areas of the Indian Head peninsula, the Upper Potomac Group sediments were eroded by the ancestral Potomac River system, which deposited paleo-channel and fluvial (river) sediments on top of the Potomac Group. Along the eastern side of the peninsula these Quaternary age fluvial sediments are estimated to extend to approximately 75 feet below sea level (Hiortdahl, 1990). In other areas, the Potomac Group is overlain by younger sedimentary layers which may include the Aquia Greensand, the

Columbia Formation, as well as other Tertiary deposits. The Coastal Plain sediments are underlain by much older Precambrian bedrock, consisting of igneous and metamorphic crystalline rocks.

E-4-3d **Hydrogeology**

E-4-3d(1) Regional Hydrogeology

The Potomac Formation aquifer system is the major confined aquifer for the area around Indian Head. It is a multi-aquifer system which contains several confined aquifers within the lower and middle Patapsco group, consisting of saturated, poorly consolidated sand and gravel deposits that may range from 1 to 20 feet thick. These water-bearing units are interbedded with clay and fine-grained confining units.

Shallow water table aquifers exist in the Quaternary fluvial sediments which overlie the Potomac Group, but these aquifers are not used for potable water supply at Indian Head (Hiortdahl, 1990).

The Potomac Group historically produces water of good quality, and have supplied all of the groundwater withdrawn from the 15 production wells on base. The Patapsco Formation contains several water-bearing sand layers, which have been extensively tapped. Three zones within this Formation have been encountered which contain significant permeable units; the Upper Sand, Middle Sand and Lower Sand Zones. In the Indian Head area, the Upper Sand Zone is thin or absent, and is not a significant water producer. The Middle Sand Zone occurs between 50 and 200 feet below mean sea level, and is not as productive as the Lower Sand Zone. The Lower Sand unit generally yields the most water, and is encountered between 200 and 300 feet below mean sea level.

The transmissivity of the Lower Sand Zone at the Indian Head area ranges from 270 $feet^2$/day to 535 $feet^2$/day, with the combined transmissivity of the entire Patapsco Formation estimated at about 1,070 $feet^2$/day. The clay-rich aquitards of this Formation have very low vertical hydraulic conductivities, in the range of 2×10^{-8} feet/second to 2×10^{-10} feet/second (Tech International, 1988). Coefficients of storage for the Patapsco formation range from 0.0004 to 0.0002 feet/feet. The average well yield for production wells in this area is approximately 250 gpm (Greenhorn and O'Mara, 1990).

The deeper Patuxent Formation contains mostly clay-rich units, although some IHDIVNAVSURFWARCEN production wells tap the permeable sand layers which are interbedded with these units. The sand units are not laterally continuous, and most wells find sufficient water yields within the overlying Patapsco Formation.

The IHDIVNAVSURFWARCEN is the largest water user in the Indian Head region, with 15 production wells which together pump over 1 million gallons per day (gpd) on a long-term average. Eight of the production wells are screened exclusively in the Lower Sand Zone, with seven wells screened in all three sand zones. Extensive pumping has occurred at these wells for several decades, and as a result, potentiometric water levels around the Indian Head peninsula for the deep aquifer system have declined more than 85 feet over the last 80 to 90 years (Tech International, 1988; Aware, 1982).

Figure E-4-3 shows a potentiometric surface map of the area for the lower sand of the Patapsco Formation, and the locations of the on-base production wells. The water level contours show a cone of depression at least 5 miles long and 3 miles wide. The lowered potentiometric surface in the area has induced recharge of the Patapsco Formation with poor-quality water from the Potomac River through the paleo-channel deposits which overlie the Potomac Group, and has increased the vertical gradient from the water table through the confining clay layers (Hiortdahl, 1990). However, since the vertical hydraulic conductivities of the thick clay layers within the Patapsco Formation are quite low, the migration of significant amounts of surface contaminants, if present, is unlikely.

E-4-3d(2) Local Hydrogeology

To date, there have been no site-specific hydrogeologic studies performed at the SATTP. The discussion of the local hydrogeology presented here is based on regional information, as well as the activity-wide information.

Because monitoring wells have not yet been installed at the SATTP, no data exists to define site-specific groundwater flow directions and gradients. It is assumed that the groundwater flow direction in the near surface portion of the aquifer at Strauss Avenue will be radially outward towards the adjacent Mattawoman Creek. The activity at the Main Point is located on a peninsula with elevations of up to 7 feet above mean sea level, which is surrounded by Mattawoman Creek near the confluence with the Potomac River. Shallow groundwater would tend to flow towards the bodies of water which surround the site. Similarly, shallow groundwater at the Auxiliary Point would be expected to flow away from the higher (central) portion of the smaller peninsula, radially outward towards Mattawoman Creek. Expected groundwater flow directions are illustrated in Figure E-4-4.

Currently, Production Well 15 (also known as Cb 9) is being taken out of service (due to the age of the well) and is being replaced by a new production well in the immediate vicinity. Well 15 is the closest production well to SATTP, located approximately 1,300 feet from the SATTP Main Point area, and approximately 2,400 feet from the CRTTP (see Figure E-4-3). The new well is screened in four sand layers within the Patapsco Formation, at 190 to 195 feet, 222 to 232 feet, 237 to 242 feet, and 263 to 269 feet. Water obtained from this well will be used by the base power plant for steam generation. Production yields for this well are not established, although the yields will most likely be similar to the older well in the vicinity, approximately 220 gpm. Therefore, pumping activities from this new well are not expected to cause an additional decrease in the potentiometric surface in the area. Also, due to the depth of the screened intervals (190 to 269 feet) and the low vertical hydraulic conductivities of the aquitards in the area, the effects on the near-surface aquifer are expected to be minimal.

E-4-4 TOPOGRAPHIC MAP REQUIREMENTS [40 CFR 270.14(c)(3) and COMAR 26.13.07.02F(3)]

A topographic map of the SATTP is provided (Figure E-4-4), and will be used to illustrate the requirements of the Detection Monitoring Program, (discussed in Section E-4-7). The following paragraphs provide a brief discussion of the contents of the topographic map.

Groundwater Flow Direction - It is assumed that groundwater flow in the near surface portion of the aquifer at the SATTP will be most likely dictated by local topography. Shallow groundwater would tend to flow towards the surface water that surrounds the site. Similarly, shallow groundwater at the Auxiliary Point would be expected to flow away from the higher portion of the smaller peninsula, radially outward towards Mattawoman Creek. Expected groundwater flow directions are illustrated in Figure E-4-4.

Point-of-Compliance - For the Thermal Treatment Point, this boundary includes the vertical surface located at the hydraulically down gradient limit of the existing waste management units that extends into the uppermost aquifer. For the Main Point and Auxiliary Point at the SATTP, this boundary is near the edge of the peninsula on which thermal treatment occurs. At both the Strauss Avenue sites the proposed Detection Monitoring Wells, with the exception of the background water quality wells, are located at the Point-of-Compliance.

Groundwater Monitoring Wells for the Detection Monitoring Program - No monitoring wells presently exist at the SATTP. Ten monitoring wells and one piezometer will be installed at the SATTP, as described in Section E-4-7b(1).

Extent of Plume - The presence or extent of any plume of contamination is unknown at this time.

Waste Management Area - For the TTP, the waste management area is the limit projected in the horizontal plane of the area in which material will be treated during the active life of the units. The Main Point waste management area is defined as a 400-foot x 200-foot zone at the end of the Main Point peninsula, within which treatment activities may take place. The Auxiliary Point waste management area is defined as a 220-foot x 150-foot zone at the end of the Auxiliary Point peninsula within which treatment activities may take place, as illustrated in Figure E-4-4.

E-4-5 CONTAMINANT PLUME DESCRIPTION [40 CFR 270.14(c)(4) and COMAR 26.13.07.02F(4)]

It is unknown at this time if a contaminant plume is present within the groundwater underlying the Thermal Treatment Points being addressed in this permit application.

E-4-6 GENERAL MONITORING REQUIREMENTS [40 CFR 270.14(c)(5) and COMAR 26.13.07.02F(5) and 26.13.05.06H]

E-4-6a Description of Wells

A description of the monitoring wells to be installed as part of the Detection Monitoring Program are included in Section E-4-7b.

E-4-6b Description of Sampling and Analysis Procedures

A description of the sampling and analysis plan for the Detection Monitoring Program is included in Section E-4-7d.

E-4-6c Procedures for Establishing Background Quality

A description of the procedures for establishing background quality for the Detection Monitoring Program is included in Section E-4-7c.

E-4-6d Statistical Procedures

A description of the statistical procedures used to evaluate data obtained from the Detection Monitoring Program to determine if statistically significant exceedances have occurred is included in Section E-4-7d(3).

E-4-7 DETECTION MONITORING PROGRAM [40 CFR 270.14(c)(6) and COMAR 26.13.07.02F(6)]

A Groundwater Detection Monitoring Program will be implemented at the SATTP. The Detection Monitoring Program will be designed to: 1) define site-specific geology and hydrogeology; 2) determine the quality of the groundwater at a background (upgradient) location; 3) determine the quality of ground water in the upper aquifer at the point of compliance at each of the TTPs; and 4) provide an appropriate statistical method to detect contamination resulting from thermal treatment activities.

E-4-7a Indicator Parameters, Waste Constituents, Reaction Products to be Monitored

Based on information on known constituents of the waste material managed at each TTP, the following parameters are proposed as Detection Monitoring Parameters. Analysis for these parameters will be performed during quarterly sampling events:

- Energetics - HMX (cyclotetramethylene tetranitramine), RDX (cyclotrimethylene trinitramine), NC (nitrocellulose), and NG (nitroglycerine).
- Total Organic Carbon (TOC).
- Total Organic Halogen (TOX).
- Metals - barium, cadmium, chromium, and lead.
- Nitrites/Nitrates.
- pH, Specific Conductance (SC), Temperature.
- Water Level Measurements.

Table E-4-1 describes the sampling frequency for the proposed indicator parameters.

E-4-7b Groundwater Monitoring System

The proposed groundwater Detection Monitoring Program is designed to be in accordance with Sections 264.97 and 264.98 of RCRA, and COMAR 26.13.05.06, Paragraphs H and I, which provide General Groundwater Monitoring Requirements and Detection Monitoring Requirements for RCRA-regulated units where groundwater monitoring is required. The Point-of-Compliance for the groundwater monitoring program will be the assumed downgradient boundary of the thermal treatment units. This placement of the Point-of-Compliance is consistent with Part 264.95 of RCRA, and Maryland Hazardous Waste Rules, Section 26.13.05.06 I. Four quarterly rounds of groundwater sampling and analysis are needed to establish appropriate background values for monitored constituents.

E-4-7b(1) Description of Monitoring System

E-4-7b(1)(a) Detection Monitoring Wells

The monitoring wells for both TTPs will be located immediately adjacent to the active portion of the TTPs, and will determine if near-surface groundwater contamination exists in the vicinity of these sites. In addition, these monitoring wells will provide a groundwater system for detecting any future groundwater contamination.

Five soil borings will be converted to flush-mount monitoring wells at the Main Point, and four soil borings will be converted to flush-mount monitoring wells at the Auxiliary Point. The remaining soil boring at the Auxiliary Point will be converted to a piezometer. This piezometer will provide additional groundwater elevation data and will serve to further define near-surface groundwater flow at the Auxiliary Point. Due to safety considerations concerning drilling operations in areas where former burning activities have occurred (i.e., the central portion of the Main Point), no piezometer will be installed at the Main Point, one background well will be installed. Monitoring well and piezometer locations are shown in Figure E-4-5.

Due to safety considerations about monitoring wells presenting trip hazards for TTP personnel, all wells installed at the SATTP will be flush mounted with protective casing finished at ground level. To prevent damage to monitoring wells from heat generated during the treatment activities at the TTPs, monitoring wells installed at both sites will be constructed of stainless-steel, and will utilize nonplastic riser caps. These riser caps will be sealed to prevent water from entering the monitoring wells during any flood events which may occur.

One monitoring well will be located up gradient of the treatment activities. The upgradient well will determine the background groundwater quality of the near-surface groundwater for each site and will serve as an additional groundwater elevation data point. The background monitoring well location is shown in Figure E-4-5 as MW-06.

E-4-7b(1)(b) Monitoring Well Construction

The monitoring wells to be constructed for the Detection Monitoring Program will be screened in the upper-most aquifer underlying the TTPs. The total depth of the screened intervals will be between approximately 12 and 15 feet below ground surface. Monitoring wells will be constructed of 4-inch diameter stainless-steel flush-joint threaded riser pipe and well screen, with 10-foot long screened sections. Well borings will be drilled using auger drilling methods. The procedures for monitoring well construction are discussed in Section E-4-7d(2).

E-4-7c Background Groundwater Concentration Values for Proposed Parameters

The sampling program described in Section E-4-7d(1) will be used to establish background groundwater quality. Chemical analytical results for groundwater samples will be evaluated from the wells installed for this task. Topographic maps of the TTPs will be used in conjunction with surveyed well elevations and a series of water level measurements made over a period of four quarters to ensure that the well designated as a background well is truly an upgradient well.

Four quarters of analytical data will be compiled to establish background groundwater quality prior to initiation of the long-term Detection Monitoring and statistical analyses phase. This Detection Monitoring Program will focus on constituents of wastes managed at these units (listed in Section E-4-7a). The first round of groundwater samples will be analyzed for components listed on Table E-4-2 including energetics (Cold Region List), appendix IX volatiles, semi-volatiles, and dissolved metals, TOC, TOX, , pH, specific conductance, temperature, and nitrate/nitrite. Any constituents found at elevated concentrations will be added to the Detection Monitoring Program. The analytical data will be used to define background conditions upgradient and at the point of compliance for each unit, and the list of constituents for the detection monitoring program.

E-4-7d Proposed Sampling and Analysis Procedures

As part of the Groundwater Monitoring Program described in 40 CFR 264, Subpart F, and COMAR 26.13.05.06, Paragraph H; groundwater sampling and analyses will be performed to accurately define the groundwater quality both at the Point-of-Compliance and at background locations, and evaluate impacts on groundwater quality resulting from operation of the TTPs. Additional environmental samples will be collected in the immediate vicinity of the TTPs to assess the impact, if any, of the treatment activities on soils, and sediment. Background soil, surface water and sediment samples from areas which have not likely been affected by treatment activities will also be collected for comparison. Samples will also be taken to determine various soil characteristics.

E-4-7d(1) Environmental Sampling and Analysis

E-4-7d(1)(a) Groundwater Sampling

The initial round of groundwater samples collected from the 10 Detection Monitoring Wells at the SATTP will include an expanded list of analytes listed in Table E-4-2. This table indicates the analytical parameters, and analytical methods for each groundwater sample. Table E-4-3 indicates preservation methods, holding times, bottle requirements for each analyte.

In addition to the established Detection Monitoring Parameters indicated on Table E-4-1, further parameters may be added to the list of analytes for quarterly sampling based upon the analytical results from the initial round of environmental sample analysis.

Groundwater Sampling Frequency

Groundwater samples will be obtained from the newly installed background and Point-of-Compliance monitoring wells to determine local groundwater quality. Groundwater samples from all background and monitoring wells will be collected on a quarterly basis for the active life of the TTPs, as stipulated in COMAR 26.13.05.06, Paragraph I (4). Monitoring wells will be purged and sampled. Samples will be prepared for shipping according to the procedures outlined in Section E-4-7d(2).

All pertinent field data will be recorded using sample log sheets found in Appendix E-4-1, and field log books.

E-4-7d(1)(b) Soil Sampling

Surface and subsurface soil samples will be collected from the soil borings installed at the SATTP. Soil samples will be collected in accordance with procedures outlined in Section E-4-7d(2). The use of drilling fluids is prohibited during soil boring activities.

Soil samples will be collected from the well borings. Continuous split-spoon samples will be taken. Three samples will be collected at the 0-1, 1-3, and 3-5 foot intervals of the borings or less, if the groundwater depth is a limiting factor. All samples obtained from the boreholes will be monitored with an organic vapor detector. Two samples per boring will be analyzed. The split-spoon samplers will have a minimum inside diameter of 3 inches and will be at least 2-feet long to fulfill the sample volume requirements for chemical analysis. The surface soil sample (for background analysis) will be collected with a stainless steel trowel, from approximately 0 to 6 inches below ground surface.

Table E-4-4 summarizes the surface and subsurface soil analysis program. Samples will be preserved in accordance with SOPs detailed in Section E-4-7d(2). Sample handling and preservation requirements are listed in Table E-4-3.

E-4-7d(1)(c) Sediment Sampling

Four sediment samples (SA-SD01 through SA-SD04) will be obtained during the investigation of SATTP. At the Main Point, two sediment samples will be collected, one on each side of the peninsula. At the Auxiliary Point, one sediment sample will be collected from each of the two sides of the Point. Sediment sample locations are presented in Figure E-4-5. Sediment samples will be analyzed for compounds listed on Table E-4-5.

One background sediment sample (SA-SD05) will be sampled and analyzed. This background sample will represent the chemical characteristics of sediment from an area not affected by activities at the Thermal Treatment sites. The location of the background sediment sample is shown in Figure E-4-5.

E-4-7d(2) Operating Procedures

The following section consists of the procedures to be used during the Detection Monitoring Program at IHDIVNAVSURFWARCEN SATTP. These procedures are designed to be in accordance with 40 CFR 264.97 (d) and COMAR 26.13.05.06, paragraph H (6). The following precedures are described below:

- Monitoring Well Construction
- Well Sampling
- Surface/Subsurface Soil Sampling
- Sediment Sampling
- Background Soil Samples
- Sample Identification System
- Decontamination
- Staff Gauge Installation
- Surveying
- Water-level Measurement
- Well Purging
- Annual Determination of Upper-most Aquifer Flow Rate and Direction
- Sample Packaging and Shipping
- Chain-of-Custody
- Transfer of Custody and Shipment
- Quality Control Samples
- Recordkeeping
- Waste Handling

E-4-7d(2)(a) Monitoring Well Installation

Maryland Regulation 26.04.04 contains standards applicable to well construction. Section 26.04.04.07.m(6) states that "the approving authority may specify special construction standards for wells installed for the sole purpose of monitoring water quality or water levels." Maryland has issued a document updated September 1, 1991 establishing special standards for monitoring wells. Following is a discussion of how these requirements will be met during monitoring well construction and where variances are requested.

Well Installation/Permits

The monitoring wells will be installed by a Maryland licensed well driller. The well driller will apply for and obtain permits from the County Health Department prior to well installation.

Well Casing/Screen Construction

Maryland specifications require that monitoring well casings and screens be constructed of 4-inch I.D. pipe. IHDIVNAVSURFWARCEN will construct the wells of 4-inch I.D. stainless-steel, flush-joint threaded riser pipe and well screens. Reduction fittings will not be used. Connections will not have protrusions or restricted diameters which could cause a pump or bailer to get stuck in the well casing.

Well screen slots shall be no larger than 0.02 inches. Figures E-4-6 and E-4-7 illustrate typical well construction details for stickup and flush mount monitoring wells.

Screened Interval

Well screens will be 10 feet in length. Total well depth of the screened interval will be approximately 12 to 15 feet below ground surface. When possible, the top of the screened interval will be positioned approximately 2 feet above the stabilized water level in the boring. The installation of flush mount wells at SATTP may prevent the well screen from being emplaced above the water table, due to the close proximity of the water table to the ground surface. After the borings are drilled to the desired depth the well screen and riser pipe will be installed through the augers or temporary casing to the desired depth.

Boring Diameter

Well borings will be drilled at least 8 inches in diameter to allow for at least a 4-inch annular space between the well screen/casing and borehole sides. This will allow sufficient space for proper placement of the sand pack, bentonite pellet seal, and cement-bentonite grout.

Centralizers

Centralizers will not be used for the well installations. Due to the shallow depths of the wells (estimated maximum 15 feet) the use of centralizers is not necessary to ensure proper alignment of the wells in the borings.

Annular Space Packing

The annulus of the boring around the well screen, and 1 to 2 feet above the well screen, will be backfilled with clean silica sand (No. 20 to 30 U.S. Standard Sieve size or as determined by the site geologist). A bentonite pellet seal with 2-foot minimum thickness for stickup wells and 1-foot minimum thickness for flush mount wells will then be installed above the sand pack and allowed to hydrate as per the manufacturer's recommendations. Due to the anticipated shallow depth to groundwater and the resulting shallow depths of the wells, the thicknesses of the backfill materials above the well may require adjustment in the field.

Annular Space Grouting

The remainder of the boring annulus, from the seal to the ground surface, will then be backfilled with cement/bentonite grout placed using a tremie pipe. The depths of all backfill materials will be constantly monitored during the well installation process by means of a weighted stainless steel or plastic tape.

Well Protection

A minimum 6-inch diameter protective steel casing equipped with a locking steel cap will be installed around each well. For stickup wells, these casings will be grouted a minimum of 3 feet into the ground, will have at least one drain hole positioned approximately 0.5 feet above the ground surface, and will extend approximately 2 feet (± 0.5 feet) above the top of the surrounding concrete pad. A 0.5-foot thick concrete apron measuring 3 feet by 3 feet will be constructed, equally portioned around the casing of each well, with the base set at least 3 inches below ground surface. Flush mount wells will be grouted from the top of the bentonite seal to 4 to 5 inches below ground surface, and will have protective steel casing and cap finished at or near ground surface. Flush mount wells will have watertight well cap and a protective sleeve with a manhole-type lid (marked as a monitoring well), and will be finished with a slightly mounded concrete pad for protection from erosion during flooding. Upon completion of groundwater sampling from monitoring wells, the protective casing will be painted glow-orange. All monitoring wells will be locked and will be keyed alike.

Well Development

Monitoring wells will be developed after installation to remove sediments and fine material from around the well screens and to remove drill cuttings and residual drilling fluids from the area around the monitored interval of the boring. Wells will be developed by bailing and surging, or by pumping, as determined by the field geologist. Wells will be developed until water removed is visibly clear of suspended solids or until approved by the field geologist. The regular pH, temperature, and specific conductance measurements will be collected for the purged water. Wells will be developed until these readings become stable and when the purged water is visibly clear, as described above. Development equipment will be decontaminated between wells using a detergent wash and a distilled water rinse.

Following development, and after water levels in the wells have had sufficient time to recover (24 hour minimum), synoptic water levels and well depths will be measured in each well. These measurements will be referenced to mean sea level datum established by a licensed surveyor. The reference point will be located and permanently marked at the top of each well casing. Measurements will be accurate to 1/100th of a foot (0.01) using an electronic water level measuring device.

Pump Tests

Monitoring wells will be used for aquifer testing to determine each well's yield and the hydrogeologic conditions in the water-bearing zone investigated by each well. The data generated from these tests will be used to define the water-yielding characteristics of the formation, and estimate rate of groundwater movement for the aquifer in the vicinity of the monitoring wells that are tested. Prior to testing, the well shall be thoroughly developed and allowed to stabilize, in order to obtain accurate results. Once the water level within the well has stabilized, the well shall be pumped for a minimum of 1 hour, to determine the well's yield (specific capacity). After the pump tests are completed, in-situ hydraulic conductivity testing (slug tests) will be performed at several newly installed monitoring wells. Due to the proximity of the proposed monitoring wells to each other, and the similar depth of the wells, the slug testing of all monitoring wells will not be necessary. The newly installed background well and half of the newly installed monitoring wells will be slug-tested. The site geologist will determine in the field which of the wells at each TTP will be slug tested.

Pressure transducers and data loggers will be used for data collection to obtain sufficiently accurate field data. Random checks of water levels will be made manually using a M-Scope or equivalent device. At a minimum, the following information will be collected for each well during slug tests:

- Well number/depth/screened interval/inside diameter of the screen/diameter of the sand pack.
- Static water level.
- Method of inducing water-level change.
- Time/recovery data.
- Total time of test.

Data recorded during slug test will be recorded on the hydraulic conductivity form attached in Appendix E-4-1.

Well Tagging

All wells will be tagged with the well construction permit number clearly visible from the outside of the well.

Well completion reports will be completed for each well installed, and a copy of the well completion report forms will be submitted to the County Health Department and to the state within 30 days of well completion. A project summary describing the installation procedure will accompany the copies of the completion reports, and will contain an accurate map depicting the precise location of all wells installed at the site in relation to known landmarks; a detailed description of the construction of the wells installed including casing, screen, gravel pack and grout intervals; the elevation of the top of the concrete pad installed at the base of the protective outer well casing; the top-of-casing elevation; and both the static and pumping water levels to the nearest 1/100th of a foot.

Notification of Well Drilling Activities

Notification will be provided to the state via telephone at least 3 to 5 working days prior to initiation of drilling at any site, so that state representatives may be present to observe the well installation.

Compliance with COMAR 26.04.04

All regulatory requirements will be met concerning the application for, permitting of, construction of, and completion of all monitoring wells. Compliance with COMAR 26.04.04 as modified by State of Maryland Specifications for the Design and Installation of Groundwater Monitoring Wells at Groundwater Investigation Sites updated September 1, 1991 is discussed in Section E-4-7d(2)(a). Variances are requested from the state where proposed construction details differ from COMAR 26.04.04 and the monitoring well guidance.

Well Abandonment Procedures

In the event it becomes necessary to abandon any wells, they will be filled and sealed in such a way that will not act as a channel for the interchange of waters of undesirable quality with waters of desirable quality and will not present a hazard to humans or animals. Any abandoned well will be sealed by or under the supervision of a well driller licensed by the Maryland State Board of Well Drillers.

Materials for sealing wells will comply with COMAR 26.04.04.11(E). Procedures for sealing wells will comply with the requirements of COMAR 26.04.04.11(F). Placement of material used in abandoning wells will comply with COMAR 26.04.04.11(G).

Well Depths

The anticipated well depths range from 12 - 15 feet, due to the shallow water table anticipated for the area (< 3 feet below ground level). At least a 2-foot separation between the ground surface and top of the well screen will be maintained, in order to allow room for a minimum gravel pack extension of 1 foot above the top of the screen and a minimum 1-foot thick bentonite pellet seal.

Well Location

Proposed well locations are shown in Figure E-4-5. The locations were selected to provide both downgradient and upgradient water quality data for the sites.

Well Accessibility

All wells will be readily accessible to both vehicles and by foot. Roads to the Thermal Treatment Points are well maintained in a serviceable condition and are all weather roads. Access to the well sites will be made available for regulatory staff upon reasonable notice.

E-4-7d(2)(b) Well Sampling

Field sampling teams will consist of at least two people. One person will collect the sample, while the other person maintains complete notes on sampling procedures and field observations. Groundwater samples will be collected in precleaned glass or plastic bottles depending on the parameter of concern. All sample bottles will be labeled with sample ID, date/time, project number, site name, analyses to be performed, and preservatives used.

Upon collection, samples will be preserved and shipped via overnight carrier to a pre-approved lab for analysis.

The following steps outline the procedures to be utilized when collecting groundwater samples:

- Upon arrival at the monitoring well, the cap will be removed and monitored with an organic vapor monitor.
- The water level will be measured and one casing volume of water in the well will be determined before purging begins. This will be done to determine the minimum amount of water to be evacuated from the well prior to sampling.
- The well will be purged using stainless-steel or teflon bailers.
- A minimum of three casing volumes but not more than five will be removed or until field parameters stabilize before sampling.

- Purge water will be containerized in 55-gallon drums, which will be labeled for contents, site, date, and well number.

- For wells that purge dry, the well will be allowed to recover to at least 70 percent of its original water level prior to sampling, or within 24 hours of purging in the event of extremely slow recharge.

- Samples will be collected using dedicated bailers and polyethylene rope and poured from the bailer directly into the sample containers.

- After collection, samples will be preserved accordingly, and labeled and tagged.

This procedure will be followed for each monitoring well sampled.

E-4-7d(2)(c) **Surface/Subsurface Soil Sampling**

All samples obtained from the boreholes shall be monitored with an organic vapor detector. Samples will be collected at 2-foot intervals below the ground surface and from above the water table (two soil samples minimum per boring). Soil samples for laboratory analysis will be collected with 3-inch ID split-spoon samplers. Upon sample retrieval, the material to be analyzed will be homogenized and distributed to the required sample containers. Split-spoon samplers will be decontaminated between samples as described in later in Section E-4-7d(2). All pertinent field data will be recorded using the appropriate sample log sheet and the field log book. A soil sample log sheet is attached in Appendix E-4-1.

E-4-7d(2)(d) **Sediment Sampling**

Sediment samples will be collected using a scoop or core sampler. Sampling activities will be conducted to minimize the loss of low-density fine materials. Sediment samples will be homogenized in a stainless-steel bowl, and distributed to the appropriate sampling containers.

Sediment characteristics shall be noted on the sample log form for each sediment sample. All pertinent field data shall be recorded using sample log sheets and the field log book. Sediment sample forms are attached in Appendix E-4-1.

E-4-7d(2)(e) Background Soil Samples

Background surface soil samples will be taken at locations which have not likely been affected by site activities, which are relatively undisturbed, and which represent soil characteristics in the immediate vicinity of the TTPs. The soil samples will be collected at approximately 6 inches below ground surface and will be taken below any horizon dominated by plant roots. Surface soil will be collected with a stainless-steel trowel and homogenized in a stainless-steel bowl, then distributed to sample containers.

E-4-7d(2)(f) Sample Identification System

Each sample collected will be assigned a unique sample tracking number. The sample tracking number will consist of a five-segment, alpha-numeric code that identifies the site, sample medium and location, sample depth (in the case of soil samples), year and sampling round (in the case of groundwater samples) and QA designation, if required. Any other pertinent information regarding sample identification will be recorded in the field log books.

The alpha-numeric coding to be used in the sample system is explained in the diagram below and the subsequent definitions:

(AA) - (AANN) - (NNNN) -
(Site Location) - (Medium & Location) - (Sample depth)-

(NNNN) - (A)
(Year and Sample Round) - (QA designation)

Character Type:

A = Alpha
N = Numeric

Site Location:

SA = Strauss Avenue

Medium:

GW = Groundwater from monitoring well

SB = Soil sample from soil borings

SD = Sediment

SS = Surface soil

Sample Location:

Surface soil/subsurface soil = Well number

Sediment = Sediment sample location number

Groundwater sample = Well number

Sample Depth:

For soil samples = Start/finish depth of sample (in feet)

Not used for groundwater or surface water/sediment samples

Year and Sample Round:

Sampling year = 96 for 1996

Sampling round = 01 for first sampling round of that year

QA Sample Designation:

D = Duplicate

B = Equipment Rinsate Blank

F = Field Blank

T = Trip Blank

For example, the first round of sampling a groundwater sample collected from Strauss Avenue Monitoring Well 4 would be designated as:

SA-GW04-9601

A duplicate sample from that well would be:

SA-GW04-96201-D

A subsurface soil sample and its duplicate taken from Well Boring Number 4 at a depth of 10 to 12 feet would be:

SA-SB04-1012 and SA-SB04-1012-D

E-4-7d(2)(g) Decontamination

The equipment involved in field sampling activities will be decontaminated prior to and during drilling and sampling activities. Such equipment includes drilling rigs, downhole tools, augers, pumps, well casing and screens, soil and water sampling equipment, and water-level measurement devices.

Major Equipment

All drilling equipment, including the drill rig and its transport system, shall be steam cleaned prior to beginning work, between the drilling of separate boreholes, any time the drilling rig leaves the facility or unit prior to completing a boring, and at the conclusion of the drilling program.

Decontamination operations will consist of washing equipment using a high-pressure steam wash. All decontamination activities will take place over an on site area to be designated during mobilization.

It is assumed that the base will provide a suitable location for decontamination operations along with potable water and electricity. Decontamination fluids will be discharged onto the ground surface within the SATTP area.

Sampling Equipment

All sampling equipment used for collecting samples will be decontaminated both prior to beginning field sampling and between samples. The following decontamination steps will be taken:

- Potable water rinse
- Alconox or liquinox detergent wash
- Potable water rinse
- Distilled/deionized water rinse
- Nitric acid rinse
- Distilled/deionized water rinse
- Methanol double rinse
- Distilled/deionized water rinse
- Air dry

Field analytical equipment such as pH, conductivity and temperature instrument probes will be rinsed first with analyte-free water, then with the sample liquid.

E-4-7d(2)(h) Staff Gauge Installation

A metal gauge, with marked 0.1-foot increments will be installed in Mattawoman Creek between the Main Point and the Auxiliary Point. The top of the staff gauge will be surveyed after installation. This gauge will not interfere with activities at the SATTP, and will be tall enough to record high water elevations. Refer to Figure E-4-5 for the specific location.

E-4-7d(2)(i) Surveying

During completion of the field activities, the contractor shall establish the vertical and horizontal locations of the newly installed piezometer and monitoring wells, including ground surface, top of riser pipe at the marked location, and top of protective casing. The top of both staff gauges will also be surveyed. The exact location and elevation above mean sea level of each well will be surveyed by a Maryland licensed, professional surveyor using a local USGS benchmark for horizontal and vertical control. Horizontal accuracy will be maintained to within 0.1 feet, and vertical control will be maintained to within 0.01 feet.

E-4-7d(2)(j) Water Level Measurement

One complete round of water level measurements will be obtained from all new monitoring wells and the piezometer at Strauss Avenue. A round of water level measurements will be taken within a 2-hour period of consistent weather conditions to minimize atmospheric/precipitation effects on groundwater levels. Water levels will also be taken before collecting the sample from each well.

Measurements will be taken with an electronic water level indicator using a marked or notched location on the top of the well casing as the reference point for determining depths to water. Water-level measurements will be recorded to the nearest 0.01 foot in the appropriate field logbook and on Water Level Measurement Forms (attached in Appendix E-4-1). An HNu or organic vapor analyzer (OVA) will be used to determine the presence of organic vapors in the well. If organic vapors do exist, a clear bailer will be used prior to purging to verify the existence and thickness of any potential immiscible layers.

E-4-7d(2)(k) Well Purging

After water-level measurements have been made, at least three well casing volumes of water will be purged from each well before sampling. This is to ensure that stagnant water within the well casing is removed so that a sample will be obtained that represents the surrounding aquifer. The upgradient, background wells will be purged prior to purging the downgradient wells. All wells to be sampled will be purged by bailing. A dedicated stainless-steel or teflon bailer will be used for each well.

Field measurements of pH, specific conductance, and temperature will be taken before purging and after each well volume is removed from the well. Readings of pH, specific conductance, and temperature should equilibrate after approximately three volumes. If the readings have not equilibrated after three well volumes have been removed, additional well volumes and readings are required. Sampling can be performed only after readings have stabilized or as determined by the field geologist.

If any well does not produce a sufficient amount of water for such an evacuation, the well will be bailed dry and allowed to recharge to 70 percent of the well's original capacity prior to sample collection within 24 hours.

The total volume removed and all field measurements shall be recorded on the well purging/sampling form and also in the field notebook. Appendix E-4-1 presents the Well Purging/Sampling Form.

E-4-7d(2)(l) Annual Determination of Upper-Most Aquifer Flow Rate and Direction

Selected monitoring wells will be measured for hydraulic conductivity upon completion of installation using a rising-head or falling-head test (e.g., slug tests). Water levels will be measured in all wells during each sampling round to determine groundwater flow directions and assess seasonal fluctuations in the water table. Groundwater contour maps will be produced from each round of water-level measurements.

E-4-7d(2)(m) Sample Packaging and Shipping

Samples will be packaged and shipped according to the following steps:

- Complete all sample labels and place samples into ziplock bags.
- Place samples into a strong outside container such as a metal picnic cooler lined with a garbage bag.
- Place absorbent material (vermiculite) in and around samples.
- Place several pillows of ice in the coolers on top of the sample containers.
- Place a copy of the Chain-of-Custody (COC) Form in a ziplock bag and tape it to the inside lid of the cooler.
- Apply strapping tape around the outside of the cooler; apply COC labels to cooler and go once over with the tape.
- Complete shipping airbill and place it on the top of the cooler for delivery to the shipper.

E-4-7d(2)(n) Chain-of-Custody (COC)

Custody of samples will be maintained and documented at all times. COC begins with the collection of the samples in the field. A sample is in custody if:

- It is in the field investigator's or the transferee's actual possession.
- It is in the field investigator's or the transferee's view, after being in his/her physical possession.
- It was in the field investigator's or the transferee's physical possession and then he/she secured it to prevent tampering.
- It is placed in a designated secure area.

A COC Record Form shall be used to record the custody of all samples collected and maintained by contractor personnel. The COC also serves as a sample logging mechanism for the laboratory. The COC Form will be completed and kept with the samples at all times inside the cooler in a plastic bag. Appendix E-4-1 contains an example of a COC Form.

The sampler will maintain custody from the time of sampling until the coolers are prepared for transport and shipped via overnight air freight, or until the samples are delivered by the sampler to the laboratory.

E-4-7d(2)(o) Transfer of Custody and Shipment

The following procedures will be used when transferring custody of samples:

- Samples will always be accompanied by a COC record. When transferring samples, the individuals relinquishing and receiving them will sign, date, and note the time of the COC Record. This record documents the sample custody transfer from the sampler to the laboratory, often through another person or agency (common carrier). Upon arrival at the laboratory, internal sample custody procedures will be followed.

- Prior to shipment to the laboratory for analysis, samples will be properly packaged. Individual custody records will accompany each shipment. Shipping containers will then be sealed for shipment to the laboratory. The methods of shipment, courier name, and other pertinent information, will be entered in the remarks section of the custody record.

- All shipments will be accompanied by the COC Record identifying the contents. The original record will accompany the shipment; and a copy will be retained by the field sampler.

- Proper documentation will be maintained for shipments by common carrier.

E-4-7d(2)(p) Quality Control Samples

In addition to regular calibration of field equipment and appropriate documentation, quality control (QC) samples will be collected during environmental sampling activities. QC samples include field duplicates, field blanks, and equipment rinsate blanks. Tables E-4-2, E-4-4, and E-4-5 present the type and number of required QC samples for each media to be sampled. Each type of field QC sample is defined as follows:

- Field Duplicates. Field duplicates are two samples collected: (1) independently at a sampling location in the case of groundwater; or (2) a single sample split into two portions in the case of soil. Duplicates are obtained during a single act of sampling and are used to assess the overall precision of the sampling and analysis program. Ten percent of all samples for each media shall be field duplicates. Duplicates shall be analyzed for the same parameters in the laboratory.

- Equipment Rinsate Blanks. Equipment rinsate blanks are obtained under representative field conditions by running analyte-free water through sample collection equipment (bailer, split-spoon, etc.) after decontamination and placing it in the appropriate sample containers for analysis. Equipment blanks will be used to assess the effectiveness of decontamination procedures. Equipment blanks will be collected for each type of nondedicated sampling equipment used and will be submitted at a frequency of one per day per media. Equipment blanks however will only be analyzed every other day. Those not analyzed will be retained by the laboratory until completion of the field activities. It will be the responsibility of the Field Operations Leader (FOL) to communicate to the laboratory whether an equipment blank is, or is not, to be analyzed as stated above.

- Field Blanks. Field blanks are obtained by sampling the water(s) used for decontamination during the field investigation. Samples consist of the source water used in: (1) steam cleaning of large equipment; and (2) analyte-free water used for decontamination of sampling equipment. Field blanks will be used to confirm the effectiveness of decontamination procedures, and to determine if the analyte-free water or the potable water (used for steam cleaning) may be contributing to sample contamination. Field blanks will be collected for each type of water used for decontamination and will be submitted at a frequency of one per sampling event per source.

- Trip Blanks. Trip blanks are used to determine whether contamination of sample or bottleware has occurred in the field. Trip blanks consist of analyte-free water taken from the laboratory to the site, and returned. Trip blanks are taken at the rate of one per cooler of organics and will be analyzed for TCL VOCs only.

E-4-7d(2)(q) Recordkeeping

Records to be maintained include boring logs, well construction logs, Well Purging/Sampling Forms, Groundwater Sample Forms, COC Forms, laboratory analysis results and static water-level records. These records shall be kept throughout the active life of the facility and throughout the entire post-closure care period.

Field personnel will use bound logbooks for the maintenance of all field records pertaining to well drilling and installation, and sampling activities. These records will be maintained on-site and will document all visual observations, calculations and equipment adjustments. Every entry will be dated, and the time for each entry will be noted. The logbooks are controlled documents that will be properly maintained and retained as part of the project files.

Field notes will be maintained in the following manner:

- Entries into the field notebook will be legibly written in indelible ink.
- A new page will be used at the beginning of each day's activities. This page will identify the date, time, location, on-site personnel, and observed weather conditions.
- Sketches or maps of the site will be included to identify well, sample, and/or photograph locations. Maps should include a north arrow and scale if possible.
- Information for water-level measurements will include a well number, date, time, and weather conditions at the time.
- When sampling is complete, the notes will include date, time, sample locations, sample ID numbers, and whether the sample was a normal sample or a replicate.
- None of the documents are to be destroyed or thrown away, even if they are illegible or contain inaccuracies.

E-4-7d(2)(r) **<u>Waste Handling</u>**

All development and purge liquids will be collected, containerized, and stored on-site in DOT-approved (Specification 17-C), 55-gallon drums. If visual observation or field monitoring instruments indicate that the liquid may be hazardous, it will be segrated from the other liquids. The drill cuttings will also be collected and stored on-site in the DOT-approved drums. All drums will be sealed and labeled with site location, drum contents, well/boring number, and date. IHDIVNAVSURFWARCEN will take possession of the drums upon project completion and will determine whether off-site disposal and/or treatment is required after receiving analytical results from the sampling.

E-4-7d(3) **Procedures for Determining Statistically Significant Increases for Monitored Parameters**

Groundwater monitoring data will be statistically analyzed in accordance with the Maryland Hazardous Waste Rules, Section 26.13.05.06, Paragraph H, and Section 26.13.05.06, Paragraph I, which correspond to RCRA Regulations, 40 CFR 264.97 and 40 CFR 264.98. Section 26.13.05.06, Paragraph H, provides guidance regarding acceptable statistical methods for analyzing monitoring well data. Section 26.13.05.06, Paragraph I, provides requirements and guidance regarding data analysis procedures for Detection Monitoring Programs at RCRA regulated units. In addition, the U.S. EPA's "Guidance Document on the Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities (U.S. EPA's Guidance Document)," (U.S. EPA/530/sw/89/026) was used as a reference for developing an appropriate statistical procedure.

By using the aforementioned regulations and reference document, the following procedure was developed and it can be summarized into four major components. The components are: (1) establish appropriateness and distribution of data (Coefficient-of-Variation Test); (2) statistical procedure for evaluating data (Tolerance Limit Approach); (3) data collection and use in statistical analysis (Moving Average); and (4) data management and reporting of results.

E-4-7d(3)(a) Establish Appropriateness and Distribution of Data

Constituents which are analyzed for and exhibit less than 50 percent nondetects in the resulting data will be assessed using the Coefficient-of-Variation Test to check for evidence of gross nonnormality in the data. This procedure is critical to determine the subsequent approach to use for the statistical analysis of the data. If the data which is collected has greater than 50 percent nondetects, then a statistical distribution can not be applied at an acceptable level of confidence and there are two possible approaches for dealing with this data. For the case in which there is between 50 and 90 percent nondetects, the test of proportions would be used to identify contamination. In the event that there is greater than 90 percent nondetects, an alternative approach (e.g., one which is based on the Poisson Distribution) would be employed.

The Coefficient-of-Variation test consists of using the following equation:

$$CV = SD/M$$

where: CV = the sample coefficient-of-variation; SD = the sample standard deviation; and M = the sample mean and comparing CV to 1.0. If CV exceeds 1.0, this is evidence that the normal distribution does not fit the data adequately.

Since there is no data presently available for this site and the Federal Regulations discuss that many contaminant data sets follow a normal distribution, the following statistical analysis is based on the assumption of normality. It has also been assumed that there will be less than 50 percent of nondetects in the resulting data (on a constituent by constituent basis). In the event that the Coefficient-of-Variation Test shows nonnormality, an alternate test will be used to verify the appropriate distribution. The U.S. EPA's Guidance Document lists several tests which are appropriate for determining the correct distribution for a set of data and one of these would be used for verifying the distribution. Once the correct distribution has been determined, an alternate statistical approach may need to be developed to check for statistically significant difference between the background and monitoring wells. If it is found necessary to use a different statistical approach, an application would be submitted to the U.S. EPA's Region III office for a permit modification.

E-4-7d(3)(b) Statistical Procedure for Evaluating the Data

Determination of statistically significant difference between the background and the monitored conditions will be performed using the Tolerance Limit Approach. This procedure is one of the five recommended statistical procedures listed under Federal Regulations, 40 CFR 264.97, Paragraph (g). The method would be considered an "Equivalent Statistical Procedure" under Maryland Hazardous Waste Regulation, Section 26.134.05.06, Paragraph H(ii). With this method, a tolerance limit is established for the background well(s) for each monitored constituent. Sample analyses from monitoring wells are then compared to the established tolerance limit and if the values fall above the upper limit the test shows statistically significant difference between the monitoring well and the background well. To develop the tolerance limit, a coverage of 95 percent will be used. By using this coverage, random observations with the same distribution as the background well data would exceed the upper tolerance limit less than 5 percent of the time. Similarly, a tolerance coefficient of 95 percent will be used which means that one has a confidence level of 95 percent that the upper tolerance limit will contain at least the specified coverage (i.e., 95 percent) of the distribution of observations from background well data.

The procedure for applying this statistical method to the monitoring data is as follows:

- Calculate the mean (M) and standard deviation (SD) of the background data set for each monitored constituent.

- Calculate the upper tolerance limit (TL) as follows:

$$TL = M + SD*K$$

where: K is the one-sided tolerance factor found in Table 5, Appendix B of U.S. EPA's Guidance Document.

- Compare the data from the monitoring well to the tolerance limit which was developed for each constituent.

If, by using the Tolerance Limit method, it is determined that there is statistically significant evidence of contamination at either of the TTPs, then the procedure in Paragraph I(8) of Section 26.13.05.06 of the Maryland Hazardous Waste Regulations, and if applicable, Paragraph (g) of 40 CFR 264.98 will be followed.

E-4-7d(3)(c) Data Collection and Use in Statistical Analysis

Due to a lack of monitoring well data, background levels for the constituents to be monitored have not been established yet. These background conditions are necessary for the tolerance limit approach. Therefore, specific tolerance limits for each constituent will be determined after the collection of 4 quarters of background well data at the background well. The 4 quarters of data are being used to develop background conditions since State and Federal regulations typically consider 1 year (i.e., 4 quarters) of data as an appropriate amount of data to develop background conditions.

Maryland Hazardous Waste Regulations require that monitoring wells at the Point-of-Compliance be sampled on a quarterly basis, therefore, it is proposed that the background well will also be sampled on a quarterly basis so that a meaningful comparison can be made between background and monitoring well information. The new quarterly data from the background well will be used to update the tolerance limits in order to consider seasonal trends. To appropriately use the quarterly data, a moving average technique will be applied to develop background conditions. The moving average technique will consist of using four consecutive quarters of data to develop a mean for each constituent at the TTP's (i.e., an individual background mean for each constituent at each of the TTP's, respectively). A new background mean and standard deviation for each TTP's constituents will be calculated when a new set of quarterly data becomes available. The new means and standard deviations will be used to calculate the upper tolerance limits for the TTP's.

The quarterly background sampling will consist of taking one sample from each well. The samples will be analyzed to determine constituent concentrations for the specific quarter. Collected background data and monitoring well data which shows no contamination above the Method Detection Limit (MDL), will be incorporated into the statistical analysis by using a concentration of one-half the MDL.

The monitoring wells will be sampled on a quarterly basis during the life of the TTPs. In the event an alternate sampling interval would be necessary, an application for a permit modification would be submitted to the U.S. EPA's Region III office. It should also be noted that the moving average method, which is proposed to be used to determine background conditions, may need to be revised if the sampling interval is modified.

The quarterly monitoring well data will be compared on an individual constituent basis to the appropriate constituents tolerance limit to determine if there is a statistically significant difference. The comparison procedure will consist of the following steps: 1) an individual constituent concentration from one of the 9 monitoring wells will be compared to the background well constituent tolerance limit; (2) continue the comparisons for each well and each constituent.

E-4-7d(3)(d) Data Management and Reporting of Results

Appropriate data sheets will be used by the laboratory to record analysis data. Records of the groundwater analytical data will be kept in a computer database which is appropriate for statistical analysis. A project file will also be kept which will include a copy of the groundwater monitoring data and the statistical evaluations.

Groundwater monitoring data and the statistical evaluations will be submitted to the U.S. EPA's Region III office on a quarterly basis for their review. A quarterly submittal of the information used for and resulting from the statistical analysis of groundwater at the Point-of-Compliance will include: (1) a description of the procedures used; (2) a summary of all pertinent data, and (3) a discussion of the results. The data will be presented in tabular and graphical form and the calculations will be presented on calculation sheets. The following tables, graphs, and calculations will be included:

- Table 1 - Summary of concentrations of each constituent analyzed at each monitoring and background well for the most recent quarter and the detection limit for each constituent.

- Table 2 - Mean concentration of each chemical for the background well per the four (4) most recent quarters (i.e., moving average) and all past averages.

- Table 3 - Summary of most recent quarters statistical results including: 1) concentration of each chemical/monitoring well/quarter; 2) mean concentration of chemical/ background well per four most recent quarters; 3) the tolerance limit calculated for the background well; and 4) special designation for a monitoring well denoting that the measured concentration exceeds the tolerance limit.

- Figure 1 - Graph of each chemical's moving average for the background well versus time.
- Calculations showing the Tolerance Limit, the Mean, and the Standard Deviation for the background well. Initial reports will also include calculations for the coefficient-of-variation test.

E-4-7e **Statistically Significant Increase in any Constituent or Parameter Identified at any Compliance Point Monitoring Well**

In the event that the Tolerance Limit Approach shows that there is statistically significant evidence of contamination for any constituent or parameter at any of the TTP compliance point monitoring wells, then the procedure in Paragraph I(8) of Section 26.13.05.06 of the Maryland Hazardous Waste Regulations, and if applicable, Paragraph (g) of 40 CFR 264.98 of the Federal Regulations will be followed. Two minor modifications to Paragraph I(8 and 9) of Section 26.13.05.06 of the Maryland Hazardous Waste Regulations are proposed and they are summarized below.

(1) COMAR 26.13.05.06, Paragraph I, 8(a,d,e) and 9(a,b,c)

The Region III EPA instead of the Secretary will be notified in writing of all the findings.

(2) COMAR 26.13.05.06, Paragraph I(b,c,d[i])

If it is deemed appropriate and acceptable by the Region III EPA, the groundwater samples taken from the monitoring wells will only be analyzed for the constituents listed in Appendix IX of the Federal Regulations and the additional constituents listed in Section E-4-7a. Maryland Hazardous Waste Regulations typically require that groundwater samples be analyzed for all constituents listed in COMAR 26.13.02.24, however, this list is extremely extensive and several of these constituents can not be identified using the current analysis techniques.

E-4-8 COMPLIANCE MONITORING PROGRAM [40 CFR 270.14(c)(7) AND COMAR 26.13.07.02(F)(7)]

Statistically significant evidence of contamination in groundwater does not exist since the detection monitoring system has not been installed. If results of the detection monitoring program show statistically significant evidence of contamination, a compliance monitoring program will be submitted within 90 days of such a determination.

E-4-9 CORRECTIVE ACTION PROGRAM [40 CFR 270.14(c)(8) AND COMAR 26.13.07.02F(8)]

Determinations have not been made that hazardous constituents have entered the groundwater. If a determination is made that hazardous constituents have entered the groundwater, a corrective action program meeting the requirements of 40 CFR 264.100 and COMAR 26.13.05.06(K) will be submitted as a permit modification request. Alternatively, a demonstration may be made that other facilities have caused the contamination.

REFERENCES

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Hiortdahl, S. N., 1990. "Changes in Ground Water Quality Caused by River-water Intrusion in the Potomac Group Aquifer System of Northwestern Charles County, Maryland." Groundwater Management, proceedings of the FOCUS Conference on Eastern Regional Ground Water Issues.

Tech International, 1988. Draft RCRA Part B, Subpart X Permit Application for Indian Head Naval Ordnance Station.

U.S. EPA, 1986. Test Methods for Evaluating Solid Waste - SW846.

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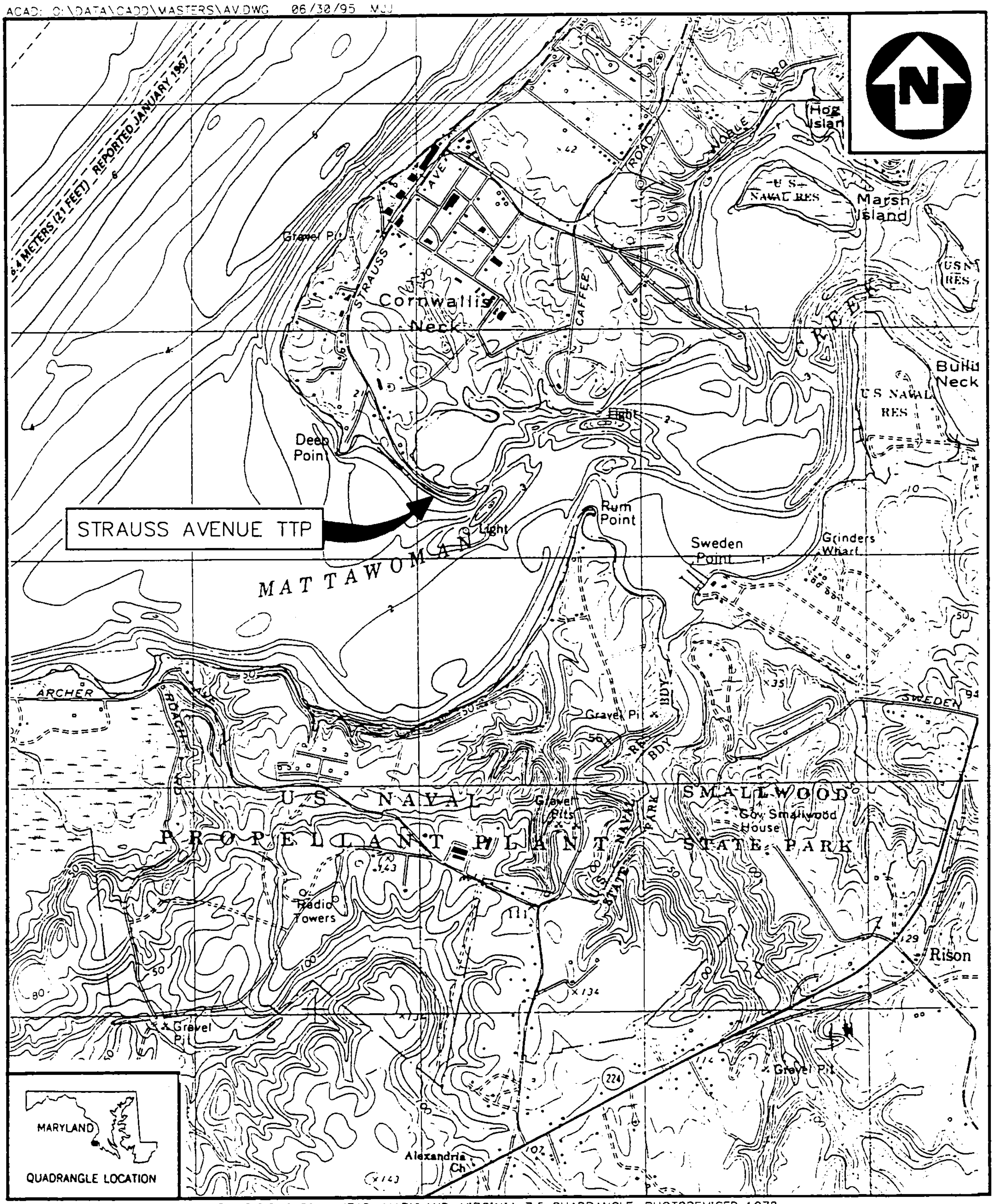

BASE MAP IS A PORTION OF THE U.S.G.S. INDIAN HEAD, MARYLAND-VIRGINIA 7.5 QUADRANGLE, PHOTOREVISED 1978.

LOCATION MAP OF INDIAN HEAD PENINSULA

INDIAN HEAD, MARYLAND

0 2000 4000

SCALE IN FEET

FIGURE E-4-1

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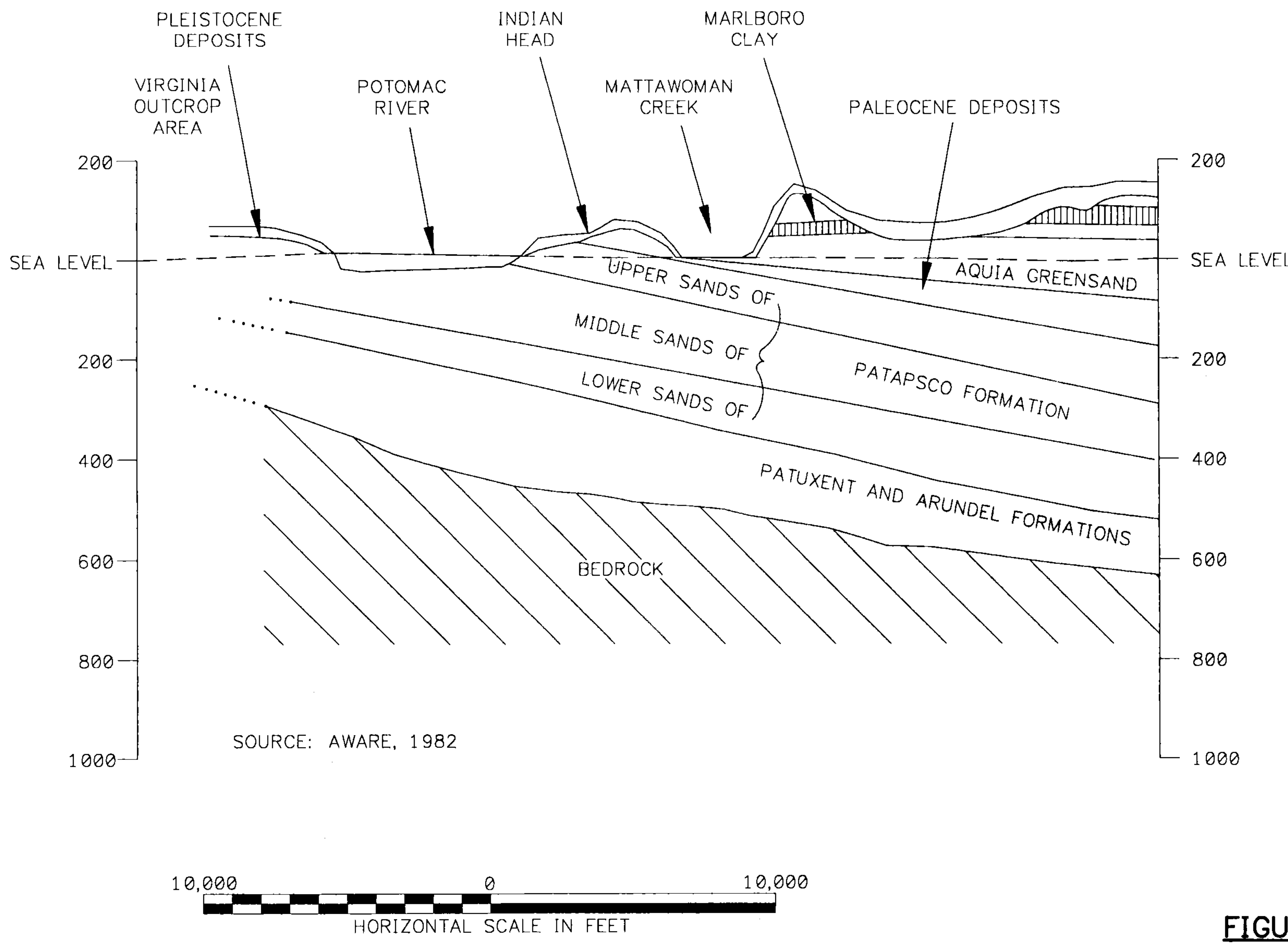

FIGURE E-4-2

GENERALIZED CROSS-SECTION OF THE INDIAN HEAD AREA INDIAN HEAD, MARYLAND

Brown & Root Environmental

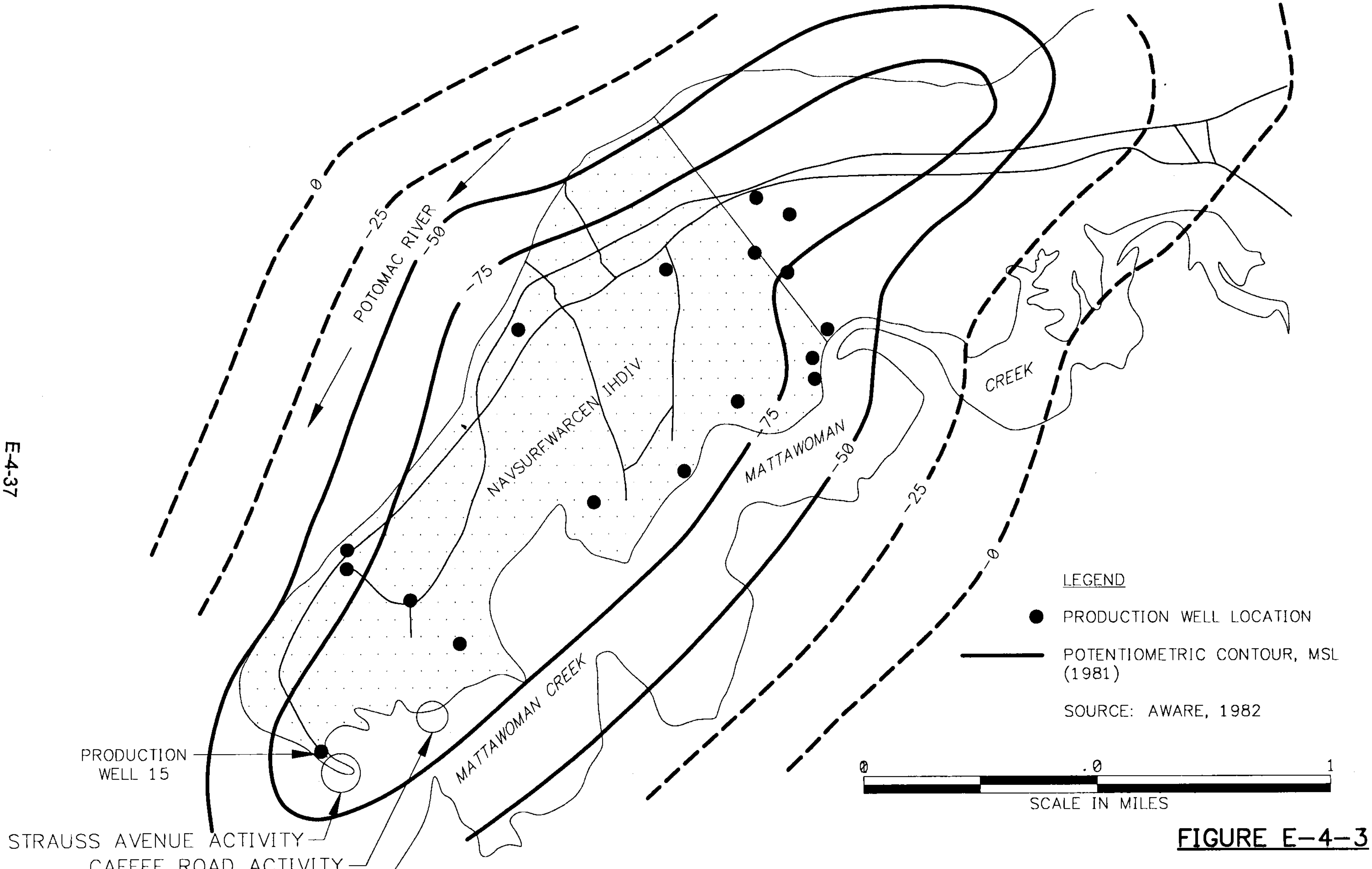

FIGURE E-4-3

POTENTIOMETRIC SURFACE MAP OF
LOWER SAND OF PATAPSCO FORMATION
INDIAN HEAD, MARYLAND

Brown & Root Environmental

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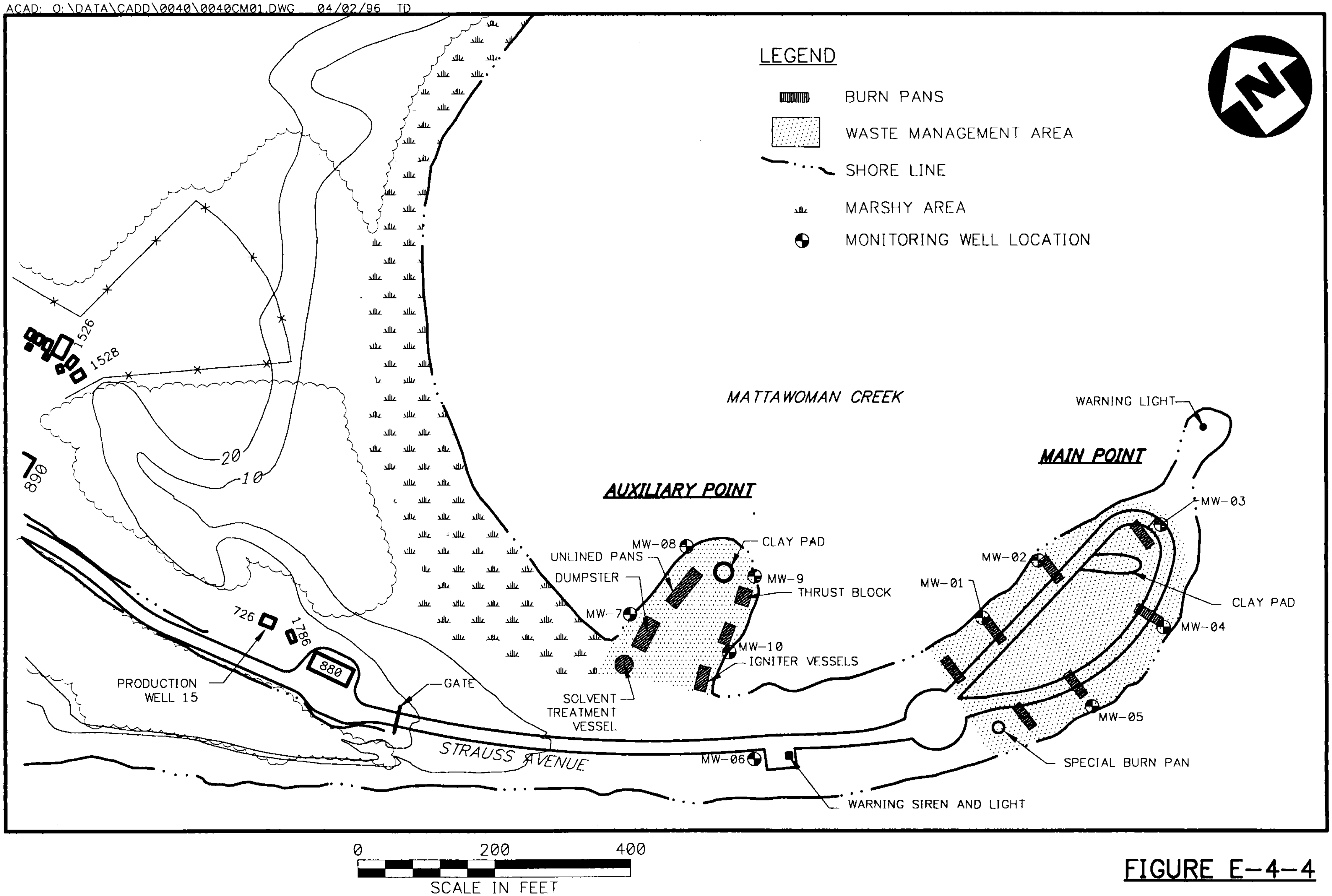

FIGURE E-4-4

TOPOGRAPHIC SITE MAP
STRAUSS AVENUE THERMAL TREATMENT POINT
INDIAN HEAD, MARYLAND

Brown & Root Environmental

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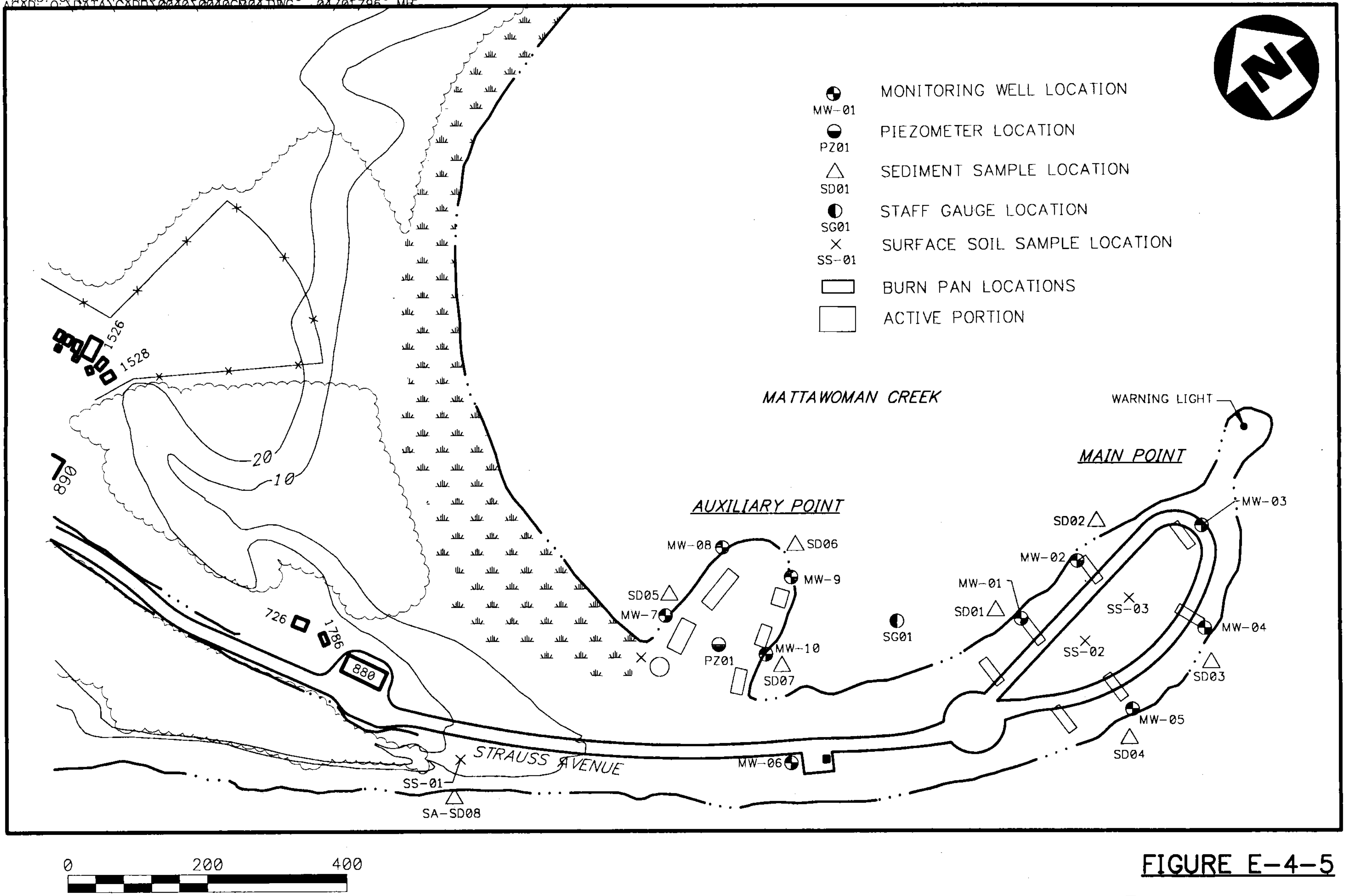

FIGURE E-4-5

STRAUSS AVENUE SAMPLING LOCATIONS
INDIAN HEAD, MARYLAND

Brown & Root Environmental

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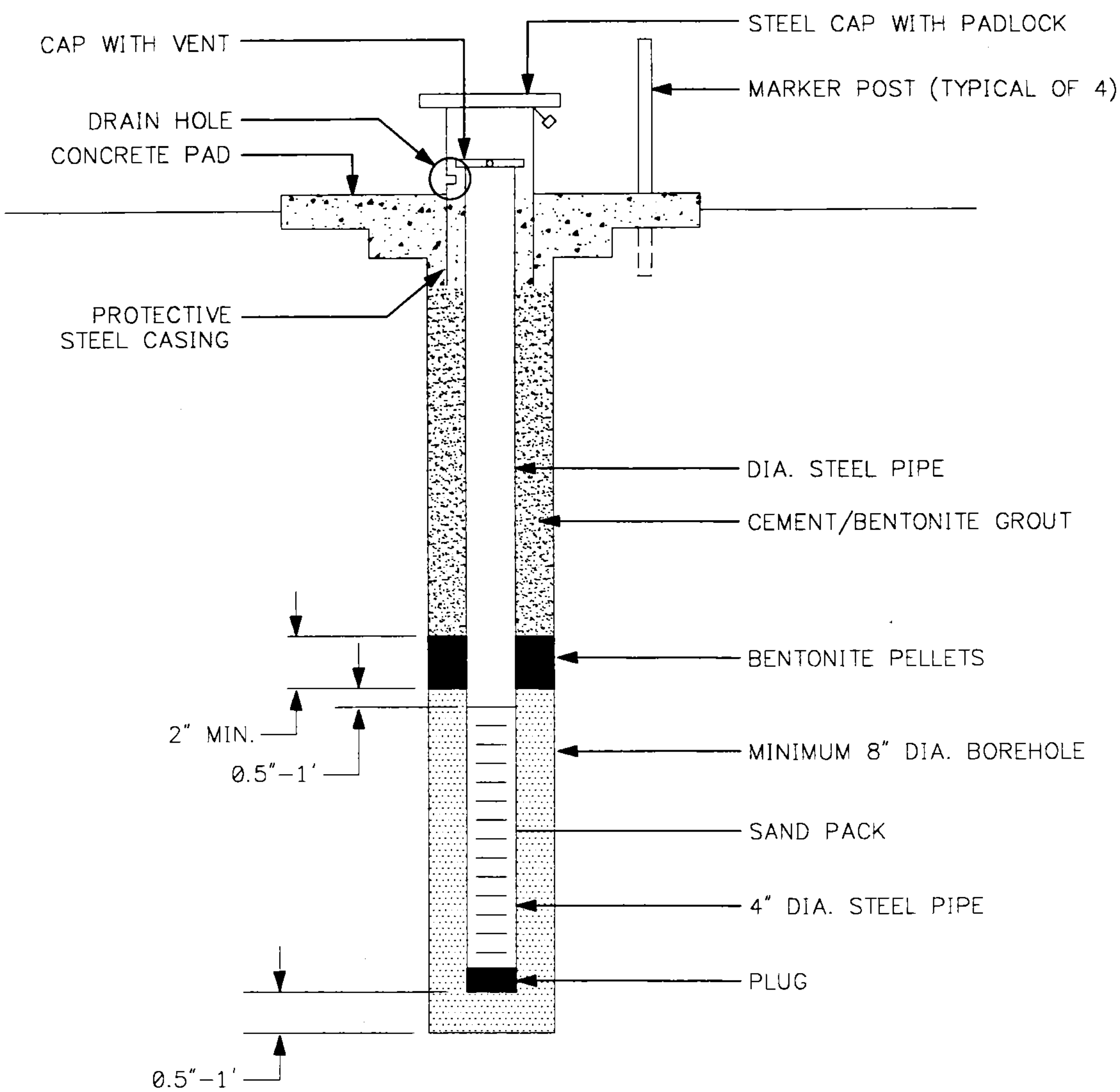

DETAIL OF TYPICAL STICKUP WELL
INDIAN HEAD, MARYLAND

FIGURE E-4-6

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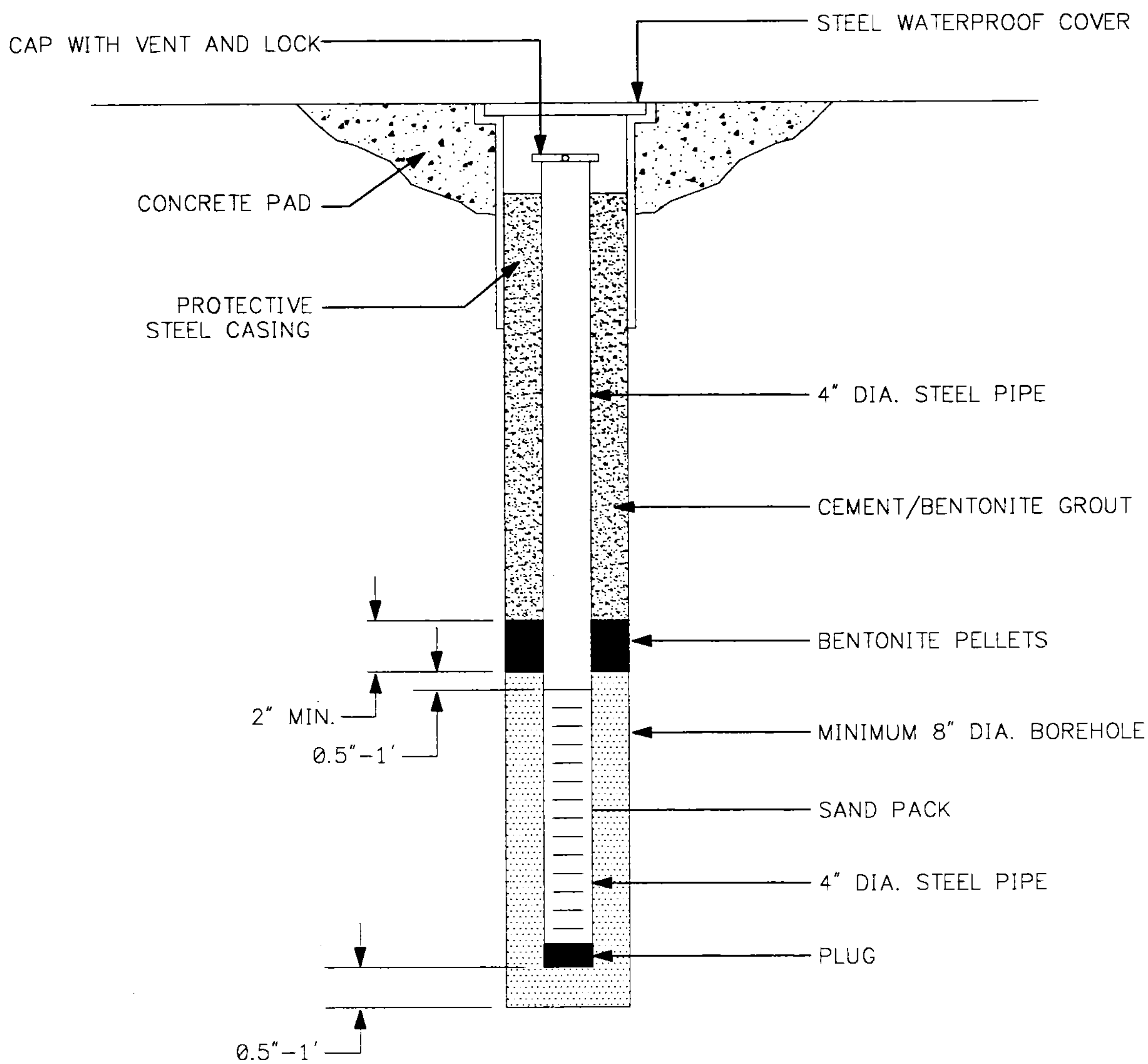

DETAIL OF TYPICAL WELL
WITH FLUSH MOUNT
INDIAN HEAD, MARYLAND

FIGURE E-4-7

Brown & Root Environmental

TABLE E-4-1

DETECTION MONITORING PROGRAM SAMPLING FREQUENCY
SATTP
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Parameter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
GW Elevations	X	X	X	X
TOC	X	X	X	X
TOX	X	X	X	X
Nitrites/Nitrates	X	X	X	X
pH, SC, T	X	X	X	X
Metals(1)	X	X	X	X
Energetics(2)	X	X	X	X

(1) Barium, chromium, lead, cadmium

(2) HMX, RDX, NG, NC

TABLE E-4-2

GROUNDWATER SAMPLING PROGRAM FOR SATTP
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Media	Analysis	Analytical Method	No. of Samples	Trip Blank(1)	Equipment Blank(7)	Field Blanks(3)	Duplicates(4)	Total Samples
Groundwater	Energetics:(5)	SW-8330	10	0	2	0	2	14
	Nitrocellulose	UF05	10	0	2	0	2	14
	Nitroglycerine(6)	UW27	10	0	2	0	2	14
	Appendix IX Metals(7)	SW-6010/ 7000+	10	0	2	0	2	14
	Appendix IX(8) Volatiles	SW-8240	10	3	2	0	2	17
	Appendix IX(9) Semivolatiles	SW-8270	10	0	2	0	2	14
	Indicator Parameters							
	TOX	SW-846; 9020	10	0	2	0	2	14
	TOC	SW-846; 9060	10	0	2	0	2	14
	Nitrate/Nitrite	EPA 353.3	10	0	2	0	2	14
	Temperature/pH/Conductivity	Field	10	NA	NA	NA	NA	NA

(1) Trip Blanks - Samples which originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic compound (VOC) samples. One trip blank per each cooler containing VOCs. Trip Blanks are only analyzed for VOCs.

(2) Equipment Blank - Samples obtained by pouring analyte-free water over sample collection equipment (bailer, etc.) after decontamination. Assesses the effectiveness of field decontamination procedure. Obtained at a frequency of 1/day/media/ analysis but analyzed every other day unless positive detection are recorded. Number of samples reflects the number of actual laboratory analyses performed.

(3) Field Blank - Samples consisting of the source water used in steam cleaning and/or decontamination. Obtained at a frequency of 1/event/source. Field blanks are included on soil sample table.

(4) Duplicates - A single sample split into two portions during a single act of sampling. Assess the overall precision of the sampling and analysis program. Obtained at a frequency of 10 percent of the number of samples.

(5) Energetics Method SW-8330 target analyte list includes the following: cyclo-1,3,5-trimethylene-2,4,6-trinitramine (RDX), cyclotetramethylene tetranitramine (HMX), 2,4,6-trinitrotoluene (TNT), o-nitrotoluene (2NT), m-nitrotoluene (3NT), p-nitrotoluene (4NT), trinitro-2,4,6-phenylmethylnitramine (TETRYL), nitrobenzene (NB), dinitrobenzene - all isomers (DNB), 1,3,5-trinitrobenzene (TNB), dintrotoluene - all isomers (DNT).

(6) Acceptable alternate analytical method is analysis via addition of nitroglycerine to Method SW-8330 as a nontarget analyte of interest.

TABLE E-4-2 (continued)
GROUNDWATER SAMPLING PROGRAM FOR SATTP
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

(7) Method Reference 40 CFR 261; metals analysis using applicable SW-846 procedures. Appendix IX Metals target analyte list consists of the following: antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, tin, vanadium, zinc.

(8) Method Reference 40 CFR 261; volatile organic compound (VOC) analysis using SW-846 Method 8240. Appendix IX VOC target analyte list consists of the following: acetone, acetonitrile, acrolein, acrylonitrile, allyl chloride, benzene, bromodichloromethane, chloroethane, chloroform, chloromethane, chloroprene, 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, dibromomethane, trans-1,4-dichloro-2-butene, dichlorodifluoromethane, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, trans-1,2-dichloroethene, 1,2-dichloropropane, 1,3-dichloro-2-propanol, cis-1,3-dichloropropene, trans-1,3-dichloropropene, ethylbenzene, ethyl methacrylate, 2-hexanone, iodomethane, methacrylonitrile, methylene chloride, methyl methacrylate, 4-methyl-2-pentanone, 2-picoline, propionitrile, pyridine, styrene, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane, tetrachloroethene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethane, trichlorofluoromethane, 1,2,3-trichloropropane, vinyl acetate, vinyl chloride, and xylene.

(9) Method Reference 40 CFR 261; semivolatile organic compound (SVOC) analysis using SW-846 Method 8270. Appendix IX SVOC target analyte list consists of the following: acenaphthylene, acetophenone, aniline, anthracene, 4-aminobiphenyl, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, benzyl alcohol, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bis(2-chloroisopropyl)ether, bis(2-ethylhexyl)phthalate, 4-bromophenyl phenyl ether, butylbenzylphthalate, 4-chloroaniline, 2-chloronaphthalene, 4-chloro-3-methylphenol, 2-chlorophenol, 4-chlorophenyl phenyl ether, chrysene, dibenzo(a,h)anthracene, dibenzofuran, di-n-butylphthalate, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 3,3'-dichlorobenzidine, 2,4-dichlorophenol, 2,6-dichlorophenol, diethylphthalate, p-dimethylaminoazobenzene, 7,12-dimethylbenz(a)anthracene, a,a-dimethylphenethylamine, 2,4-dimethylphenol, dimethylphthalate, 4,6-dinitro-2-methylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2,6-dinitrotoluene, diphenylamine, di-n-octylphthalate, ethyl methanesulfonate, fluoranthene, fluorene, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, indeno(1,2,3-c,d)pyrene, isophorone, 3-methylcholanthrene, methyl methanesulfonate, 2-methylnaphthalene, 2-methylphenol(o-cresol), 4-methylphenol(p-cresol), naphthalene, 1-naphthylamine, 2-naphthylamine, 2-nitroaniline, 3-nitroaniline, 4-nitroaniline, nitrobenzene, 2-nitrophenol, 4-nitrophenol, N-nitroso-di-n-butylamine, N-nitrosodimethylamine, N-nitrosodipropylamine, N-nitrosopiperidine, pentachlorobenzene, pentachlorophenol, phenacetin, phenanthrene, phenol, 2-picoline, pronamide, pyrene, 1,2,4,5-tetrachlorobenzene, 1,2,4-trichlorobenzene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, acetamide, aramide, chlorobenzilate, 3-methylphenol (m-cresol), diallate, thionzin, dimethoate, 3,3'-dimethylbenzidine, 1,3-dintrobenzene, famfur, hexachlorophene, hexachloropropene, isodrin, isosafrole, kepone, metha-pyrilene, 1,4-naphthoquinone, 4-nitroquinoline-1-oxide, N-nitrosodiethylamine, N-nitrosomethylethylamine, N-nitrosomorpholine, 5-nitro-o-toluidine, p-phenylenediamine, phorate, safrole, O,O,O-triethyl phosphorothioate, and 1,3,5-trinitrobenzene (sym-).

TABLE E-4-3
SUMMARY OF BOTTLE REQUIREMENTS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Parameter	Media	Container Material and Sample Volume	Preservation	Holding Time
Energetics SW-8330, Target Analyte List plus Nitrocellulose Nitroglycerine	Groundwater/Surface Water Soil/Sediment	1-L amber glass bottle 1 pint glass jar	Cool to 4°C Cool to 4°C	7 days 7 days
Metals	Groundwater/Surface Water Soil/Sediment	1-L plastic bottle 8 oz. glass jar	HNO_3 to pH <2, Cool to 4 °C Cool to 4°C	6 months; Hg 28 days 6 months; Hg 28 days
Appendix IX: Volatiles	Groundwater/Surface Water Soil/Sediment	3 - 40 ml VOA vials 2 - 60 ml VOA vials	HCl to pH <2 Cool to 4°C	14 days 14 days
Appendix IX: Semivolatiles	Groundwater/Surface Water Soil/Sediment	1 - 80 oz. amber glass bottle w/Teflon-lined cap 2 - 60 ml	Cool to 4°C Cool to 4°C	Extract 7 days; analyze 40 days Extract 7 days; analyze 40 days
pH	Groundwater/Surface Water Soil/Sediment	Analyzed in the field 4 oz. plastic bottle	None Cool to 4°C	None None
Conductivity, Temperature	Groundwater/Soil Sediment	Analyzed in the field	None	None
Indicator Parameters:				
TOX	Groundwater/Surface Water	1-L PE bottle	H_2SO_4 to pH <2 Cool to 4°C	28 days
Nitrate/Nitrite	Groundwater/Surface Water	500 ml PE bottle	H_2SO_4 to pH <2 Cool to 4°C	28 days
Soil Characteristics:				
Grain size	Soil only	1-qt glass jar	None	None
Moisture content	Soil only	1-qt glass jar	None	None
Bulk density	Soil only	1-qt glass jar	None	None
Permeability of undisturbed sample	Soil only	Shelby tube	None	None
Soil classification	Soil only	1-qt glass jar	None	None

TABLE E-4-4

SOIL SAMPLING PROGRAM FOR SATTP
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Media	Analysis	Analytical Method	No. of Samples	Trip Blank[1]	Equipment Blank[2]	Field Blanks[3]	Duplicates[4]	Total Samples
Soil	Energetics:[5]	SW-8330	23	0	2	2	3	30
	Nitrocellulose	UFO5	23	0	2	2	3	30
	Nitroglycerine[6]	UW27	23	0	2	2	3	30
	Appendix IX Metals[7] (Totals)	SW-6010/ 7000+	23	0	2	2	3	30
	Mercury	SW-846/7471	23	0	2	2	3	30
	Appendix IX[8] Volatiles	SW-846/8240	23	4	3	2	3	35
	Appendix IX[9] Semivolatiles	SW-846/8270	23	0	3	2	3	31
	Soil Analysis[7] [10]							
	Bulk Density	Agronomy No. 9	3	0	0	0	0	3
	Permeability of Undisturbed Sample	SW-9100	3	0	0	0	0	3
	Soil Classification	ASTM D421/422 ASTM D2216 ASTM 4318	3	0	0	0	0	3

(1) Trip Blanks - Samples which originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic compounds (VOC) samples. One trip blank per each cooler containing VOCs. Trip Blanks are only analyzed for VOCs.

(2) Equipment Blank - Samples obtained by pouring analyte-free water over sample collection equipment (bailer, etc.) after decontamination. Assesses the effectiveness of field decontamination procedure. Obtained at a frequency of 1/day/media/analysis but analyzed every other day unless positive detection are recorded. Number of samples reflects the number of actual laboratory analyses performed.

(3) Field Blank - Samples consisting of the source water used in steam cleaning and/or decontamination. Obtained at a frequency of 1/event/source. Field blanks are included on soil sample table.

TABLE E-4-4 continued
SOIL SAMPLING PROGRAM FOR SATTP
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

(4) Duplicates - A single sample split into two portions during a single act of sampling. Assess the overall precision of the sampling and analysis program. Obtained at a frequency of 10 percent of the number of samples.

(5) Energetics Method SW-8330 target analyte list includes the following: cyclo-1,3,5-trimethylene-2,4,6-trinitramine (RDX), cyclotetramethylene tetranitramine (HMX), 2,4,6-trinitrotoluene (TNT), o-nitrotoluene (2NT), m-nitrotoluene (3NT), p-nitrotoluene (4NT), trinitro-2,4,6-phenylmethylnitramine (TETRYL), nitrobenzene (NB), dinitrobenzene - all isomers (DNB), 1,3,5-trinitrobenzene (TNB), dintrotoluene - all isomers (DNT).

(6) Acceptable alternate analytical method is analysis via addition of nitroglycerine to Method SW-8330 as a nontarget analyte of interest.

(7) Method Reference 40 CFR 261; metals analysis using applicable SW-846 procedures. Appendix IX Metals target analyte list consists of the following: antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, tin, vanadium, zinc.

(8) Method Reference 40 CFR 261; volatile organic compound (VOC) analysis using SW-846 Method 8240. Appendix IX VOC target analyte list consists of the following: acetone, acetonitrile, acrolein, acrylonitrile, allyl chloride, benzene, bromodichloromethane, chloroethane, chloroform, chloromethane, chloroprene, 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, dibromomethane, trans-1,4-dichloro-2-butene, dichlorodifluoromethane, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, trans-1,2-dichloroethene, 1,2-dichloropropane, 1,3-dichloro-2-propanol, cis-1,3-dichloropropene, trans-1,3-dichloropropene, ethylbenzene, ethyl methacrylate, 2-hexanone, iodomethane, methacrylonitrile, methylene chloride, methyl methacrylate, 4-methyl-2-pentanone, 2-picoline, propionitrile, pyridine, styrene, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane, tetrachloroethene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethane, trichlorofluoromethane, 1,2,3-trichloropropane, vinyl acetate, vinyl chloride, and xylene.

(9) Method Reference 40 CFR 261; semivolatile organic compound (SVOC) analysis using SW-846 Method 8270. Appendix IX SVOC target analyte list consists of the following: acenaphthylene, acetophenone, aniline, anthracene, 4-aminobiphenyl, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, benzyl alcohol, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bis(2-chloroisopropyl)ether, bis(2-ethylhexyl)phthalate, 4-bromophenyl phenyl ether, butylbenzylphthalate, 4-chloroaniline, 2-chloronaphthalene, 4-chloro-3-methylphenol, 2-chlorophenol, 4-chlorophenyl phenyl ether, chrysene, dibenzo(a,h)anthracene, dibenzofuran, di-n-butylphthalate, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 3,3'-dichlorobenzidine, 2,4-dichlorophenol, 2,6-dichlorophenol, diethylphthalate, p-dimethylaminoazobenzene, 7,12-dimethylbenz(a)anthracene, a,a-dimethylphenethylamine, 2,4-dimethylphenol, dimethylphthalate, 4,6-dinitro-2-methylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2,6-dinitrotoluene, diphenylamine, di-n-octylphthalate, ethyl methanesulfonate, fluoranthene, fluorene, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, indeno(1,2,3-c,d)pyrene, isophorone, 3-methylcholanthrene, methyl methanesulfonate, 2-methylnaphthalene, 2-methylphenol(o-cresol), 4-methylphenol(p-cresol), naphthalene, 1-naphthylamine, 2-naphthylamine, 2-nitroaniline, 3-nitroaniline, 4-nitroaniline, nitrobenzene, 2-nitrophenol, 4-nitrophenol, N-nitroso-di-n-butylamine, N-nitrosodimethylamine, N-nitrosodipropylamine, N-nitrosopiperidine, pentachlorobenzene, pentachlorophenol, phenacetin, phenanthrene, phenol, 2-picoline, pronamide, pyrene, 1,2,4,5-tetrachlorobenzene, 1,2,4-trichlorobenzene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, acetamide, aramide, chlorobenzilate, 3-methylphenol (m-cresol), diallate, thionzin, dimethoate, 3,3'-dimethylbenzidine, 1,3-

dintrobenzene, famfur, hexachlorophene, hexachloropropene, isodrin, isosafrole, kepone, metha-pyrilene, 1,4-naphthoquinone, 4-nitroquinoline-1-oxide, N-nitrosodiethylamine, N-nitrosomethtylethylamine, N-nitrosomorpholine, 5-nitro-o-toluidine, p-phenylenediamine, phorate, safrole, O,O,O-triethyl phosphorothioate, and 1,3,5-trinitrobenzene (sym-).

(10) A total of three surface soil samples will be taken to determine soil characteristics. One will be taken from a background location and two from the Strauss Avenue Thermal Treatment Point.

TABLE E-4-5

SEDIMENT SAMPLING PROGRAM FOR SATTP
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Media	Analysis	Analytical Method	No. of Samples	Trip Blank[(1)]	Equipment Blank[(2)]	Field Blanks[(3)]	Duplicates[(4)]	Total Samples
Sediment	Energetics: [(5)]	SW-8330	5	0	1	0	1	7
	Nitrocellulose	UFO5	5	0	1	0	1	7
	Nitroglycerine[(6)]	UW27	5	0	1	0	1	7
	Appendix IX Metals (Total)[(7)]	SW-6010/ 7000+	5	0	1	0	1	7
	Mercury	SW-846/7471	5	0	1	0	1	7
	Appendix IX[(8)] Volatiles	SW-846/8240	5	0	1	0	1	7
	Appendix IX[(9)] Semivolatiles	SW-846/8270	5	0	1	0	1	7

(1) Trip Blanks - Samples which originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic compound (VOC) samples. One trip blank per each cooler containing VOCs. Trip Blanks are only analyzed for VOCs.

(2) Equipment Blank - Samples obtained by pouring analyte-free water over sample collection equipment (bailer, etc.) after decontamination. Assesses the effectiveness of field decontamination procedure. Obtained at a frequency of 1/day/media/analysis but analyzed every other day unless positive detection are recorded. Number of samples reflects the number of actual laboratory analyses performed.

(3) Field Blank - Samples consisting of the source water used in steam cleaning and/or decontamination. Obtained at a frequency of 1/event/source. Field blanks are included on soil sample table.

(4) Duplicates - A single sample split into two portions during a single act of sampling. Assess the overall precision of the sampling and analysis program. Obtained at a frequency of 10 percent of the number of samples.

(5) Energetics Method SW-8330 target analyte list includes the following: cyclo-1,3,5-trimethylene-2,4,6-trinitramine (RDX), cyclotetramethylene tetranitramine (HMX), 2,4,6-trinitrotoluene (TNT), o-nitrotoluene (2NT), m-nitrotoluene (3NT), p-nitrotoluene (4NT), trinitro-2,4,6-phenylmethylnitramine (TETRYL), nitrobenzene (NB), dinitrobenzene - all isomers (DNB), 1,3,5-trinitrobenzene (TNB), dintrotoluene - all isomers (DNT).

(6) Acceptable alternate analytical method is analysis via addition of nitroglycerine to Method SW-8330 as a nontarget analyte of interest.

(7) Method Reference 40 CFR 261; metals analysis using applicable SW-846 procedures. Appendix IX Metals target analyte list consists of the following: antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, tin, vanadium, zinc.

(8) Method Reference 40 CFR 261; volatile organic compound (VOC) analysis using SW-846 Method 8240. Appendix IX VOC target analyte list consists of the following: acetone, acetonitrile, acrolein, acrylonitrile, allyl chloride, benzene, bromodichloromethane, chloroethane, chloroform, chloromethane, chloroprene, 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, dibromomethane, trans-1,4-dichloro-2-butene, dichlorodifluoromethane, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, trans-1,2-dichloroethene, 1,2-dichloropropane, 1,3-dichloro-2-propanol, cis-1,3-dichloropropene, trans-1,3-dichloropropene, ethylbenzene, ethyl methacrylate, 2-hexanone, iodomethane, methacrylonitrile, methylene chloride, methyl methacrylate, 4-methyl-2-pentanone, 2-picoline, propionitrile, pyridine, styrene, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane, tetrachloroethene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethane, trichlorofluoromethane, 1,2,3-trichloropropane, vinyl acetate, vinyl chloride, and xylene.

(9) Method Reference 40 CFR 261; semivolatile organic compound (SVOC) analysis using SW-846 Method 8270. Appendix IX SVOC target analyte list consists of the following: acenaphthylene, acetophenone, aniline, anthracene, 4-aminobiphenyl, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, benzyl alcohol, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bis(2-chloroisopropyl)ether, bis(2-ethylhexyl)phthalate, 4-bromophenyl phenyl ether, butylbenzylphthalate, 4-chloroaniline, 2-chloronaphthalene, 4-chloro-3-methylphenol, 2-chlorophenol, 4-chlorophenyl phenyl ether, chrysene, dibenzo(a,h)anthracene, dibenzofuran, di-n-butylphthalate, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 3,3'-dichlorobenzidine, 2,4-dichlorophenol, 2,6-dichlorophenol, diethylphthalate, p-dimethylaminoazobenzene, 7,12-dimethylbenz(a)anthracene, a,a-dimethylphenethylamine, 2,4-dimethylphenol, dimethylphthalate, 4,6-dinitro-2-methylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2,6-dinitrotoluene, diphenylamine, di-n-octylphthalate, ethyl methanesulfonate, fluoranthene, fluorene, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, indeno(1,2,3-c,d)pyrene, isophorone, 3-methylcholanthrene, methyl methanesulfonate, 2-methylnaphthalene, 2-methylphenol(o-cresol), 4-methylphenol(p-cresol), naphthalene, 1-naphthylamine, 2-naphthylamine, 2-nitroaniline, 3-nitroaniline, 4-nitroaniline, nitrobenzene, 2-nitrophenol, 4-nitrophenol, N-nitroso-di-n-butylamine, N-nitrosodimethylamine, N-nitrosodipropylamine, N-nitrosopiperidine, pentachlorobenzene, pentachlorophenol, phenacetin, phenanthrene, phenol, 2-picoline, pronamide, pyrene, 1,2,4,5-tetrachlorobenzene, 1,2,4-trichlorobenzene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, acetamide, aramide, chlorobenzilate, 3-methylphenol (m-cresol), diallate, thionzin, dimethoate, 3,3'-dimethylbenzidine, 1,3-dintrobenzene, famfur, hexachlorophene, hexachloropropene, isodrin, isosafrole, kepone, metha-pyrilene, 1,4-naphthoquinone, 4-nitroquinoline-1-oxide, N-nitrosodiethylamine, N-nitrosomethylethylamine, N-nitrosomorpholine, 5-nitro-o-toluidine, p-phenylenediamine, phorate, safrole, O,O,O-triethyl phosphorothioate, and 1,3,5-trinitrobenzene (sym-).

SECTION F

PROCEDURES TO PREVENT HAZARDS

F. PROCEDURES TO PREVENT HAZARDS

F-1 SECURITY [40 CFR 264.14(b),(c); 270.14(b)(4) and COMAR 26.13.05.02E AND 26.13.07]

F-1a Security Procedures and Equipment [40 CFR 264.14(a)]

F-1a(1) 24-Hour Surveillance System [40 CFR 264.14(b) and COMAR 26.13.05.02E(2)(a)]

The OB facilities at IHDIVNAVSURFWARCEN meet the requirements for security procedures and equipment through a combination of operating practices and physical systems. The station is physically divided into Restricted and Non-Restricted Areas. The Non-Restricted Area is where the administrative offices, military housing, recreational, and other nonessential services are located. The development, testing, manufacturing, and thermal treatment points are located in the Restricted Area. This area is separated from the Non-Restricted Area by natural barriers and security fencing and barriers.

A full-time, uniformed, armed, security staff maintains 24-hour surveillance at IHDIVNAVSURFWARCEN. During each shift, guards conduct routine patrols on roads in both areas. Two to three patrol cars and a supervisor are on duty at all times. Three boats are available to patrol the shoreline. Boat patrols are random during daylight hours. Guards also respond to emergency or unusual situations. The guards are equipped with two-way radios.

The Strauss Avenue Operations Building 880, located at the entrance to the main and auxiliary thermal treatment points, is equipped with telephones and panning telephoto video cameras. These cameras are controlled by the operators in Building 880. However, any building connected to the Local Area Network (LAN) can access these cameras. The Security Station is equipped with the LAN. After hours the cameras are set at wide angle to give the security guards the most panoramic view of the area.

F-1a(2) Barrier and Means to Control Entry [40 CFR 264.14(b)(2)(i) and COMAR 26.13.05.02E(2)(b)]

F-1a(2)(a) Barrier

The IHDIVNAVSURFWARCEN is located on a peninsula formed by the Mattawoman Creek on the east and south and the Potomac River to the west. It is separated from the adjacent town of Indian Head by a 7-foot-high, galvanized, chain-link fence that meets at Gate 1. The Restricted Area is separated from the Non-Restricted portion of the Station by the same type of fence that is used at Gate 2.

F-1a(2)(b) **Means to Control Entry [40 CFR 264.14(b)(2)(ii) and COMAR 26.13.05.02E(2)(c)]**

The only access for vehicle and pedestrian traffic into the Restricted Area is controlled by a security guard 24 hours a day at Gate 2. To enter the Restricted Area all persons must:

- Provide proper identification.
- Be cleared by the Pass Office (Visitors).
- Coordinate visit and secure escort at Pass Office.
- Smoke ONLY in designated areas.
- Obey the restriction that lighters and matches are prohibited.
- Transmit radio signals in permitted areas only.

Further means to control entry exist to restrict unauthorized personnel from the Thermal Treatment Areas.

Prior to each burn, entry is further restricted by a chain gate across the access road at the entrance. This chain gate is always locked and keys are provided only to authorized personnel for access. Keys are located in the Operations Building 880 at the entrance, with Security, Fire Department, or in the Health and Safety Office in Building 482. Hazardous wastes are held for only a short period of time (less than a day) in this area. No planes or boats are allowed in the waterway between Sweden Point Buoy and the Thermal Treatment Point during ignition. Prior to thermal treatment, warning signals, warning sirens, and flashing red lights are activated. If necessary, security boats are available to patrol the waterways to escort boaters out of the danger zone. A megaphone is used to disperse boaters.

F-1a(3) **Warning Signs [40 CFR 264.14(c) and COMAR 26.13.05.02E(3)]**

Warning signs (in English) with the legend "Danger - Unauthorized Personnel Keep Out" are posted at the approaches and on the perimeter of the Thermal Treatment Points. These signs are legible from a distance of at least 25 feet and are visible from road and water approaches.

A sign mounted on a wooden horse in the middle of the road reads: DANGER DO NOT PASS. A large sign is posted at the chain gate which reads:

DO NOT PASS BEYOND
THIS POINT - UNTIL INSTRUCTED
BY BURN POINT PERSONNEL
IN BLDG. 880 OR ON THE BURN
POINT.

FOLLOWING SAFETY
APPAREL REQUIRED
BEYOND THIS POINT
FIRE-RESISTANT COVERALLS
CONDUCTIVE SHOES OR NON-STATS
SOFT CAP OR HARD HAT
SAFETY GLASSES OR GOGGLES

Attached to the bottom of the sign is a smaller sign which reads: BUILDING MAIN BURN AREA LIMITS EXPLOSIVE 9,000 LBS CLASS 1 - DIVISION 1 PERSONNEL 8.

F-1b **Waiver**

IHDIVNAVSURFWARCEN does not request a waiver of the security procedures and equipment requirements.

F-2 INSPECTION SCHEDULE [40 CFR 264.15; 270.14 (b)(5) and COMAR 26.13.05.02F]

F-2a General Inspection Requirements [40 CFR 264.15; 264.14(b)(5); 264.33 and COMAR 26.13.05.02F(1)]

IHDIVNAVSURFWARCEN personnel inspect the monitoring equipment, safety and emergency equipment, security devices, and operation and structural equipment that are vital to prevent, detect, or respond to environmental or human health hazards to ensure that facility operations are safe and environmentally sound. Inspections are performed prior to and after each treatment. A written inspection schedule outlining items, types of problems, and inspection frequencies is provided in Figure F-1. A copy of this inspection schedule is maintained in the Environmental Engineering Office.

FIGURE 1

STRAUSS AVENUE THERMAL TREATMENT POINT
INSPECTION CHECKLIST
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

INSPECTION ITEM	FREQUENCY		STATUS		PROBLEM (REJECT ONLY)	DATE: NATURE OF CORRECTIVE ACTION
	BEFORE USE	AFTER USE	ACCEPT	REJECT		
Adequate Squibs Casting Powder/ Fuel Oil Supply	X					
Communication/ Warning System	X					
Safety Equipment Availability/Condition	X					
Smoldering Material	X					
Untreated Waste	X	X				
Excessive Ash	X	X				
Unit Integrity	X	X				
Ejected Materials	X	X				
Precipitation Accumulation in Unit	X	X				
Wind Velocity	X					
Security	X					

Inspector__________ **Date**_______

Notes:

F-2a(1) Types of Problems [40 CFR 264.15(b)(3) and COMAR 26.13.05.02 F(2)(c)]

The types of specific problems in the thermal treatment areas are identified on the inspection checklist. A copy of the inspection checklist is provided in Figure F-1.

F-2a(2) Frequency of Inspections [40 CFR 264.15(a),(b)(1), (3),(4) and COMAR 26.13.05.02F(2)(d)]

The written inspection is conducted prior to and after each treatment. The goal of frequent inspections is to identify and correct situations before they become problems. Figure F-1 indicates inspection items. The SATTP is used daily when conditions permit.

F-2b <u>Specific Process Inspection Requirements</u> [40 CFR 264.15(b); 264.602 and COMAR 26.13.05.02F]

F-2b(1) Container Inspection [40 CFR 264.174 and COMAR 26.13.05.09E]

IHDIVNAVSURFWARCEN does not store hazardous wastes in containers at the Thermal Treatment Points.

F-2b(2) Tank System Inspection [40 CFR 264.195 and COMAR 26.13.05.10E]

IHDIVNAVSURFWARCEN does not treat hazardous waste in tanks at the Thermal Treatment Points.

F-2b(3) Waste Pile Inspection [40 CFR 264.254 and COMAR 26.13.05.12E]

IHDIVNAVSURFWARCEN does not manage hazardous wastes in waste piles.

F-2b(4) Surface Impoundment Inspection [40 CFR 264.226 and COMAR 26.13.05.11F]

IHDIVNAVSURFWARCEN does not manage hazardous wastes in surface impoundments.

F-2b(5) Incinerator Inspection [40 CFR 264.347 and COMAR 26.13.05.15D(3)]

IHDIVNAVSURFWARCEN does not manage hazardous wastes in incinerators.

F-2b(6) Landfill Inspection [40 CFR 264.303 and COMAR 26.13.05.14C]

IHDIVNAVSURFWARCEN does not manage hazardous wastes in landfills.

F-2b(7) Land Treatment Facility Inspection [40 CFR 264. 273(G) and COMAR 26.13.05.13]

IHDIVNAVSURFWARCEN does not manage hazardous wastes in land treatment units.

F-2b(8) Miscellaneous Unit Inspections [40 CFR 264.15 and COMAR 26.13.05.17C]

The Inspection Record Form (Figure F-1) is completed prior to the use of all miscellaneous units. Inspection of the Thermal Treatment Points is shared by the Engineering/Maintenance Division; the Stores, Transportation, and Operations Division; and the Safety and Surveillance Division. The inspection program for the Thermal Treatment Points is carried out as described in Section F-2. This program ensures that the treatment points units are operated in compliance with the standards specified in Section D of this permit application.

F-3 DOCUMENTATION OF PREPAREDNESS AND PREVENTION REQUIREMENTS

F-3a Equipment Requirements [40 CFR 264.32 and COMAR 26.13.05.03C]

F-3a(1) Internal Communications [40 CFR 264.32(a) and COMAR 26.13.05.03C(1)]

Warning signs, revolving red lights and electronic sirens, are strategically placed along the shoreline of Mattawoman Creek. Burning operations are not initiated unless these electronic devices are operational. Prior to and during each thermal treatment, red flashing lights and electronic siren are activated to alert employees to the pending operation at SATTP.

IHDIVNAVSURFWARCEN maintains internal telephone, two-way radio, and video camera systems for communications within the installation. A fire call-box communication system connected to the 24-hour Fire Department dispatcher provides access to immediate emergency response. Telephones are located in Operations Building 880 near the entrance to SATTP. Personnel and vehicles are equipped with two-way radios. To prevent unsafe transmissions in sensitive areas, signs are posted and roads are painted where radio transmissions are banned.

F-3a(2) External Communications [40 CFR 264.32(b) and COMAR 26.13.05.03C(2)]

Both the telephone system and the radio network are capable of summoning emergency assistance from both onsite and offsite security, fire, and emergency response teams.

F-3a(3) Emergency Equipment [40 CFR 264.32(c) and COMAR 26.13.05.03C(3)]

Each of the explosive-carrying vehicles is supplied with a portable, multipurpose, fire extinguisher. Fire extinguishers are also maintained at the SATTP.

The Fire Protection Division is equipped with three pumper trucks and a tanker truck with a 300-gallon-per-minute (gpm) transfer pump. A combined total of 2,250 gallons of water can be transported at one time to these areas for fire fighting. The Fire Protection Division is also equipped with two foaming devices capable of delivering 1,000 gallons of foam per minute. This equipment is available on site 24-hours per day and 7 days per week.

IHDIVNAVSURFWARCEN maintains a full-service On Scene Operations Team (OSOT). The Team operates a fully equipped Hazardous Materials Trailer. The forward section of the trailer serves as a Command Control, Communications, and Information Center. Emergency equipment includes computer hardware and emergency response software, portable radios, and cellular telephones. The rear section provides storage for personal protective equipment, decontamination equipment, tools, absorbent materials, and other spill containment and control equipment.

F-3a(4) Water for Fire Control [40 CFR 264.32(d) and COMAR 26.13.05.03C(4)]

The IHDIVNAVSURFWARCEN Fire Protection Division can respond to a fire in the Thermal Treatment Points within 5 minutes of notification. Both areas are located within proximity to the facility's fire hydrant system. The system is capable of delivering a water flow rate of approximately 1,000 gpm at a pressure of 100 pounds per square inch (psi). In addition to the fire hydrant system, the Mattawoman Creek is readily accessible with sufficient water and adequate surface area to support fire trucks in drafting water.

Because of safety concerns, no attempt will be made to fight fires in the explosive area. In case of a fire, the Fire Protection Division will deploy and protect the surrounding areas until explosive-related fires have burned down. Considering the materials that could be involved in a nonexplosive-type fire in the thermal treatment areas, water is the appropriate fire-fighting agent.

F-4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [40 CFR 270.14(b)(8) and COMAR 26.13.05.17]

Unloading operations for the thermal treatment areas are conducted by trained personnel. Although spills are unlikely, if an accident occurs and waste is spilled, the spill will be contained, placed in the burn pan, and treated. If the material is unsafe to move, it will be burned in place.

The SATTP is not used during rainfall or flooding events. Explosive wastes are completely treated, and residuals are removed expediently from the treatment area to minimize contact with rainfall/runoff.

F-4a <u>Unloading Operations</u> [40 CFR 270.14(b)(8)(i) and COMAR 26.13.07.02D(22)(a)]

Unloading operations for the transfer of reactive waste materials for treatment at the thermal treatment grounds are according to the following general procedures:

1. Before receiving scrap, review the Scrap Sheet Preparation document and verify that the scrap to be received is acceptable according to the Master List of Acceptable Materials (Appendix C-2). If unacceptable, notify Point-of-Contact (POC).

2. Intercept the scrap delivery vehicle at Building 880. Ensure that the scrap on the vehicle is the same scrap that was approved. If not, instruct the driver to return the scrap to the originator.

3. Drive the Thermal Treatment Point vehicle to the burn area and park it at least 100 feet from the pan or tank to used.

4. Instruct the scrap delivery vehicle driver to back up beside the pan that will be loaded, being careful that the truck is far enough away from the pan that the liftgate can be lowered without touching the pan. Only one scrap delivery vehicle is allowed on a Thermal Treatment Point at any one time.

5. The scrap delivery vehicle driver shall remain in the truck with the engine running.

6. At least two thermal treatment personnel shall climb into the truck bed and at least one remain on the ground to operate the liftgate.

7. Inspect the scrap sheets affixed to each container, or supplied by the driver. Ensure that the wastes listed are the ones previously approved for this burn. Leave unacceptable containers on the vehicle for return to the originator.

8. Move acceptable containers to the rear of the truck and place on the liftgate. Do not drag containers over the floor of the truck or the ground. Do not throw, push, or drop containers off the truck. Minimize motion within the containers to avoid static electricity generation and accumulation.

9. Do not place scrap containers near the delivery truck exhaust.

10. Do not unload more containers than can be placed in the burn pan without exceeding explosive limits or physical capacity.

11. When all containers have been removed, have the driver move at least 100 feet away in the direction of Building 880. After the containers have been emptied, have the delivery truck driver back up to the area where the empty containers are standing. However, make sure that the truck does not back up past a loaded pan to pick up containers.

12. Do not stack empty containers inside each other, in the event that contamination is present on the sides of the containers.

13. Examine empty containers for the presence of contamination. Place plastic containers and uncontaminated metal containers on the delivery truck for return to the generator. If the vehicle has no more scrap for delivery, instruct the driver to leave the point, stop at Building 880, remove the explosive placards, and leave the area. If there are more explosives on the truck, instruct the driver to return to Building 880 until called back down to the point.

14. If there are any contaminated metal containers left behind for flashing, back the Thermal Treatment Point vehicle to the containers. Load the containers on the vehicle and deliver them to the Auxiliary Point for treatment.

15. If the pan is not full and more scrap will be placed, instruct the next truck to come down. Move at least 100 feet from all loaded pans while waiting for the truck.

F-4b **Runoff [40 CFR 270.14(b)(8)(ii) and COMAR 26.13.07.02D(22) (b)]**

Runoff is not considered to be a problem at SATTP. Treatment is routinely planned 24 hours in advance. Reactive waste is not stored at the thermal treatment areas. Operations at the two Thermal Treatment Points are not permitted during periods of precipitation or high probability of precipitation. In addition, most reactive thermal treatment is conducted in welded steel containment structures. All the devices are elevated above the ground surface and therefore removed from contact with runoff. The area is also bermed to prevent runoff from entering nearby surface waterways. After thermal treatment, the area is inspected for unreacted materials. If any are found, they are retreated.

F-4c **Water Supplies [40 CFR 270.14(b)(8)(iii) and COMAR 26.13.07.02D(22)(c)]**

The thermal treatment operations all are conducted in steel treatment pans, vessels, on clay pads, or on cement blocks. Treatment does not take place directly on the ground surface. Areas around treatment units are policed for any energetic wastes ejected during treatment. Treatment units are inspected before treatment to check their integrity and after treatment to ensure that releases have not occurred to the ground surface. If releases occur, the unit is taken out of service and the release cleaned up. Treatment does not take place during precipitation events. Any accumulated precipitation within the units at the Activity is removed and not discharged to the ground surface Based on these factors, surface and drinking water supplies are protected at IHDIVNAVSURWARCEN.

F-4d **Equipment and Power Failure [40 CFR 270.14(b)(8)(iv) and COMAR 26.13.07.02D(22)(d)]**

Equipment and/or power failures have little effect on thermal treatment operations. The only aspect of treatment requiring power is electrical ignition of treatment. If power is unavailable, treatment cannot be initiated until power is available. Operations are conducted in open air during daylight hours. If equipment failure should occur, operations will be discontinued until the equipment is repaired on site or replaced. Temporary disruption caused by failure of any equipment will not pose additional hazards to personnel or to the environment.

F-4e **Personal Protective Equipment [40 CFR 270.14(b)(8)(v)]**

IHDIVNAVSURFWARCEN maintains a full complement of personal protective equipment. The types of protective gear required for use depend upon the waste handled and the operation being performed. For wastes handled at the SATTP areas, the required personal protective equipment includes flameretardant coveralls with fire-resistive, long underclothes or burn suits; gloves; steel-toe, non-sparking safety shoes; safety glasses; and dust masks. Additional protective equipment that may be required includes rubber or vinyl gloves, safety goggles, face shields, flak vests, and flak helmets.

F-5 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES [40 CFR 264.17; 270.14(b)(9) and COMAR 26.13.05.02H]

F-5a <u>Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Waste</u> [40 CFR 264.17 and COMAR 26.13.05.02H]

IHDIVNAVSURFWARCEN follows safety requirements when handling, storing, or treating ignitable and/or reactive wastes. All personnel must take appropriate measures to prevent incidents that:

- Generate uncontrolled extreme heat or pressure, fire or explosions, or violent reactions.
- Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment.
- Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion.
- Through any other means, threaten human health or the environment.

Incompatible wastes are not mixed for treatment at this facility.

Containers for ignitable or reactive waste are selected to be compatible with the waste. The only potential source of ignition is external to the container. Accidental reaction is minimized through proper packaging, handling, and storage of the containers (i.e., stacking, labeling, and sealing of the container). Prior to use, containers that are to hold explosive or explosive-contaminated wastes are checked for compatibility.

Given that burning operations must generate heat, fires, and sometimes violent reactions, to treat the reactivity characteristic, IHDIVNAVSURFWARCEN is interpreting this requirement to mean that the intentional initiation of such phenomena must be carried out in a controlled setting, which is the intent of thermal treatment.

The means to prevent unintended reactions is provided through the establishment of safety guidelines. As summarized below, the safety guidelines include, but are not limited to, the following:

- Unauthorized ignition sources are prohibited.
- Sparking equipment and tools are prohibited from use near explosive materials unless specifically authorized by the operator.
- Incompatible materials are not be treated or stored in the same locations.
- All hand tools and mechanical devices are inspected prior to use to ensure that they have not become unsafe for use.
- Motor vehicles used to transport waste explosives, ammunition, or other material to the treatment area are checked to meet safety requirements for the area.
- Thermal treatment are not conducted during electrical storms.
- Explosives awaiting destruction are stored at not less than 100 feet from explosives being destroyed (detonation or burn pan).
- The material is protected against accidental ignition or explosion from fragments, grass fires, burning embers, or the impulse associated with materials being detonated.
- Dry grass, leaves, and other inflammable/combustible material that is present prior to OB operations in amounts deemed sufficient to spread fire is removed.
- Initiators and explosives are transported separately and handled separately until placement for treatment.
- Smoking is prohibited.
- Electro Explosive Devices (EEDs) used to initiate reactions are kept shorted except during continuity testing and when attaching to the circuit for use.
- Person who will be setting EED is the only person with a key to the firing panel.

F-5b **General Precautions for Handling Ignitable or Reactive Waste or Mixing of Incompatible Wastes [40 CFR 264.17 and COMAR 26.13.05.02H]**

All hazardous wastes handled at the Thermal Treatment Points are reactive. IHDIVNAVSURFWARCEN operates in compliance with stringent regulations for managing and handling reactive and ignitable materials. Procedures in effect at IHDIVNAVSURFWARCEN to prevent unplanned reactions are written into Standard Operating Procedures (SOPs) that detail information for each job involving thermal treatment of explosive or propellant-contaminated waste. These SOPs are periodically revised to reflect new operational or administrative requirements. These SOPs are reviewed by both the Safety and Environmental Departments. An SOP is in effect for each job involving explosive/propellant waste. Supervision during each job ensures that the SOPs and hazard control briefings are read and reviewed monthly. The job is periodically audited for compliance with operating instructions and safety requirements.

Safety sheets for chemical substances are available to all employees. These sheets include information on the chemical and physical characteristics, effects of exposure, symptoms, first aid, and required safety equipment.

Precautions taken to prevent unplanned ignition or reaction of reactive and/or ignitable materials and exposure of people include the following:

- Smoking is prohibited within the treatment areas. Lighters, matches, etc., are prohibited past the entrance gates to the Restricted Area.
- Appropriate chemical hazard symbols are displayed on the vehicles transporting the material to be treated.
- Warning symbols are conspicuously placed and activated during operations.
- Security boats, when necessary, clear the Mattawoman Creek of unauthorized recreational or sport users.
- All personnel entering the SATTP must log in at Building 714.

- Supervisors limit the number of personnel in the treatment area to keep exposure risks low.

- Only the number of persons needed for each procedure are allowed closer than 100 feet.

- Only a quantity of explosives that can be destroyed or secured is delivered to the area.

- Thermal operations are not conducted during rainfall or flooding events. Explosive waste is completely treated, and residuals are removed expediently to minimize contact with rainfall/runoff.

- The thermal treatment areas are designed to treat explosive contaminated wastes in a safe manner.

- All employees read detailed, step-by-step descriptions of the procedure, including applicability, approval procedures, packing, transporting, preparation, and execution prior to working in the area.

- Personnel are required to wear appropriate safety and protective equipment. Fire protection, first aid, and emergency response equipment are ready and available within the immediate vicinity of the treatment areas.

SECTION G

CONTINGENCY PLAN

G. CONTINGENCY PLAN [40 CFR 264. 50 and COMAR 26.13.05.04]

This Contingency Plan describes action personnel will take at the Naval Surface Warfare Center, Indian Head Division (IHDIVNAVSURFWARCEN), in response to an unplanned fire, explosion, or a release of hazardous waste at the thermal treatment areas.

G-1 GENERAL INFORMATION [40 CFR 264.50 to .56, 270.14(b)(7) and COMAR 26.13.05.04.B]

The IHDIVNAVSURFWARCEN is located on approximately 3,500 acres of land 25 miles south of Washington, D.C., on the eastern shore of the Potomac River. The Station is adjacent to the Town of Indian Head in the west central portion of Charles County and is bounded on three sides by the Potomac River and Mattawoman Creek (see Figure B-1).

The mission of the IHDIVNAVSURFWARCEN is to provide material and technical support for assigned weapons systems, weapons or components, and to perform additional tasks as directed by the commander, Naval Sea System Command. Additionally, their mission is to provide technical support, production capability, and technical expertise in all phases of weapons systems propulsion, explosives development, and propellant and explosive chemistry.

The IHDIVNAVSURFWARCEN generates a variety of reactive hazardous wastes as a result of research, testing, evaluation, and production activities. These reactive wastes include explosives and propellants, as well as various solids and liquids contaminated with explosives and propellants. Treatment of these hazardous wastes is conducted at the Strauss Avenue Thermal Treatment Point (SATTP). See Figure B-5 for the location map.

The vast majority of the energetics (propellants and explosives) are treated at the SATTP in the following treatment units.

- Main Point
  - Five 1.3 Burn Pans (Pans 1, 2, 3, 4, and 5)
  - One Slum Pan
  - One 1.1 Burn Pan
  - One Clay Pad
  - One Special Burn Vessel

- Auxiliary Point
  - One Solvent Treatment Vessel
  - One Igniter Containment Vessel
  - One Unlined Burn Pan
  - One Thrust Block
  - One Prototype Pan
  - One Clay Pad

Section D contains additional information on operating procedures.

Various emergency situations may occur as a result of treatment activities. These are outlined in the general Contingency Plan. For each of the emergency situations outlined, there is a designated response team. Hazardous substance releases are handled by the On Scene Operations Team (OSOT). Fire and explosions are handled by the Fire Protection Division. Medical emergencies are the responsibility of the Emergency Medical Technician (EMT) Squad. IHDIVNAVSURFWARCEN has adopted the National Fire Academy Incident Command System. In this system, the Incident Commander is determined by the nature of the incident. In the thermal treatment areas, the Incident Commander will always be the Emergency Response Coordinator (ERC). The Fire and Medical Chiefs will provide support to the ERC.

The OSOT is comprised of 18 trained employees. The OSOT is headed by a full-time ERC. However, most OSOT members serve in this capacity on an as-needed basis. Work and training performed for the OSOT are extra duties. All members are supplied with response equipment and pocket-pager radios with individual- and group-call capabilities.

The Fire Protection Division employs five certified firefighters, inspectors and specialists. With the exception of the firefighters that comprise the EMT teams, all of the firefighters are full time. The Fire Protection Division is staffed 24 hours a day, 7 days a week.

The EMT Team is staffed by six firefighters who are cross-trained and certified by the State of Maryland as Emergency Medical Technicians. Two EMTs are on duty at all times. The ambulance is operated from the firehouse, located in Building 878.

G-2 EMERGENCY COORDINATORS [40 CFR 264.52(d), 264.55 and COMAR 26.13.05.04F]

The ERC is responsible for coordinating all routine emergency response measures. The ERC is predesignated by the Navy Installation Commander as the Hazardous Materials OSOT Coordinator. This person has the authority to commit all resources necessary to carry out the contingency plan. Therefore, the ERC must be familiar with this contingency plan, with operation of the facility, types of emergencies that may occur, and with the location and characteristics of hazardous wastes treated and generated at the thermal treatment areas. In the event that an unplanned fire, a spill, or other emergency situation develops, or may develop, the ERC will be immediately contacted. If the ERC is not available, the next person on the list will act as the alternate ERC. At least one ERC will be available 24 hours a day. The ERC and alternates are trained in proper management techniques for the hazardous waste treated in the thermal treatment areas and are familiar with the properties of the treated wastes.

When emergency incidents go beyond the routine at the open burning areas, the ERC will inform the next highest responsible person in the Navy chain of command. The Commanding Officer of IHDIVNAVSURFWARCEN is designated the Navy On-Scene Commander (NOSCDR). The NOSCDR has the responsibility to mitigate, contain, and clean up oil spills and hazardous substance releases. The NOSCDR then reports to the Commanding Officer of the Chesapeake Division of the Naval Facilities Engineering Command, who is designated the Navy On-Scene Coordinator (NOSC). This contingency plan was developed and implemented by the Commandant of the Naval District-Washington (NDW).

Names, telephone numbers, and addresses of the primary and alternate ERC are maintained in the 24-hour Fire Department Dispatch Center in Building 878. They are as follows:

Primary:

Mr. Fred M. Cox
Hazardous Materials On Scene Operations Coordinator

Work Telephone No.:	(301) 743-4320/1249
Work Address:	Building D-28
Home Telephone No.:	(301) 743-3591 (unlisted)
Home Address:	4 Pine Street Indian Head, MD 20040

Alternate No. 1:

Dave Fuchs	
Work Telephone No.:	(301) 743-4320/1249
Work Address:	Building314
Home Telephone No.:	(301) 743-9588 or 3796
Home Address:	10 Davis Drive Indian Head, Maryland 20640

G-3 IMPLEMENTATION OF CONTINGENCY PLANS [40 CFR 264.52(a), 264.56(d), COMAR 26.13.05.04.B(2)]

The provisions of this Contingency Plan must be carried out immediately whenever there is an imminent or actual unintentional fire or situation which could threaten the environment or human health at the SATTP. Any person who discovers a spill, leak, or potential spill or leak of hazardous waste or discovers any other condition which could result in the release of hazardous waste to the environment (ground, water, or air) is responsible for implementing the contingency plan. The discoverer will immediately notify the Fire Protection Division, who will notify the Fire Department Dispatcher by two-way radio or by dialing extension 4333 and describing the situation. The dispatcher is responsible for notifying the ERC and other emergency teams as needed.

The ERC has full authority to make the decision concerning the implementation of the contingency plan. Following is a discussion of types of emergencies and criteria that will assist the ERC in making a determination to implement the Contingency Plan, based on personal observations or those of the person reporting the incident.

Fire - The occurrence of any unplanned fire within the thermal treatment areas constitutes a reason to consider implementating the contingency plan. The primary impact of unexpected/unplanned fires would be on people working in the immediate vicinity. Injuries could include thermal burns and respiratory distress from the inhalation of the products of combustion. The thermal treatment areas are cleared of trees and surrounded by water; therefore, there is little chance of igniting surrounding areas. The primary impact to the environment would be destruction of vegetation. Any reactive wastes burned in unplanned fires would no longer possess the reactivity characteristic. Evacuation of personnel outside the thermal treatment areas will not be necessary unless a major fire has erupted. The quantities of wastes handled is small enough that any unexpected occurrence of fire would not result in danger to people outside the treatment areas.

Explosions - An explosion of any magnitude is not part of normal operations. Most energetics containing wastes treated present only a fire hazard. However, certain waste materials (1.1 classification) present an explosive hazard. These wastes are treated in quantities designed to minimize the potential for explosions.

Spills - Most of the wastes treated at the SATTP are solids. With the exception of wastes treated in the solvent vessel, all liquids are absorbed into sawdust, wood chips, or other absorbent media prior to treatment. Spills of these solid waste materials could be readily cleaned up. A maximum of 150 gallons of liquid solvent is treated in the solvent vessel at one time. A maximum of three 55-gallon drums are transferred to the vessel one at a time. Releases from the solvent vessel would be contained in the secondary containment of the vessel.

The largest potential for spills at SATTP occurs during transfer operations. Spills of solids onto the ground can be readily cleaned up without the necessity of implementing the Contingency Plan. The maximum spill of liquids during transfer operations would be 55 gallons. This spill could affect the environment through a release to the soil and/or surface waters.

The ERC must consider the following in evaluating the need to implement the Contingency Plan:

- The nature of the emergency, fire, explosion, or spill.
- The potential for fire to spread beyond the SATTP.
- The location of untreated reactive wastes in the fire path.
- The physical/chemical properties (1.3, 1.1, solvent, grain, etc.) of untreated wastes that may be exposed to unplanned fires.
- The potential for injury to personnel.
- The potential for unplanned explosions.
- The physical state of spilled waste (liquid, adsorbed liquid, solid, grain, shaving, etc.).
- The potential for precipitation to spread spills within or beyond the treatment areas.
- The potential for wind dispersal of spilled wastes.
- The estimated quantity of the spilled waste.
- The potential for adverse impacts on the environment.
- The potential for harm to humans.

G-4 EMERGENCY RESPONSE PROCEDURES [40 CFR 264.52(e) and COMAR 26.13.05.04G]

The ERC is required to take a series of actions upon discovering or being notified of an emergency situation, during the emergency control phase and immediately following the attainment of control. The procedures to be followed for either of these emergency situations are summarized below.

- If the Fire Department arrives on scene first, the Senior Fire Official will immediately assess the situation and will act as ERC until the designated ERC arrives. Upon arrival, the ERC will determine whether activation of the Contingency Plan is necessary.

- Immediately after the decision is made whether or not to implement the Contingency Plan, the ERC will assess possible hazards to human health or the environment.

- Based on this assessment, the ERC will determine whether immediate evacuation of the thermal treatment area is required. The ERC will direct the Fire Dispatcher to notify EMTs if injuries are reported.

- The OSOT maintains protective clothing and equipment for emergency responders. The Health and Safety Department will act as Safety Coordinator for the incident.

G-4a Notification [40 CFR 264.56(a) and COMAR 26.13.05.04G(1)(a) & (b)]

Any employee observing uncontrolled conditions involving hazardous wastes and/or hazardous constituents will immediately evacuate the area and notify his/her supervisor and the Fire Department. Operations Building 880, located at the entrance to the SATTP area, is equipped with telephones and panning telephoto video cameras. Each employee is assigned a two-way portable radio. However, if the situation does not pose a threat to safety or health, then the employee should try to control the incident.

The supervisor will radio or call extension 4333 and provide the following information to the Fire Department Dispatcher:

- Name and telephone number.
- Location of emergency.
- Extent of injuries.
- Substance involved in spill, fire, etc., and volume.

- Description of any reactions.
- Source of incident.
- Time incident occurred.

In the event of a hazard or a potentially severe hazard, the ERC will:

- Call the appropriate agency, department, and/or contractor.

- Assess the situation to determine whether an evacuation of the surrounding area should be considered. Security will coordinate evacuation activities. Outside Emergency Officials will be consulted as soon as possible.

- Notify the National Response Center, other federal government agencies, and state and local agencies of the emergency conditions and the steps taken. The following information must be included:

  - Name and telephone number of the reporter.
  - Name and address of facility.
  - Time and type of incident.
  - Name and quantity of material(s) released.
  - Extent of Injuries.
  - Possible hazards to human health or the environment outside the area.

If additional fire services are required, the IHDIVNAVSURFWARCEN Fire Protection Division will notify outside fire/emergency agencies.

A list of emergency phone numbers is included in Table G-1. A copy of this list is located at the IHDIVNAVSURFWARCEN Fire Protection Division Dispatch Center at all times.

TABLE G-1

LIST OF EMERGENCY CONTACTS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

	Name	Phone No.
1.	Charles County Emergency Dispatcher	911
2.	National Response Center	(800)424-8802
3.	MDE Hazardous and Solid Waste Management Division: • Enforcement Division • Emergency Response Personnel	 (410)631-3400 (410)333-2950
4.	MDE/HSWMA 24-hour emergency number (7 days/week)	(410)974-3551
5.	Commander, Indian Head	743-4401
6.	U.S. Navy On-Scene Coordinator	(202)433-3760
7.	Security	743-4721
8.	Indian Head Fire Department	743-4333
9.	Fire Chief	743-4370
10.	Property Disposal Office	743-4343
11.	Public Works Officer	743-4286/4288
12.	Branch Medical Clinic	743-4449
13.	Public Affairs Officer	743-1637/4627
14.	CHEMTREC	(800)424-9300
15.	Association of American Railroads Bureau of Explosives	(202)639-2222

G-4b **Identification of Hazardous Materials [40 CFR 264.56 (b) and COMAR 26.13.05.04G(2)]**

In the event of a release of hazardous wastes and/or hazardous constituents, the ERC will immediately identify the character, exact source, amount, and extent of the release. This may require:

- Reviewing the scrap preparation document(s).
- Conducting interviews with observers/handlers.
- Viewing the video tape of treatment.
- Checking labels or obtaining container identification.
- Obtaining records pertaining to the thermal treatment areas.

Hazardous materials can be generally identified based on the treatment unit in which they are treated. Each treatment unit treats only certain types of reactive wastes. Section C describes in detail the physical and chemical characteristics of wastes treated at each unit. Appendix C-4 describes the energetic constituents of representative hazardous waste items treated at the thermal treatment points. Specific identifications of wastes are made by referring to the PDO form listing scrap to be treated. This document is issued by Property Disposal Office which lists the type of contamination, the generator, and the building from which it came.

Hazardous wastes are not stored at the SATTP. All wastes are treated on the day of arrival. However, residues from open burning treatments are accumulated in containers until testing or movement to the storage area.

G-4c **Hazard Assessment [40 CFR 264.56(c), 264.56(d) and COMAR 26.13.05.04G(3)]**

The ERC will use all information and resources available to assess all threats to human health and the environment.

Fires - The primary initial impact of an unexpected/unplanned fire within the treatment areas would be on the persons working in the immediate vicinity. Injuries to workers could include thermal burns and inhalation of the products of combustion. Death or severe physical/physiological impairment could result. Of secondary concern is impact to the environment, including destruction of trees. Impacts to the air, soils, surface waters, groundwater, and associated receptors from combustion emissions are not considered to be significantly different from that of normal operations and are therefore of tertiary concern.

Downwind evacuation, if necessary during a fire, will be limited to those persons within the visible smoke cloud.

Explosions - The primary impact of an unexpected/unplanned explosion would be on people working in the immediate vicinity of the unit where the explosion occurred. Injuries could include bodily dismemberment caused by shock waves and flying projectiles as well as thermal burns and inhalation of the products of combustion caused by fires. Death or severe physical/physiological impairment could result. Of secondary concern is impact on the environment, including destruction of trees. (This is highly unlikely at SATTP because it is cleared of trees.) Impact to the air, soils, surface waters, groundwater, and associated receptors from combustion emission is not considered to be significantly different from that of normal operations and is therefore of tertiary concern. Evacuation of personnel outside the treatment area will not be necessary unless a uncontrolled brush fire has erupted. The quantities of explosives handled are small enough that shock waves are confined to the treatment area.

Spills - The majority of liquid wastes are absorbed in sawdust or other absorbent media and are treated as solids, since they do not contain free liquids. Only 150-gallons of liquid solvents are treated at any one time. This liquid is transported in three 55-gallon drums.

Impact on the soils, air, groundwater and associated receptors is considered to be of secondary concern since the materials are not sufficiently mobile to reach offsite receptors (provided spills are thoroughly and promptly cleaned).

Weather conditions are carefully analyzed prior to operations in the treatment area. These operations are conducted only on days conducive to adequate upward vertical and horizontal dispersion.

All hazardous wastes treated at the SATTP possess the RCRA characteristic of reactivity. The type, amount, and variety of waste treated in the SATTP includes a wide range of solid propellants and ordnance. Propellants and ordnance materials are transported directly to the treatment units for immediate treatment. Storage or impoundment does not occur in the treatment areas. Upon arrival, materials are unloaded and transported to the appropriate unit and treated in accordance with written operating procedures.

A supervisor must confirm any reported incident and notify the ERC. The following basic information is to be transmitted:

- The time the hazardous event occurred or was first observed.

- The location of the event and the potential location if substances involved are moving.
- The type of substance involved in the hazardous event.
- An estimate of the amount of substance involved.
- The conditions affecting the event, such as wind direction and velocity.
- The cause of the incident.
- The actions being taken to combat the situation.
- An opinion regarding the effects of the event on equipment, employees, and the environment.

G-4d Control Procedures [40 CFR 264.52 and COMAR 26.13.05.04G(5)]

The control and cleanup of a spill, release, or fire is accomplished by Indian Head personnel and, as needed, local response teams. If the ERC determines that Indian Head is unable to handle the emergency, assistance is available from local emergency service agencies.

Indian Head has significant resources available in an emergency. These include the following:

- On Scene Operations Team (OSOT). An OSOT is available to assist the ERC in all control procedures. The OSOT includes, but is not limited to, the following:

  - Fire Chief
  - Safety Officer
  - Industrial Hygienist
  - Chief, Land Maintenance Branch
  - Commander, 528th Engineering Detachment
  - Environmental Engineer
  - Environmental Protection Specialist
  - Other Site Personnel as needed

  Members of the OSOT provide assistance to the ERC within their areas of expertise as required.

- Fire Station. There is one fire station at Indian Head. The station is located in the Unrestricted Area at the entrance to the Restricted Area. All fire trucks are equipped with multiple frequency two-way radios. The Indian Head Fire Department frequency, is 139.475.

- Branch Medical Clinic.

- Emergency Medical Services (Ambulance).

- Security Division.

- Heavy equipment, such as trucks, tractors, sweepers, and front-end loaders.

- Outside Fire Departments, through Charles County Mutual Aid agreement (Reference Appendix G-1).

In the event of a fire or a release of hazardous waste, control procedures should be implemented immediately to mitigate threats to human health and the environment. The initial response to any emergency is to protect human health and safety and then the environment. Identification, containment, treatment, and disposal assessment is the secondary response.

The ERC must assess all possible hazards to human health or the environment. If the ERC determines that there is a release, fire, or an explosion that could threaten public health or the environment, these findings must be reported, as outlined, to the personnel listed in Section G-4a.

The ERC shall initiate the following emergency actions as appropriate to the incident:

- Establish a command post at a safe distance upwind from the incident.

- Identify the hazardous substances involved.

- Activate OSOT members and others, as required.

- Designate a safe staging area for responding units.

- Establish safety zones within the control site as appropriate to the incident (support area, contamination reduction area, and contaminated area).

- Permit only authorized personnel with proper protective equipment within the control site.

- Maintain an incident log of all actions. See Hazardous Material Incident Registry Check List in Appendix G-1.

- Establish, through the Security Department, a patrolled perimeter at distance from the spill,as determined by the ERC.

- Determine the need for evacuation of personnel from areas outside the control site. If evacuation of the civilian community off-base becomes necessary or advisable, IMMEDIATELY NOTIFY the NOSC, who will coordinate the procedure with local officials.

Emergency procedures and cleanup operations at the site will include the following:

1. Stop the source of the spill.
2. Disperse toxic/flammable gases.
3. Contain the spill or prevent spill runoff from reaching surface or ground.
4. Prevent spill from spreading.

Fires - The ERC will coordinate with the IHDIVNAVSURFWARCEN Fire Protection Division in situations where fire is involved. Both thermal treatment areas are accessed easily by firefighting and other emergency vehicles and equipment. Indian Head Fire Protection Division is used in controlling fires and will take all precautions in preventing fire from spreading.

The following actions are recommended when appropriate:

- The Fire Protection Division determines the amount of additional firefighting equipment and resources to control fires.

- The area will be cleared of all personnel not actively involved in fighting the fire.

- All injured persons must be removed, and medical treatment administered by qualified personnel. If fire is concentrated at the source, evacuation downwind will be determined by the ERC and local authorities. Indian Head Fire Protection Division is responsible for all firefighting efforts.

Fire hydrants are located in the vicinity of the thermal treatment grounds. In the event of a major fire, additional water will be pumped from the Mattawoman Creek.

Cleanup and Disposal - Cleanup and disposal are the responsibility of the ERC under the authority of the NOSCDR. Cleanup method will depend on the characteristics of the spilled substance, size of spill, location of spill, character of the area, and potential impacts.

The ERC shall ensure that cleanup efforts are sufficient to meet regulatory requirements, prevent risk to health and safety, prevent further contamination, and restore environmental quality of the affected area. The ERC will direct efforts to collect all necessary samples to determine the degree of contamination. This helps to determine whether the spill material will be treated in place or removed to dispose of elsewhere. The ERC is also responsible for determining the OSOT capability to conduct cleanup operations and which outside assistance, if any, is needed.

An all-clear notification will be given by radio and/or telephone when the fire has been extinguished and the safety of personnel is no longer endangered.

G-4e Prevention of Recurrence or Spread of Fires, Explosions, or Releases [40 CFR 264.56(e) and COMAR 26.13.05.04G(5)]

In the event of an unplanned fire, an explosion, or spill causing a threat to human health or the environment, further thermal treatment will stop and will not begin until it is safe. The ERC may ensure that nearby wastes are moved, if necessary, to avoid a recurrence or spread of fires, explosives, or spills. All nonessential personnel will be evacuated. Spills may be contained by the use of berms, booms, absorbent materials, etc. Appropriate tools will be used to clean up hazardous waste and contaminated soil. All contaminated soil will be considered a hazardous waste unless analysis shows otherwise. All contaminated soils, which are unable to be thermally treated, will be placed in labeled 55-gallon drums for the storage of hazardous waste. After any incident requiring implementation of the Contingency Plan, the events leading to the incident will be evaluated to determine what steps can be taken to avoid such incidents in the future.

G-4f Storage and Treatment of Release Material [40 CFR 264.56(g) and COMAR 26.13.04.05G(7)]

Immediately following an incident, the ERC is responsible for treatment, storage, or disposal of recovered waste. Facility personnel and equipment, or a contractor, may be utilized. In most cases the released material will be thermally treated immediately or treated in the next burn. All contaminated materials, unable to be thermally treated, will be placed in labeled 55-gallon drums, and if hazardous, managed in accordance with RCRA regulations.

G-4g **Incompatible Waste [40 CFR 264.56(h)(1) and COMAR 26.13.04.05G(8)(a)]**

Incompatible wastes are not treated at the thermal treatment areas. All reactive wastes are evaluated prior to being placed on the Master List of Acceptable Materials (Appendix C-2). Treatment techniques and unit quantity limits are determined based on their physical and chemical characteristics. This takes into consideration factors which include compatibility. Wastes are not stored at the SATTP prior to treatment, since all wastes are treated upon receipt. The potential for mixture of incompatible wastes is minimal due to the small quantity of energetic materials present. In addition, the energetic materials are in a non-mobile form (absorbed, contained in crevices, interior portions, etc.).

All treatment and movement of wastes to nearby treatment units will stop if there is any potential for the spilled material to mix with incompatible wastes or materials.

The potential for mixture of incompatible treatment residuals is considered minimal. Treatment residuals are segregated by type and treatment unit.

G-4h **Post-Emergency Equipment Maintenance [40 CFR 264.56(h)(i) and COMAR 26.13.05.04.G(8)(b)]**

1. Immediately after an emergency, the ERC must provide for management of any residues generated by emergency personnel during the cleanup, including either treatment, storage, or disposal. Wastes may be treated or stored temporarily on site until they are shipped off site for disposal.

2. The ERC will ensure that all emergency equipment listed in the Contingency Plan has been inspected and tested, when necessary, and declared fit for its intended purpose.

3. Prior to resuming operation, when the Contingency Plan has been implemented, the Maryland Department of the Environment will be notified that post-emergency equipment maintenance has been performed and that operations will resume.

G-4i **Container Spills and Leakage [40 CFR 264.56(h)(1) and COMAR 26.13.05.04G(8)(b)]**

Hazardous wastes are not stored in containers at the SATTP. However, wastes are transported to the treatment area in containers. Hazardous treatment residues are accumulated in containers while awaiting testing or shipment to permitted hazardous waste storage and/or treatment/disposal facilities. Response to container spills or leakage that results in a release to the environment will follow the procedures outlined in the previous sections of this Contingency Plan. Spills are immediately cleaned up and transported to the burn pans or are burned in place, whichever is safer.

G-5 **EMERGENCY EQUIPMENT [40 CFR 264.52(e) and COMAR 26.13.05.04C (5)]**

The Hazardous Materials Emergency Response Trailer is located near Building 48. The Indian Head Fire Department is located in Building 878. The major equipment available to the ERC is included on the following table.

No.	Description
1	Hazardous Materials Trailer
1	1987 - Pierce 1,000 Gallon-Per-Minute Pumper
1	1988 - Pierce 1,000 GM Pumper with Tele-Squirt
1	GMC Pumper
1	All-Wheel-Drive Brush Truck Pump
1	1989 - Ford 350 Wheelcoach Ambulance

See Appendix G-1 for a detailed listing of equipment maintained in the Indian Head Hazardous Materials Trailer.

G-5a **Chemical-Protective Clothing**

The ERC is responsible for maintaining an inventory of personal protective equipment for various types of wastes. Stockpiles of Level A and other chemical-protective clothing are stored in Building 48.

G-5b **First-Aid Equipment**

Emergency first-aid equipment is available at the Fire Department Emergency Medical Units and at the Branch Medical Clinic. The Fire Protection Division Ambulance is a fully stocked Basic Life Support Unit.

G-5c Communications Equipment

Two-way radios (including hand-held sets) are available for emergency communications. A complete listing of all emergency frequencies used at Indian Head is provided in Appendix G-1.

G-5d Spill Control Equipment

Spill control equipment is available at Indian Head and can be transported to either site within a few minutes. The Emergency Response Team has a fully-equipped, Hazardous Materials (HAZMAT) spill trailer. Additional booms, absorbent, and other materials are available in Building 48.

G-5e Emergency Response Protection Equipment

Emergency personal protective equipment is transported to the thermal treatment area by the OSOT Trailer and the Fire Protection Division. Level D protection, consisting of fire-resistive coveralls, is required at all times for entering the SATTP. This work uniform primarily offers protection against flash fire.

G-5f First-Aid and Medical Supplies

First-aid and medical supplies are available from emergency medical technicians in the Fire Protection Division Ambulance.

G-5g Emergency Decontamination Equipment

Decontamination equipment is available on the HAZMAT trailer.

G-6 COORDINATION AGREEMENT REQUIREMENTS [40 CFR 264.52(c), 264.37 and COMAR 26.13.05.04C(3)

The primary authority for all emergencies within the thermal treatment areas is the ERC. Coordination agreements have been established with various emergency response entities. Copies of the most recent agreements are presented in Appendix G-1 of this Contingency Plan. In all cases, non-Indian-Head response entities report to the Indian Head officer in charge of the incident scene (i.e., ERC or Fire Chief) and are subject to the orders of that official.

Medical evaluation and treatment is provided by Fire Department Emergency Medical Technicians. The EMTs are supported by the Charles County Emergency Medical Services System.

The ERC and/or the fire chief is responsible for conducting annual meetings with Indian Head and non-Indian-Head response entities to review/update coordination agreements, to review the facilities operations, and to discuss any change in the thermal treatment areas or this Contingency Plan.

G-7 EVACUATION PLAN [40 CFR 264.52(f) and COMAR 26.13.05.04G. (4)(a)]

During a hazardous event that may lead to evacuation of an area, the Indian Head Fire Department will contact the Fire Dispatcher by two-way radio to notify the Security Department. The ERC determines when evacuation will be required by considering the hazards involved and the nature of the hazardous incident. Security will then coordinate all evacuation activities. If evacuation is initiated, all local personnel are notified by voice command or two-way radio.

In the event of a sudden, uncontrolled fire or a dangerous situation at the thermal treatment areas, the leader at the scene shall determine whether evacuation is necessary for the safety of the crew.

To evacuate safely the leader will take the following steps:

- Communicate the evacuation order to all personnel present.
- Direct workers to leave the area and assemble at the Operations Building.
- Account for all individuals in the crew prior to leaving the area.
- Remain at the point of assembly to provide information to the environmental coordinator, fire department, or other officials.

The evacuation routes from the thermal treatment areas are as follows:

Primary Route	Strauss Avenue; right onto Greenslade Road; left onto Caffee Road; right onto Hanlon, left onto Patterson, right onto Farnum to Main Gate.
Alternate Route	Strauss Avenue to Farnum to Main Gate.
Regrouping Point	Strauss Road, immediate area of Building 890.

The ERC will contact appropriate local government authorities (listed in Table G-1) and assist them in deciding whether local areas should be evacuated.

G-8 REQUIRED REPORTS [40 CFR 264.56(j) and COMAR 26.13.05.04G(10)]

The environmental coordinator must note in the operating record the time, date, and details of any incident that requires implementing the Contingency Plan. Within 15 days after the incident, the ERC must submit a written report on the incident to the Maryland Department of the Environment. The report must include:

- Name and telephone number of the reporter.
- Name, address, and telephone number of the facility.
- Date, time, and type of incident (for example, release, fire).
- Name and quantity of material(s) involved, to the extent known.
- Extent of injuries, if any.
- Estimate of actual or potential hazards to human health or the environment, where applicable.
- Estimated quantity and disposition of recovered material that resulted from the incident.

A Pollution Incident Report will be prepared by the ERC and forwarded to the United States Environmental Protection Agency Region III, within 15 days after the hazardous event that required implementation of the Contingency Plan. The Pollution Incident Report must include the following information, as applicable:

- Name and location of installation.

- Name and telephone number of installation commander.

- Date and time of incident or time of discovery.

- Severity of incident.
  a. Size of discharge (major, medium, minor)
  b. Degree of threat
     - Life (human, animal, plant)
     - Property (private, state, and Federal)

- Location and specific areas affected by incident
  a. Building number or area

b. Terrain (type and slope)
c. Drainage (runoff and subsurface)
d. Relationship to nearby bodies of water

- Cause and source of incident
  a. Human error
  b. Physical damage
  c. Corrosion

- Type and estimated amount
  a. Oil (type and amount)
  b. Hazardous material (general type of chemical, chemical name, and reportable quantity, manufacturer, trade name, catalog numbers, and amount)

- Samples taken and disposition
  a. Number of samples
  b. Laboratory that will perform analysis

- Damage impact on surroundings
  a. Fish and wildlife (killed and affected)
  b. Groundwater or drinking water sources

- Potential dangers
  a. Fire
  b. Explosion
  c. Toxic fumes or liquids
  d. Other

- Corrective actions taken and recommended to eliminate pollution source or preclude recurrence.

- Corrective actions taken to remove pollutant.

- Additional assistance required.

- Estimated completion date of remedial and restorative actions.

- Anticipated or actual reaction by news media and public to the incident.

- Notification Summary -- agency, individual, date and time, mode of notification, and summary of information given.

- Other items required in the regional contingency plan and a general discussion of the incident.

G-9 AMENDMENT OF CONTINGENCY PLAN [COMAR 26.13.05.04.E]

As required, the Contingency Plan must be reviewed and immediately amended, if necessary, whenever any of the following occurs:

1. The facility permit is revised.

2. The plan fails in an emergency.

3. The facility changes--in its design, construction, operation, maintenance, or other circumstances--in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency or presents potential emergency situations not previously considered.

4. The list of environmental coordinators changes.

5. The list of emergency equipment changes.

A change in the lists of facility environmental coordinators or equipment in the Contingency Plan constitutes a minor modification to the facility permit to which the plan is a condition. Revisions will be forwarded to all parties holding a copy of the plan, including Federal and state agencies.

All parties to the Contingency Plan will be issued copies of the Plan.

SECTION H

PERSONNEL TRAINING

H. PERSONNEL TRAINING

H-1 OUTLINE OF THE TRAINING PROGRAM [40 CFR 270.14(b)(12), 264.16(a)(1) and COMAR 26.13.05.02G(1)]

The information contained in this section describes the training program for the IHDIVNAVSURFWARCEN open burning unit personnel. In addition, members of the Fire Protection Division (FPD), Cast Operations Manager and Staff, Environmental Management Office, the On Scene Operations Team (OSOT), the Environmental Coordinator (EC), and the Emergency Response Coordinator are covered. The program consists of a combination of classroom and on-the-job training (OJT) that teaches personnel to perform their duties safely and in compliance with hazardous waste regulations.

Contractors who assist in transporting and disposing of hazardous waste off site are required to have the same level of training as required of Naval personnel. Navy employees are required to attend courses that directly influence the performance of their duties.

The training program outlined in this section will describe the training program for personnel in the thermal treatment points. The program describes the additional training required for the OSOT and the Fire Department personnel to enable them to perform their duties in compliance with hazardous waste regulations, including the requirements contained in this permit application.

H-1a Job Title/Job Description [40 CFR 264.16 (d)(1 & 2) and COMAR 26.13.05.02G(3)(a)]

The following employees are required to attend hazardous materials/hazardous waste training. The degree of training will depend on the job duties required. Job descriptions are provided for each of the following.

H-1a(1) Environmental Coordinator (EC)

Responsibilities and duties include:

- Implement and manage the environmental and pollution abatement programs.
- Establish and coordinate management plans, technical requirements, and program schedules for environmental projects.

- Determine environmental and pollution abatement training requirements and coordinate with civilian personnel to facilitate the implementation of the training programs.

The EC provides the OSOT and the Fire Protection Division with information regarding the hazards and situations that require the activation of the contingency plan. The EC also determines whether hazardous waste spills exceed CERCLA Reportable Quantity (RQ) and notifies appropriate state and Federal authorities. The EC provides advice on the identification, control, containment, and cleanup. The EC maintains all information and correspondence, from the beginning to end of the incident, with either the State of Maryland or EPA.

H-1a(2) Emergency Response Coordinator (ERC) or Alternate

Duties and responsibilities include the following:

- Assume duty as On-Scene Coordinator in case of hazardous waste emergency.
- Become thoroughly familiar with all aspects of the facility, the Contingency Plan, and all operations and activities, including the chemical and physical characteristics of the hazardous wastes treated.
- Assess situation and initiate action to mitigate danger to human health and the environment.
- Utilize IHDIVNAVSURFWARCEN resources needed to implement the Contingency Plan.
- Brief fire-fighting unit commander(s) on the type and amount of waste involved.
- Obtain information as to the character, exact source, and amount of released substance and the area affected.
- Determine the proper action to stop the spill and the removal or neutralization of the spilled substance.
- Maintain an event log of all actions taken during the incident.

The ERC or Alternate is responsible for emergency containment, control, and cleanup activities. The ERC has the authority of the Base Commander in mobilizing personnel and equipment. The ERC is responsible for activating required response teams and is responsible for all incident reporting procedures. The ERC completes all hazardous waste training prior to assuming these duties. Annual retraining occurs as required.

H-1a(3) Environmental Engineers/Specialists

Responsibilities and duties include the following:

- Serve as alternate ERC.
- Assist the EC.
- Serve as environmental representatives and contacts for hazardous waste management activities.
- Identify potential problems and reporting of detected leaks or spills.
- Prepare environmental permit applications.

H-1a(4) Safety Director

Responsibilities and duties include the following:

- Conduct overall safety management at the hazardous waste areas.
- Provide support services to the ERC.

H-1a(5) Fire Protection Division (FPD) Chief and Staff

Responsibilities and duties include the following:

- Determine the nature and extent of spills and secure access to the immediate area of the spills.
- Contact designated responders.
- Provide initial containment of spills.
- Assume duties of On-Scene Coordinator until designated personnel arrive.
- Support containment/cleanup effort until relieved by the On-Scene Coordinator.

The FPD stands by during all thermal treatment operations in the Caffee Road area to respond to fires and other emergency incidents. All FPD personnel are trained under the OSHA Hazardous Waste Operations and Emergency Response 29 CFR 1910.120 law. Several FPD personnel are also trained as nationally certified Emergency Medical Technicians.

H-1a(6) Cast Operations Manager and Staff

Responsibilities and duties include the following:

- Operate/maintain the facility.
- Check for compliance and correct dangerous conditions.
- Maintain control burn sheets.
- Ensure that all conditions established by the Navy, the State of Maryland, and other Federal, State, and local agencies are met.

H-1b Training Content, Frequency, and Techniques [40 CFR 264.16(c) and (d)(3) and COMAR 26.13.05.02G(1)(c) and (2)]

The Hazardous Materials/Hazardous Waste (HM/HW) training program is designed to ensure the capability of facility personnel to safely handle, package, store, and transport HM/HW. In addition, the program teaches IHDIVNAVSURFWARCEN personnel how to respond safely and effectively to emergency situations. Emphasis is placed on spill and accident prevention. All courses stress worker safety and environmental protection.

Instruction in emergency response procedures and safety guidelines is presented through various on site courses. Both general instruction and specific courses developed for safe and effective management of selected hazardous waste are offered.

Appendix H-1, titled "Certification Plans, Strauss Avenue Thermal Treatment Point," outlines the training of personnel at the SATTP. Recertification is required annually. The topics covered include:

1. Certification Levels/Requirements
2. Preparation for Operations
3. Receiving Scrap
4. Placement of Specific Materials - Main Point
5. Ignition of Wastes - Main Point
6. Placement of Specific Materials - Auxiliary Point
7. Ash and Residue Disposal
8. Documentation
9. Hazardous Materials/Waste Handling and Transportation

Appendix H-2 describes hazard control procedures in which SATTP workers are trained. The topics covered include:

1. Facility Preparation
2. Scrap Delivery
3. Material Placement
4. Ignition
5. Material Treatment
6. Burn Pan Patching
7. Emergency Response/Contingency Plan
8. General Requirements

Other training courses and the topics covered include the following:

1. Overview Seminar Topics
    a. Department of Defense Policy on Environmental Protection
    b. Maryland Hazardous Waste Regulations
    c. Hazardous Waste Management Plan Review
    d. Preparedness and Contingency Planning
    e. RCRA Overview
    f. Employee Liability

2. RCRA Course Topics
    a. Overview of Hazardous Waste Regulations
    b. Proper Use of Material Safety Data Sheets
    c. Site Spill Contingency Plans
    d. Personal Protective Clothing
    e. Respiratory Protection
    f. Safety and Health

3. Emergency Response Course Topics
    a. RCRA Overview
    b. SARA and OSHA Regulations
    c. Hazardous Material/Waste Regulations
    d. Site Characterization and Analysis
    e. Levels of Personal Protective Clothing

f. Maintenance, Care, Handling, and Storage of Equipment

g. Emergency Field First Aid

h. Emergency Response Procedures

i. Facility and Site Spill Contingency Plans

j. Respirator Fit-Test

k. Field Exercises on Spill Incidents

4. Safety Awareness

a. Disposal of Hazardous Materials and Waste

b. Emergency Procedures (First Aid)

c. Reporting Procedures

Employees gain experience through extensive OJT. After initial classroom and "hands-on" training, experienced employees accompany new hires to the field and demonstrate safe practices. OJT also helps ensure that personnel retain formal course material and practice safe work habits. This OJT continues throughout employment. Sample documentation of both supervisor and operator training records is presented in Figures H-1 and H-2.

The contents of the training program for the OSOT and Fire Department personnel meet the requirements of the 24-hour and 8-hour OSHA HAZWOPER Training (29 CFR 1910.120).

An example of a certification exam is provided in Appendix H-3, titled "Example of Certification Exam."

SATTP operating, OSOT, and FPD personnel will not perform hazardous waste duties until properly trained or will serve in an ancillary position under the supervision of a properly trained person. Personnel will be annually retrained. The training technique will consist of a combination of classroom and on-the-job training.

FIGURE H-1

SUPERVISOR TRAINING DOCUMENTATION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Format for Supervisor's Statement

SOP No. ____________ REV. No. ____ CHANGE No. ____ DATE: ____________

I have personally reviewed each of the operational steps of the SOP and have no question in my mind that the operation can be performed safely and efficiently. I have trained the following operators in the details of their part of the operation and have instructed them to follow the SOP without deviation:

NAME	DATE	OPERATION NUMBER

SUPERVISOR: ____ DATE: ______________

FIGURE H-2

OPERATOR TRAINING DOCUMENTATION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Format for Operator's Statement

SOP No. ____________ REV. No. ____ CHANGE No. ____ DATE: ____________

I have read or have had read to me and understand the general and specific safety requirements, personnel and explosive limits, work description, and inspection requirements necessary to accomplish my operation. I have been thoroughly trained in, and am familiar with, my part of the operation and I agree to abide by these instructions throughout my assignment to the operation.

NAME	DATE	OPERATION NUMBER

SUPERVISOR: ____ DATE: ______________

Table H-1 outlines the Personnel Training Requirements for Indian Head.

H-1c Training Director [40 CFR 264.16(a)(2), and COMAR 26.13.05.02G(1)(b)]

The hazardous waste training program will be directed by the EC, who is qualified in hazardous waste management procedures as described in the permit application. The EC is responsible for implementing and maintaining the training program and records. The training director qualifications are as follows:

- Has technical or educational background or at least 5 years of OJT experience.
- Possesses a thorough understanding of Federal, State, and local hazardous waste regulations.
- Has successfully completed all hazardous waste training.

H-1d Relevance of Training to Job Position [40 CFR 264.16(a)(b)(c) and COMAR 26.13.05.02G(1)(b)]

The training requirements are designed to assure that thermal treatment area personnel are trained to conduct tasks relevant to their jobs.

The hazardous waste training program is designed to ensure the capability of facility personnel to safely handle, package, store, and transport hazardous materials. In addition, it teaches personnel how to respond safely and effectively to emergency situations. Emphasis is placed on spill and accident prevention. All courses stress worker safety and environmental protection.

Instruction in emergency response procedures and safety guidelines is presented through various on site courses. Both general instruction and specific courses developed for safe and effective management of selected hazardous wastes are offered. The specific courses are designed to address hazards and spill response techniques for individual wastes to which personnel can expect to be exposed on a frequent basis.

Employees gain experience through extensive OJT. After initial classroom and "hands-on" training, experienced employees accompany new hires to the field and demonstrate safe practices. OJT also helps ensure that personnel retain formal course material and practice safe work habits. This OJT continues throughout employment. Personnel directly involved in thermal treatment operations receive further specialized training that allows them to perform their jobs in compliance with RCRA, 40 CFR 264.16 (a)(1).

Date: April 5, 1996

TABLE H-1

PERSONNEL TRAINING REQUIREMENTS
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Personnel Category	Total Employees	Training Outline	Initial Off site Training	Annual Refresher*
Management Personnel	13	Overview Seminar	24-Hour	2-Hour
Commanding Officer				
Executive Officer				
Technical Director				
Safety Director				
Public Works Officer				
Security Director				
Supply Director				
Head, Ordnance				
Head, Manufacturing and Technology				
Head, Test and Evaluation				
Environmental Coordinator				
Emergency Response Coordinator & Alternates	3	Emergency Response	40-Hour	24-Hour
Environmental Technicians/ Engineers/Specialists	5	Emergency Response	40-Hour	24-Hour
Cast Operations Manager/ Staff	4	RCRA/ Operations	24-Hour	8-Hour
SATTP Personnel	8	RCRA/ Operations	24-Hour	8-Hour
Fire Department	45	Emergency Response	40-Hour	24-Hour
New Employees	--	Safety Awareness	8-Hour	2-Hour

* Refresher training can be provided as off site classroom training or as documented on-the-job training (i.e., safety standards, weekly safety stand-up meetings, hazard control briefing).

H-1e Training for Emergency Response [40 CFR 264.16(a)(3) and COMAR 26.13.05.02G(1)(c)]

Employees are taught the appropriate emergency response measures in the event of an emergency situation. These procedures include evacuation plans; chain of command; operations; shutdown procedures; and emergency response to fire, explosion, or groundwater contamination. The program trains hazardous waste handling/management personnel to maintain compliance under both normal and emergency conditions.

Training elements addressing nonroutine and emergency situations (unscheduled interruption of operations related to storms, power outages, fires, explosions, spills) include:

- Procedures for locating, using, inspecting, repairing, and replacing facility emergency and monitoring equipment.
- Emergency communications procedures and alarm systems.
- Response to groundwater contamination incidents and procedures for containing, controlling, and mitigating spills.
- Shutdown operations and power failure procedures.
- Procedures for evacuation of nearby areas.

In addition to hazardous waste management personnel, the Fire Protection Division is on standby for response to all fires and other emergencies. This Division is trained using both classroom training methods and response drills. The classroom training is required for introductory training and as annual review for each member assigned specifically to the Hazardous Waste Management Training Program. Fire drills are conducted at least monthly.

H-2 IMPLEMENTATION OF TRAINING PROGRAM [40 CFR 264.16(b) and COMAR 26.13.05.02.G(2)]

The EC and all current thermal treatment unit operating personnel have been fully trained at the time of this submittal. All new personnel complete their training within 6 months of assignment to a hazardous waste position or within 6 months of their date of employment, whichever is later. No employee working in a hazardous waste position works in an unsupervised capacity prior to completion of the training program, including successful demonstrations of proficiency as shown by passing written or OJT tests.

Employees meet annually for review and update of this training program as set forth below:

- Employees attend review courses (shortened versions of courses received during initial training) on material appropriate to their position.
- Employees are briefed on the status of storage and operating conditions and procedures, noting any areas where there are problems or potential problems.
- Employees are briefed on any changes to the requirements contained in the facilities permit.
- Contingency plan incidents occurring in the past year are reviewed. The review focuses on the cause of the incident and identification of steps to be taken to prevent or to ensure improved response in the future.

H-2a Training Records and Documents [40 CFR 264.16(b),(d)(4), and (e), 270.14(b)(12) and COMAR 26.13.05.02G(4)]

The following documents and records will be maintained on file:

- The name of each employee filling a position related to operation of the thermal treatment areas.
- A written job description for each job position related to operation of the thermal treatment areas, including the requisite skills, education qualifications, and duties of employees assigned to each position.
- A description of the type and amount of introductory and continuing training that will be given to each person filling a position related to operation of the thermal treatment areas.
- Records that document that training has been given and completed by facility personnel.

Training records for current employees will be kept until closure of the facility. Training records of former employees will be maintained for at least 3 years following the date the employee last worked at the facility. All training records will be maintained by the civilian personnel office and each operating unit. Figure H-3 is a typical personnel training record.

Date: April 5, 1996

FIGURE H-3

TYPICAL PERSONNEL TRAINING RECORD
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Employee: ______________________________

Title: ______________________________

Employee Number: ______________________________

Course Title	Date(s)	Hours of Instructions	Instructor	Location
Hazardous Waste Overview Seminar				
RCRA Training				
Emergency Response				
Safety Awareness				
Other				

SECTION I

CLOSURE AND POST-CLOSURE PLANS

I. CLOSURE AND POST-CLOSURE PLANS

I-1 CLOSURE PLAN [40 CFR 264.112(a) and COMAR 26.13.05.07C]

This Closure Plan identifies steps that will be necessary to close the Open Burning (OB) units at Strauss Avenue Thermal Treatment Point (SATTP).

I-1a Description and Map of Facility

The IHDIVNAVSURFWARCEN is located at Indian Head in the southwestern portion of the State of Maryland on a peninsula formed by the confluence of the Potomac River and Mattawoman Creek. This location is on the east bank of the Potomac River in the west-central portion of Charles County, approximately 25 miles south of Washington, D.C. The installation covers approximately 3,500 acres. Figure B-1 depicts the location of the facility.

The principal mission of the activity at Indian Head is the research, development, and production of propellants and explosives for the United States Navy. The site has been used in this capacity for more than 100 years. Site operations range from full-scale production of materials to laboratory research on new explosives and propellants. These operations generate waste explosives, propellants, and explosive/propellant-contaminated scrap and dunnage, all exhibiting the reactivity characteristic (D003). The explosive/propellant-contaminated wastes, which are regulated under 40 CFR Part 264, Subpart X, must be thermally treated to deactivate the reactivity characteristic.

Thermal treatment of these materials is performed at the SATTP, located in the southwest portion of the base. The SATTP is on a narrow 1,100-foot long peninsula, which extends off Indian Head into Mattawoman Creek. The location of this waste management unit is shown on Figure B-3.

I-1b Description of Waste Management Units to be Closed

I-1b(1) Present Status of the Facility

Materials that are thermally treated at the SATTP include rocket grains (motors), propellant and explosive scrap, and other materials contaminated with explosives and propellants. Treatment activity occurs at two seperate OB locations at the SATTP: the Main Point and the Auxiliary Point. The Main Point, located at the end of the Strauss Avenue Peninsula, is used for the majority of the materials. There are seven Burn Pans evenly spaced along the perimeter of the Main Point. A smaller peninsula, which branches off from the Strauss Avenue peninsula, contains the Auxiliary Point. This area contains four unlined burn pans, one prototype Burn Pan, one clay pad, one solvent treatment vessel, one igniter treatment vessel, and one JATO block. A map of the SATTP is shown in Figure B-4.

Building 880, located at the Main Point, is used as an observation point and for the storage of treatment materials. No hazardous waste is stored in this building.

The Burn Pans at the Main Point are lined with at least 6 inches of clay to protect the pan from potentially excessive heat during thermal treatment. The clay also acts as a support medium for the wastes being treated. These pans are made of 1/4-inch steel plate and are approximately 20 feet long by 8 feet wide by 14 inches deep. The pans are supported on concrete piers about 8 inches above the ground. The area beneath the pans is composed of concrete or clay-like soils to serve as secondary containment.

The unlined burn pans at the Auxiliary Point are smaller, 10 feet long 4 inches by 4 feet wide by 8 inches deep. These pans are supported over a slightly larger pan by concrete blocks. This larger pan, which is elevated from the ground by concrete blocks, acts as secondary containment.

The solvent treatment vessel is made of 1/4-inch steel and is approximately 4 feet in diameter by 3 feet 3 inches in height. The igniter treatment vessel is fabricated of 3/8-inch steel. It is shaped like a round-bottom trough, approximately 10 feet long by 2 feet deep by 3 feet 4 inches wide. Steel grating is placed across the top of the trough. These vessels are held above the ground by steel supports, which allow for routine inspection for structural integrity. The burn pans and vessels are covered when they are not being used to keep precipitation out.

I-1b(2) Status of Facility After Closure

The closure of the SATTP may occur in stages with either the Main Point or the Auxiliary Point being closed separately. Also, individual treatment units may be closed independently of other treatment units.

After closure, the OB areas will remain part of IHDIVNAVSURFWARCEN and be available for other uses. Upon completion of closure of the OB units, the IHDIVNAVSURFWARCEN will submit a written permit withdrawal request in accordance with COMAR 26.13.07.11E.

I-1c **Closure Certification (40 CFR 264.115; COMAR 26.13.05.07F)**

A closure certification stating that the unit(s) have been closed in accordance with the approved closure plan will be submitted. This certification will be signed by an authorized representative of IHDIVNAVSURFWARCEN and an independent, qualified, registered Professional Engineer. Documentation supporting the independent, qualified, registered Professional Engineer's certification will be available to the Maryland Department of the Environment (MDE) upon request.

I-1d **Closure Performance Standard (40 CFR 264.111; COMAR 26.13.05.07B)**

When OB operations at the IHDIVNAVSURFWARCEN have been terminated, the OB units will be closed in a manner that eliminates the need for post-closure care. This closure plan has been designed to:

- Minimize the need for further maintenance of the OB units.
- Minimize post-closure escape of hazardous waste, hazardous constituents, waste degradation products, leachate, and contaminated runoff into surface water and groundwater to the extent necessary to protect human health and the environment.
- Comply with Environmental Performance Standards contained in 40 CFR Part 264 Subpart X and COMAR 26.13.05.17 (Miscellaneous Units) and COMAR 26.13.05.18 (Thermal Treatment and Open Burning), relative to closure activities and post-closure facility conditions.

At facility closure, all contaminated treatment residuals and soils will be removed from the OB treatment unit. The need for further maintenance of these units will not exist. If decontamination of residue or soil cannot be achieved at a given TTP during closure, additional closure activities will be conducted at that TTP to protect human health and the environment. In addition, the post-closure plan in Section I-2 will be implemented for any unit if the removal of all contaminated residue or soil proves to be infeasible. If statistically significant releases to groundwater are indicated based on the detection monitoring program (see Section E-4), post-closure groundwater monitoring may take place. The methodology provided in Appendix I-1 will be used as a basis for evaluating whether contaminant concentrations remaining in soil exceed background levels or risk-based levels.

At closure of the TTPs, a surface and subsurface soil sampling program will be undertaken. In the event of confirmed or potential soil contamination, groundwater monitoring will be continued. This is also dependent on the results of routine groundwater monitoring to be conducted during OB operations. The Sampling and Analysis Plan for soils and residuals is included in Appendix I-2 (including parameters to be analyzed, number of samples and locations, sample type, sampling methods and equipment, analytical methods, and QA/QC protocols). Groundwater monitoring will be conducted in accordance with the procedures described in Section E-4.

Cleanup goals will include regulatory standards, background levels, and/or risk-based objectives and will be established through a series of screening steps and detailed evaluations. The analysis procedure to be used to establish cleanup goals for the IHDIVNAVSURFWARCEN OB sites may be outlined as follows.

Step 1 - Comparison with Background

Background values for naturally occurring parameters are to be developed during sampling for closure. For parameters that occur naturally, the existence of contamination will be determined from the background sampling. Naturally occurring parameters will be considered to indicate contamination if those concentrations exceed the background mean plus the 95 percent confidence interval, using a one-tailed t-test (mean plus two times the standard deviation). For contaminants that do not occur naturally, such as explosives, any amounts above the method detection limit will be indicative of contamination.

If background values are not exceeded, the unit(s) will be considered to be clean, and no further analysis will be completed. If background values are exceeded, a risk analysis (Step 2) will be conducted.

Step 2 - Quantitative Risk Analysis

Risk-based criteria will be used as the primary criteria for quantitative risk assessment and development of cleanup goals. Risk estimating procedures are presented in Appendix I-1. Quantitative risk estimates will be developed for carcinogenic and noncarcinogenic compounds that exceed background levels.

In the event that the cumulative incremental cancer risk (from all routes of exposure for all carcinogens detected above background) does not exceed 1.0×10^{-4}, no further analysis of potential carcinogenic effects will be conducted, and the site will be considered clean from the standpoint of carcinogenic contamination.

In the event that the cumulative Hazard Index does not exceed unity (1.0), no further analysis of potential systemic toxicants will be conducted, and the site will be considered clean from the standpoint of noncarcinogenic contamination.

If the cumulative Hazard Index does exceed unity, additional analysis will be completed to determine the Hazard Index based on the toxicity endpoints of the potential chemicals of concern. Under these circumstances, it is likely that several cumulative Hazard Indices for chemicals with similar endpoints will be determined. If the cumulative Hazard Index based on toxicity endpoints does not exceed unity, the site will be considered clean from the standpoint of noncarcinogenic contamination.

Step 3 - Soil Removal

If the conditions described above are not satisfied, corrective action (soil removal) is necessary to meet the cleanup goals (incremental cancer risk less that 1.0×10^{-4} and Hazard Index less than 1.0). The areas where soil will be excavated to meet the closure performance standard will be based on the analytical results from the pre-closure sampling and analysis.

I-1e **Partial Closure and Final Closure Activities [40 CFR 264.112(b); COMAR 26.13.05.07C(2)(c)]**

The closure of the SATTP could occur in stages with either the Main Point or the Auxiliary Point being closed separately. In all these cases, the general closure activities described in this closure plan can be applied separately to the SATTP Main and Auxiliary Points. Individual treatment units (i.e., burn pan, solvent tank, etc.) may be closed separately. In such cases, the individual treatment unit would be decontaminated by removal of all treatment residue followed by flashing with subsequent sale as scrap.

Final closure activities for the containers and OB units are discussed in Sections I-1i and I-1p(2), respectively.

I-1f **Maximum Waste Inventory [40 CFR 264.112(b)(3); COMAR 26.13.05.07C(2)(c)]**

Wastes that are to be treated are not accumulated or stored at the SATTP. All reactive wastes are treated on the day of arrival. The maximum waste that would be in inventory at one time is limited by the process explosive limits described in SOP 198-098. These are as follows:

Main Point	9,000 pounds
Auxiliary Point	
Solvent Vessel:	300 gallons of contaminated solvent
Ignitor Vessel:	1 layer and 2 cages of pryotechnics or 20 Smokey Sam motors
Prototype Burn Pan:	1,000 pounds
Unlined Pans:	2,000 pounds (500 lbs/pan)
Thrust Block:	9 grains (SR-121) 8 chambers/grains (MK 25/MK 6) 28 grains (CKU-7) 8 grains (MK 128) 8 grams (MK 16) 4 grams (DEMNS)

Treatment residues will also be present in the treatment units and in containers awaiting sampling and analysis or movement to permitted storage and/or disposal facilities. These quantities will typically be only a small fraction of the original mass of reactive material treated.

I-1g Schedule for Closure [40 CFR 264.112(b)(6); 40 CFR 264.113; COMAR 26.13.05.07D]

There is no plan to close the OB units in the foreseeable future. The final hazardous wastes received at the unit will be treated on the day they are received, according to SOPs for the units. Closure will be in compliance with this closure plan as approved by the MDE and within 240 days of receipt of the final volume of hazardous wastes for OB. The proposed schedule of projected activities is provided below for complete closure of the Strauss Avenue Main Point and Strauss Avenue Auxiliary Point, either separately as partial closures or combined.

Task	Cumulative Time (day)
- Notify MDE or U.S. EPA of intent to close unit.	60
- Receive/treat final volume of waste.	0
- Begin closure sampling. (The MDE will be notified 5 days before sampling activities.)	0
- Closure sampling complete.	60

-	Receipt of analyses, determine if soil removal is required to meet performance standard.	120
-	Excavate, decontaminate, and dispose of burn pan and residue/soil, as needed. (The MDE will be notified 5 days before excavation/ removal of soils.)	200
-	Regrade and revegetate.	240
-	Submit closure certification to MDE or U.S. EPA.	300

The IHDIVNAVSURFWARCEN will contact the MDE or U.S. EPA at least 5 business days in advance of certain critical activities (e.g., sampling, soil removal) so that a representative may be present to observe the activity, obtain split samples, or inspect other items.

It is estimated that 300 days will be required from the time closure begins to completion and certification of closure. This time period is in excess of the 180-day requirement for completion of closure. This estimated extended closure is based on anticipated delays in turnaround times for laboratory results, and on allowances for adverse weather conditions that could delay investigative and remedial work. Typically, at least 20 to 30 days are required for analysis, reporting, and validation of analytical data.

If large quantities of contaminated soil are encountered during closure of any OB unit or if additional closure activities (i.e., cap installation) are required, an extension of the estimated closure time may be necessary to allow sufficient time to conduct sampling events and to receive and interpret analytical data. Demonstrations required for an extension of closure time will be made in accordance with the requirements of COMAR 26.13.05.07D(2) or 40 CFR 264.113.

It may be necessary to close individual treatment units during the active life of the facility (e.g., ignitor vessel, Burn Pan, unlined pan). Closure may occur either because the unit is no longer needed or because it is being taken out of service either necessary upgrading or deterioration and is being replaced. These units will be decontaminated and recycled as metallic scrap. Since such closures are considered to be part of the routine operation of the TTPs, they are not considered partial closure of the TTPs.

I-1h Closure Procedures

I-1h(1) Inventory Removal [40 CFR 264.112(b)(3); COMAR 26.13.05.07C(2)(c)]

Inventory removal for the OB units is discussed in Section I-1p(4). Methods are specified for removal of wastes and contaminated media; transportation of waste; and storage, treatment, and disposal.

I-1h(2) Disposal or Decontamination of Equipment, Structures, and Soils [40 CFR 264.112(b)(4) and 264.114; COMAR 26.13.05.07C(2)(d) and .07E]

Disposal and decontamination of equipment, structures, and soils for the OB units are discussed in Sections I-1p(2) and (4), respectively. Included are descriptions of all efforts to clean or decontaminate hazardous waste and its residues and constituents from equipment and other appurtenances, and management of wastes resulting from these activities. All hazardous wastes generated will be managed in accordance with applicable Land Disposal Restrictions (LDRs) as described in 40 CFR 268.

I-1h(3) Closure of Disposal Units/Contingent Closures [40 CFR 264.258(c)(1); COMAR 26.13.05.12I(3)(b)]

If a TTP or portion of a TTP cannot be fully decontaminated to constituent concentrations below those developed in accordance with Appendix I-1 by means of closure activities, any such treatment point or portion will be closed as a land disposal unit. Any disposal unit will be fully covered with soil material or a synthetic membrane having a permeability less than or equal to the permeability of the natural subsoils present beneath the unit to minimize the migration of liquids through the closed unit. The cover will be vegetated and contoured to promote drainage and to prevent erosion. The cover material will be of sufficient thickness and elasticity to accommodate settling and subsidence.

I-1h(3)(a) Run-on and Runoff Control

Any treatment point or portion closed as a land disposal unit will also have a run-on control system (e.g., a dike) installed to minimize flow onto the closed unit and a runoff management system. These systems will be designed to prevent run-on and runoff from damaging the final cover.

I-1h(3)(b) Groundwater Monitoring

If all hazardous waste or hazardous constituents cannot be removed from one of the TTPs during closure, the monitoring well network as described in Section E-4 will be maintained. This monitoring well network will be modified, if necessary, based on the TTP or portion thereof, requiring capping. These wells will be sampled in accordance with the procedures outlined in Section E-4. If the concentrations found in the downgradient groundwater samples are less than risk-based levels, further groundwater monitoring will not be conducted. In addition, necessary corrective action will be taken to protect human health and the environment in accordance with COMAR 26.13.05.06K, if the concentrations found in the downgradient samples indicate that this action is required.

I-1i Closure of Containers (40 CFR 264.178; COMAR 26.13.05.09I)

Hazardous wastes are not stored in containers at the TTPs. However, reactive wastes are sometimes transported to the TTPs in containers. Any metal containers remaining at the TTPs which were used to transport wastes to the SATTP at IHDIVNAVSURFWARCEN will be decontaminated by flashing using procedures described in Section I-1p. Drums containing reactive treatment residuals will be treated the same way. Containers composed of combustible materials will be decontaminated by burning in a burn pan. Decontaminated metallic containers will be combined with other decontaminated metallic scrap for recycling.

I-1j Closure of Tanks (40 CFR 264.197; COMAR 26.13.05.10F)

Hazardous wastes are not stored in tanks at the TTPs.

I-1k Closure of Waste Piles (40 CFR 264.258; COMAR 26.13.05.12)

Hazardous wastes are not stored or treated in waste piles at the TTPs.

I-1l Closure of Surface Impoundments (40 CFR 264.228; COMAR 26.13.05.11G)

This section is not applicable because no hazardous waste surface impoundments are present at the TTPs.

I-1m Closure of Incinerators (40 CFR 264.351; COMAR 26.13.05.15E)

This section is not applicable because no hazardous waste incinerators are present at the TTPs.

I-1n Closure of Landfills (40 CFR 264.310; COMAR 26.13.05.14J)

This section is not applicable because no hazardous waste landfills are present at the TTPs.

I-1o Closure of Land Treatment Facilities (40 CFR 264.280; COMAR 26.13.05.13K)

This section is not applicable because no hazardous waste land treatment facilities are present at the TTPs.

I-1p Closure of Miscellaneous Units (40 CFR 264.601; COMAR 26.13.05.17)

I-1p(1) General

Methods for performing decontamination and evaluating the effectiveness of decontamination procedures during closure of the miscellaneous treatment units at the SATTP are described in this section.

The intent of closure is to close to the risk-based or background levels, whichever is higher. Clean closure will require the identification of areas where hazardous wastes and constituents have entered the environment and removal of these constituents to background or risk-based levels. At this time, it is expected that the OB units will all be closed at one time. Partial closure is not anticipated. However, if partial or separate closure of the Auxiliary Point or the Main Point is necessary, applicable portions of this Closure Plan will be utilized.

If groundwater is contaminated, clean closure will not be possible. If clean closure (due to groundwater contamination) is not possible, the closure approach will be to remove surface and subsurface soil that exceeds risk-based or higher background levels. Groundwater monitoring and/or remediation will be conducted according to the detection monitoring program for groundwater included in Section E-4. If soil cannot be excavated and removed to below risk-based concentrations, the contingent closure (which includes capping) will be implemented.

I-1p(2) Closure of OB Units

Closure activities will generally occur as follows:

- All visible and/or readily identifiable wastes and residues, including the treatment units, will be removed from the TTPs. These wastes and residues will be sorted into classes. The materials will be segregated and temporarily stored in containers at a temporary staging area at the station.

- An investigation will be undertaken to sample and analyze surface and subsurface soils, groundwater, and possibly sediments. The focus will be to identify the presence of hazardous wastes and/or constituents resulting from OB operations. Finally, any equipment staged or used at the OB units that may have come into contact with hazardous waste propellants, explosives, or treatment residues will be evaluated for evidence of contamination. Analytical data will be evaluated to determine whether compounds are present at concentrations that exceed risk-based levels. The sampling plan and analytical procedures for closure-related sampling and analysis are presented in Appendix I-2.

- Soils that are determined to be contaminated at levels exceeding risk-based levels will be remediated to these levels. Soils will be excavated from those locations, sorted, containerized, and moved to a temporary staging area. Contaminated equipment will be cleaned by physical means, such as scraping, brushing, etc., or with appropriate cleaning agents. Residues from equipment and area decontamination will be containerized and moved to a staging area for temporary storage. All equipment decontamination using liquids will be performed in a bermed, lined area to contain spent decontamination solutions.

- Verification will be performed to evaluate the effectiveness of remediation and decontamination efforts. Previously sampled soils will be resampled, analyzed, and evaluated to determine whether contaminants are present in concentrations exceeding risk-based levels. If necessary, additional remediation and decontamination will be performed, followed by additional verification. This process will continue until hazardous wastes, constituents, and OB residues are no longer present in excess of background or risk-based cleanup levels.

- Waste and residues from closure activities will be containerized and temporarily stored at a staging area. Signs will be posted, labels will be placed on the containers, and other precautions will be taken to properly secure the containerized wastes. Generally, two types of waste will have been aggregated: soils and other solids that must be reburned because they contain or are contaminated with ignitable or reactive substances, and potentially-contaminated liquids collected during equipment decontamination, if liquids are used for equipment decontamination.

- Solids that must be reburned because they are contaminated with ignitable or reactive substances will be segregated from the reacted wastes and residues. Unreacted solids will be sorted and reburned in a burn pan to ensure that wastes and residues no longer are RCRA reactive. The burn pans will be cleaned, and the residues from the final OB operations will be collected, containerized, labeled, and moved to a temporary staging area for processing and offsite disposal.

- After the final wastes have been treated in a unit, the treatment residues will be removed and the unit treated by flashing, with a clean fuel, most likely No. 2 fuel oil. In the case of burn pans with a clay bed, treatment residues will be removed and the clay bed treated by flashing. After the bed is determined to be nonreactive, it will be removed from the burn pan and placed into containers for sampling and analysis. The treatment unit will again be treated by flashing and then recycled as scrap.

- After closure activities have ensured that any residual contamination is at or below risk-based levels, the OB units will be considered to be clean closed. The treatment units will be recycled as scrap metal. The soil in the area will be regraded to the contour of the surrounding area and revegetated.

Deciding that clean closure of the TTPs has been accomplished will depend on identifying waste-related compounds present and on determining risk-based cleanup concentrations for these compounds. These must be satisfied for clean closure to be demonstrated. The development of soil cleanup goals and of methods to be used to estimate site risks following clean closure is presented in Appendix I-1.

Throughout the OB unit closure activities, all operations will be performed in a manner that will protect personnel, human health, and the environment. The necessary level of protection will be achieved by ensuring that various precautions are put in place and properly implemented during closure. The precautions will include the following:

- Security - All existing security measures (e.g., signs, gates) will be maintained and, as necessary, supplemented.

- Inspections - The OB unit inspection programs will continue as applicable, and the inspection plan and schedule will be amended to include areas where hazardous waste and residues are temporarily stored during remediation and decontamination.

- Personnel Training - All personnel associated with unit closure will receive the training necessary to perform their duties.

- Preparedness and Prevention - During closure activities, all equipment necessary to respond to potential emergencies at the units will remain available. The OB units will be maintained to minimize the potential for emergencies during closure.

- Contingency Plan and Emergency Procedures - The OB unit contingency plan will be maintained and, as necessary, revised to describe proper responses in the event of emergencies during closure.

- Control of Air Emissions - Measures will be taken (e.g., wetting or water spray) to control particulate emissions if fugitive dust is a problem during excavation and other earth-moving activities.

I-1p(3) Determination of the Presence, Nature, and Extent of Contamination

Surface and subsurface soil samples will be collected from the locations identified in Appendix I-2 and under each of the burn units. Sampling and analysis will be conducted according to the protocols specified in Appendix I-2. Sampling conducted at closure will be representative sampling. Areas where soil contamination could have occurred during specific OB events should already have been identified, and, if necessary, cleaned up as part of the Standard Operating Procedures for the OB areas.

Samples will be tested for the parameters listed in Appendix I-2. Samples will be analyzed in accordance with U.S. EPA or equivalent acceptable methods.

If hazardous wastes are present or if hazardous constituents are found at concentrations that exceed background or risk-based levels, additional samples will be collected to define the horizontal and vertical extent of contamination. Samples will be taken at a greater depth than the initial sampling locations to define the vertical extent of contamination, and samples will be taken at a greater distance from the units to determine the horizontal extent of contamination.

If the analyses of the residue/soil samples show that concentrations of all constituents are equal to or less than background or risk-based levels, no further sampling or soil removal/remediation will be necessary.

I-1p(4) Procedures/Methods to Perform Decontamination

Any contaminated residues/soils at OB facilities equaling or exceeding background or risk-based values will be removed using a backhoe, other excavation equipment, and/or hand tools, as appropriate. The residue or soil will then be containerized, properly manifested, and transported to an approved waste management facility. Unreacted materials may be treated in place if determined to be unsafe to move.

Contaminated materials will be removed from the unit and brought to a temporary staging area located adjacent to the unit. The staging area will be encircled by a temporary dike to prevent run-on and runoff of the contaminated materials. At the staging area, the contaminated materials will be placed in U.S. Department of Transportation (DOT) approved drums or other containers (e.g., rolloffs) for offsite transport. The staging area will consist of a graded, compacted earthen foundation surrounded by an earthen berm. The foundation and berms will be overlain by a 30-millimeter (minimum) liner of sufficient durability to withstand sorting activities. Plywood or a similar material will be laid on top of the liner to prevent tearing. The staging area will be covered in a manner that prevents accumulation of rainwater while allowing work to continue.

Materials will be sorted at the staging area as they arrive. Sorting or segregation, is done to divide wastes into similar categories for management and disposition. Similar materials will be consolidated to the maximum extent practical to minimize the number of containers that must be handled. Only compatible wastes of similar nature will be placed in the same container.

Waste will be packed into metal or plastic shipping containers, except for unreacted and ignitable wastes that will be reburned. The shipping containers will meet appropriate U.S. DOT shipping and labeling requirements, as specified in 49 CFR Parts 172, 173, 178, and 179. Items classified as hazardous waste will be labeled in accordance with 49 CFR 172.304.

The methods used for sorting may include the use of screens of varying mesh sizes, selection and removal of discrete items by hand, and other methods that protect workers while permitting the separation of wastes.

Once at the staging area, wastes will be sorted into the following categories as applicable and segregated by trained personnel based on visual inspection:

- Unreacted Materials - These are materials that are, contain, or are contaminated with unreacted or ignitable substances. These materials will be sorted into ignitable containers, such as cardboard or wooden boxes, in preparation for burning.

- Reacted Materials - These are materials, debris, ash, and contaminated soils that are generated after OB activities have reached completion and cannot be reinitiated. These materials will be sampled in accordance with the procedures described in Appendix I-2 and if hazardous, disposed according to their hazardous waste classification and if nonhazardous, disposed of at a nonhazardous waste facility.

- Burn Pan Wastes - These materials will be sorted and inspected to determine whether any unreacted substances remain. If no unreacted materials are present, representative samples will be handled in accordance with the procedures described in Appendix I-2, and if hazardous, disposed according to their hazardous waste classification, and if nonhazardous, disposed at a nonhazardous waste facility.

- Liquids - All liquids (primarily from equipment decontamination) will be consolidated into appropriate leakproof shipping containers. A representative sample will be taken for chemical analysis. If determined to be hazardous waste, all containers will be labelled and moved to a temporary storage area. If determined to be nonhazardous, the liquids will be disposed at a nonhazardous waste facility.

- Miscellaneous Wastes - These wastes include metal, paper, wood, etc. These materials will be inspected to determine whether they contain (or are contaminated with) reactive substances. Wastes that contain (or are contaminated with) unreacted materials will be segregated and treated as described above. The remaining waste will be sorted into nonflammable and inflammable wastes.

At the OB unit, the burn pans will be decontaminated in place. Decontamination of trays will be ccomplished through flashing, by using appropriated fuels to cause the temperature in the containment device to exceed the auto-ignition or decomposition temperature of the wastes burned in the tray. Any residues ejected from the trays during decontamination will be collected and managed in the same manner as contaminated residues/soils.

In the event that large quantities of contaminated soil are encountered during closure, leaving wastes in place and capping the units as land disposal units will be considered [see Section I-1h(3) - Closure of Disposal Units/Contingent Closures].

All equipment coming in direct contact with potentially contaminated material, and all the equipment that exits a potentially contaminated area, will require decontamination. Decontamination will generally involve gross removal of potentially contaminated material followed by water washing, if necessary. The equipment decontamination facility will be designed with a liquid collection and retention system. Collected liquids will be transported off site for treatment or disposal.

During closure activities, decontamination materials and miscellaneous disposable items and equipment will be generated. These items will be containerized and managed off site as a hazardous waste, if hazardous.

I-1p(5) Procedures to Evaluate Effectiveness of Decontamination

The effectiveness of the decontamination procedures will be determined by taking residue and soil samples, both vertically and laterally in the areas surrounding the units, to demonstrate that the risk-based concentrations derived in accordance with the procedures in Appendix I-1 are not exceeded.

During closure, excavation and soil sampling will continue until all soil contaminated above background or risk-based levels has been removed. The effectiveness of decontamination will be determined on the basis of the results of tests on soil samples from the excavations. Decontamination will be considered effective when concentrations of all samples are at or below background or risk-based levels and when the distribution of contaminants shows no pattern of increasing contaminant concentrations.

The effectiveness of decontamination for units and equipment will be determined by visual observations that all removable residues have been removed and/or flashing has been accomplished.

I-1p(6) Waste Disposal

Following sorting and the subsequent destruction of unreacted materials, three general categories of waste will remain for treatment or disposal (hazardous liquid waste, hazardous solid waste, and nonhazardous waste). Most of the materials generated from closure activities are expected to be handled as nonhazardous waste. Materials will be sampled and analyzed to determine whether they are hazardous or nonhazardous (see Appendix I-2). Based on the results, the properties and hazards associated with the wastes can be determined, and safe management can be ensured. Following sampling, it may be determined that some of the wastes can be handled as nonhazardous wastes.

I-1q **Closure Plan Amendment [40 CFR 264.115; COMAR 26.13.05.07C(3)]**

The IHDIVNAVSURFWARCEN will maintain this closure plan to ensure that it is current and accounts for anticipated closure activities. This closure plan will be amended when the following events or contingencies occur:

- Change in the expected reasons that warrant closure.

- Change in operating plans or unit design which affects this closure plan. This will include, but not be limited to, the need to add new treatment units that cannot be closed in accordance with the techniques described, to expand treatment capacity, or to treat different types of explosives or propellants that would result in residues remaining at closure requiring different closure techniques.

- Receipt of new information that significantly changes the underlying assumptions or procedures outlined in this closure plan.

- Occurrence of unexpected events during closure that require significant modification of this closure plan. Such events will include, but not be limited to, discovery of significant amounts of released hazardous wastes where limited amounts are expected, or the presence of groundwater contamination above risk-based levels.

Certain events and/or contingencies are anticipated in this closure plan and do not warrant formal amendment of the plan. For example, the need to remove additional quantities of soil than is currently anticipated, or the need to extend the anticipated schedule of some closure activities by a few days rovided the overall time scheduled for closure is not exceeded). Such events and contingencies will be brought to the attention of the MDE and U.S. EPA. However, such events of contingencies will not require formal amendment of the closure plan.

Whenever events or contingencies requiring formal amendment of this closure plan occur, a written request for permit modification will be submitted to the MDE or U.S. EPA in accordance with the procedures in COMAR 26.13.07 or 40 CFR 264.112. The written request will include a copy of the amended closure plan for approval. Such requests will be signed by the Commander's Representative and sent by certified mail.

Closure of the OB units will not commence if significant changes requiring prior MDE or U.S. EPA approval are pending, unless expressly authorized by MDE or U.S. EPA. If closure has already begun, and changed closure activities require MDE or U.S. EPA approval in order to proceed, the OB units will be maintained in good condition in accordance with all regulatory requirements until approval is received. Maintenance activities may include, but will not be limited to, inspections, security, run-on and runoff controls, and other precautionary measures.

If it is determined that the OB units cannot be decontaminated to below risk-based levels, or if groundwater contamination above risk-based levels is detected, the post-closure plan will be revised and submitted for approval. The post-closure plan will include an inspection plan, a post-closure groundwater monitoring plan, and a maintenance plan. Items to be addressed include, but are not limited to, the following: security; erosion damage; cover settlement, subsidence, and displacement; vegetative cover; run-on and runoff controls; drainage systems; and the groundwater monitoring system.

I-2 POST-CLOSURE PLAN/CONTINGENT POST-CLOSURE [40 CFR 264.118; COMAR 26.13.05.07H]

If soil at an OB unit cannot be cleaned up to meet the risk-based levels derived in accordance with the procedures in Appendix I-1, the unit will be capped as a land disposal unit in accordance with Section I-1h(3).

I-2a <u>Monitoring Plan</u> [40 CFR 264.118(b)(1); COMAR 26.13.05.07H(2)(a)]

Groundwater monitoring in accordance with the detection monitoring program presented in Section E-4 will continue throughout the post-closure care period. This program will be modified as necessary to monitor the areas closed as a landfill.

I-2b <u>Maintenance Plan</u> [40 CFR 264.118(b)(2); COMAR 26.13.05.07(2)(b)]

Deficiencies noted during inspections will be corrected by maintenance personnel to maintain the integrity of the site. Actions taken will be recorded. Telephone numbers for emergency notification and maintenance will be posted on site. Records of inspection and maintenance actions will be maintained in both the Maintenance Office and the Environmental Control Office. A discussion of the preventive and corrective procedures, as well as equipment required for the post-closure maintenance program, follows:

- Security - Signs will be replaced as they become illegible. Ground at the base of the fence will be regraded, as needed, to maintain a maximum gap of 12 inches. The fence will be replaced, as needed, to maintain adequate site security.

- Erosion - Washouts will be repaired whenever they are detected. If the cap integrity is in question, repair activities will be made immediately. Restoration of vegetative cover will be performed as needed.

- Cover Settlement - Settlement will be repaired by placing additional cover materials and vegetation on top of the existing cover.

- Vegetative Cover - Maintenance of the vegetative cover will include seeding, watering, and fertilizing, as needed. Tree or bush growth will be prevented. Mowing will be performed as necessary to control the growth of vegetative cover and to maintain it at a reasonable height above the cover.

- Runon and Runoff Control - Drains and ditches will be cleaned and maintained to allow free drainage so that retention of storm water does not occur. High-rate runoff areas will be protected by placing coarse stone, if needed, to ensure that erosion is minimal.

- Monitoring Wells - Any damage to monitoring wells will be repaired. If necessary, a damaged well will be replaced.

I-2c Post-Closure Security

The TTPs will be posted and secured, or entry will be monitored by a security guard.

I-2d Post-Closure Contact [40 CFR 264.118(b)(3); COMAR 26.13.05.07H(2)(c)]

Should post-closure care be required, the IHDIVNAVSURFWARCEN will assign a post-closure contact and will inform MDE or U.S. EPA.

I-3 NOTICES REQUIRED FOR DISPOSAL FACILITIES [40 CFR 264.115 and 40 CFR 264.119; COMAR 26.13.05.07F and COMAR 26.13.05.07I]

Because the TTPs are not disposal facilities, notation is not necessary in the deed informing potential purchasers of restrictions associated with a disposal site.

If, however, all hazardous waste or hazardous constituents cannot be removed from an OB unit(s) during closure, the post-closure notices required by COMAR 26.13.05.07F and .07I will be submitted to the MDE or U.S. EPA and to any other local zoning authority or authority with jurisdiction over land use according to the schedule specified in these regulations.

Within 60 days of completion of closure, the IHDIVNAVSURFWARCEN will submit certification that the units have been closed in accordance with the approved closure plan. The certification will be submitted to MDE or U.S. EPA by registered mail. The certification will be signed by the Commanding Officer and an independent, registered Professional Engineer. Documentation supporting the registered Professional Engineer's certification will be furnished to MDE or U.S. EPA upon request.

I-4 CLOSURE COST ESTIMATE [40 CFR 264.142 and COMAR 26.13.05.08]

As stated in 40 CFR 264.140(c), Federal government installations are exempt from the financial requirements of the hazardous waste regulations. Therefore, this requirement does not apply.

I-5 FINANCIAL ASSURANCE MECHANISM OF CLOSURE [40 CFR 264.143 and COMAR 26.13.05.08]

Federal government installations are exempt from the financial requirements of the hazardous waste regulations; therefore, this requirement does not apply.

I-6 POST-CLOSURE COST ESTIMATE [40 CFR 264.144 and COMAR 26.13.05.08]

Federal government installations are exempt from the financial requirements of the hazardous waste regulations; therefore, this requirement does not apply.

I-7 FINANCIAL ASSURANCE MECHANISM FOR POST-CLOSURE CARE [40 CFR 264.145 and COMAR 26.13.05.08]

Federal government installations are exempt from the financial requirements of the hazardous waste regulations; therefore, this requirement does not apply.

I-8 LIABILITY REQUIREMENTS [40 CFR 264.147 and COMAR 26.13.05.08]

Federal government installations are exempt from the financial requirements of the hazardous waste regulations; therefore, this requirement does not apply.

I-9 STATE MECHANISMS

This section is not applicable.

SECTION J

SOLID WASTE MANAGEMENT UNITS

J. SOLID WASTE MANAGEMENT UNITS

The Naval Surface Warfare Center Indian Head Division (IHDIVNAVSURFWARCEN) has identified 78 Solid Waste Management Units (SWMUs) and 13 Areas of Concern (AOCs). These units have been identified as having the potential for a release of hazardous constituents to the environment and are subject to the Remedial Investigation (RI) process. Table J-1 lists the SWMU areas and Table J-2 lists the AOC areas. Figure J-1 shows the locations of these sites at IHDIVNAVSURFWARCEN. Following is a brief description of each of these areas.

J-1 SOLID WASTE MANAGEMENT UNITS

Inactive Container Storage Unit (Figure J-1, Site 1)

This inactive, outdoor container storage unit consists of a concrete slab approximately 130 feet x 45 feet. The unit is RCRA-regulated and is closed. In the past, the wastes managed at this unit included organic and inorganic acids, flammable liquids, caustic liquids, solid oxidizers, and reactive metals. The container storage unit presently includes temporary storage for explosive scrap; product storage for chemicals including heptane, ethyl alcohol, and acetone; and several drums of waste cooking oil.

Active Container Storage Unit (Building 455) (Figure J-1, Site 2)

Building 455 is a RCRA-regulated container storage area. The brick building is composed of eight bays each approximately 25 feet x 100 feet. A concrete loading dock extends the length of both opposite sides of Building 455. The wastes managed at this unit include organic acids, inorganic acids, flammable liquids, lab packs, caustic liquids, solid oxidizers, and reactive metals. This facility is currently active.

PCB Storage Unit (Building 1440) (Figure J-1, Site 3)

The unit is a building constructed of steel-framed paneling on a concrete floor and is used for storage of equipment containing PCB-contaminated oil prior to offsite disposal. The dimensions of the unit are approximately 30 feet x 36 feet. This unit was designed for storage of a maximum of 12,000 gallons of PCBs. This is an active, RCRA-regulated unit.

TABLE J-1

SOLID WASTE MANAGEMENT UNITS (SWMUs)
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SWMU No.	Site Name	Current Status*
IHDIV-1	Inactive Container Storage Unit	Closed under RCRA
IHDIV-2	Active Container Storage Unit (Bldg. 455)	Active, RCRA permitted
IHDIV-3	PCB Storage (Bldg. 1440)	Active, RCRA permitted
IHDIV-4 & 5	Underground Storage Tanks at Transportation Department	Active
IHDIV-6	Used Battery Accumulation Area (Bldg. 290)	Active
IHDIV-7	Drain System and Sedimentation Trap at Biazzi Plant (Bldg. 766)	Active, NACIP
IHDIV-8	Drum Accumulation Area (Bldg. 766)	Active
IHDIV-9 & 10	Spent Acid Tanks at Biazzi Plant	Active
IHDIV-11	Town Gut Landfill	Inactive, NACIP
IHDIV-12	Paint Solvents Disposal Area (Bldg. 870)	Inactive, NACIP
IHDIV-13	Drum Accumulation Area (Bldg. 870)	Active
IHDIV-14	Waste Acid Disposal Pit	Inactive, NACIP
IHDIV-15	Fluorine Lab (Bldg. 502)	Active, NACIP
IHDIV-16	Bronson Road Landfill	Inactive, NACIP
IHDIV-17 & 18	Oil/Water Separator and Oil Storage Tank (Extrusion Plant)	Active
IHDIV-19	Strauss Avenue Thermal Treatment Point	Active, RCRA, interim status
IHDIV-20	Safety Burn Point	Inactive, RCRA, under closure
IHDIV-21	Caffee Road Thermal Treatment Point	Active
IHDIV-22	Slurry Mix Building Wastewater Discharge System (Bldg. 682)	Inactive, NACIP
IHDIV-23	Sewage Treatment Plant	Active
IHDIV-24	Spent Hexane/Acetone Accumulation Area (Extrusion Plant)	Active
IHDIV-25	Fly Ash Baghouse Facilities	Active
IHDIV-26	Trench Drain and Oil/Water Separator (Goddard Power Plant)	Active
IHDIV-27	Waste Oil Storage Area (Goddard Power Plant)	Active
IHDIV-28	Ash Precipitation System (Goddard Power Plant)	Active
IHDIV-29	Acid Neutralization Tank (Tank #1715, Goddard Power Plant)	Active
IHDIV-30, 31, & 32	Coal Storage Area Collection Sump	Active
IHDIV-33, 34, & 35	Wastewater Sump and Settling Tanks (Organic Chemical Plant)	Inactive
IHDIV-36	Radicator (Classified Paper Incinerator)	Active
IHDIV-37	Caffee Road Landfill	Inactive, NACIP
IHDIV-38	Caffee Road Waste Oil Storage Area	Active

TABLE J-1
SOLID WASTE MANAGEMENT UNITS (SWMUs)
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND
PAGE 2

SWMU No.	Site Name	Current Status*
IHDIV-39	Drum Storage Area (Bldg. 314)	Active
IHDIV-40, 41, 42, 43, 44, 45, & 46	Wastewater Collection/Treatment Tanks (Moser Plant)	Active
IHDIV-47, 48, 49, 50, & 51	Spent Acid Storage/Treatment Tanks (Moser Plant)	Active
IHDIV-52	Nitroglycerin Slums Storage Building (Bldg. 891)	Active
IHDIV-53 & 54	Spent Fixer Storage Tanks (Bldg. 266)	Active
IHDIV-55	Spent Fixer Storage Tank (Bldg. 731)	Active, NACIP
IHDIV-56	Spent Fixer Storage Tank (Bldg. 1140)	Active, NACIP
IHDIV-57	Asbestos Storage Building (Bldg. 296)	Active
IHDIV-58 & 59	Asbestos Storage Dumpsters	Active
IHDIV-60	Accumulation Area(s) for Laboratory Wastes (Bldg. 600)	Active, NACIP
IHDIV-61	Building 588 Area	Active, NACIP
IHDIV-62	Thermal Destructor 1	Inactive, NACIP
IHDIV-63	Thermal Destructor 2	Inactive, NACIP
IHDIV-64, 65, & 66	Wastewater Storage Tanks (Bldg. 1596)	Inactive
IHDIV-67	Temporary Waste Accumulation Areas	Active
IHDIV-68	Wastewater Catch Basins and Tanks	Active, NACIP
IHDIV-69	Temporary Accumulation Dumpsters for Explosive Scrap	Inactive
IHDIV-70	Temporary Accumulation Areas for Drummed Explosive Scrap	Inactive
IHDIV-71	Accumulation Dumpsters for Metal Scrap	Active
IHDIV-72	Oil/Water Separators	Active
IHDIV-73	Refuse Collection Dumpsters	Active
IHDIV-74	Unlined Overland Drainage Ditches	Active
IHDIV-75	Torrense Road	Inactive, NACIP
IHDIV-76	Lloyd Road Oil Spill Site	Inactive, NACIP
IHDIV-77	NG Slums Burning Site (Greenslade Road)	Inactive, NACIP
IHDIV-78	Temporary Solvent Storage at Organic Chemical Plant	Active

* Active - Indicates the unit continues to actively manage wastes.
Inactive - Indicates the unit no longer actively manages wastes.
RCRA - The unit is either permitted under RCRA or operates under RCRA interim status, as noted.
NACIP - The unit or area was a subject in the Initial Assessment Study conducted under Navy Assessment and Control of Installation Pollutants (NACIP) program.

Source: Phase II RCRA Facility Assessment of the Naval Ordnance Station , Indian Head, Maryland, August 1988.

TABLE J-2

AREAS OF CONCERN (AOC)
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

Area	Site Name	Current Status*
A-1	Patterson Avenue Oil Spill Site	Inactive, NACIP
A-2	Nitration Building (Bldg. 675)	Inactive, NACIP
A-3	Single Base Propellant Grains Spill Area	Inactive, NACIP
A-4	Coal Storage Area	Active
A-5	Thorium Spill Area (Bldg. 900)	Inactive, NACIP
A-6	Valley Firing Range	Active
A-7	Sand Blasting Sand Storage Area	Active
A-8	Drum at Fuel Storage Area	Active
A-9	Storage Building at Machine Shop	Active
A-10	Ballistic Test Areas	Active
A-11	Abandoned Drain Lines at Nitrocellulose Production Facilities	Inactive, NACIP
A-12	Fuel Oil Tank Secondary Containment Area (Goddard Power Plant)	Active
A-13	Disposed Metal Parts Along Mattawoman Creek	Active

* Active - Indicates the unit continues to actively manage wastes.
Inactive - Indicates the unit no longer actively manages wastes.
RCRA - The unit is either permitted under RCRA or operates under RCRA interim status, as noted.
NACIP - The unit or area was a subject in the Initial Assessment Study conducted under Navy Assessment and Control of Installation Pollutants (NACIP) program.

Source: Phase II RCRA Facility Assessment of the Naval Ordnance Station Indian Head, Maryland, August 1988

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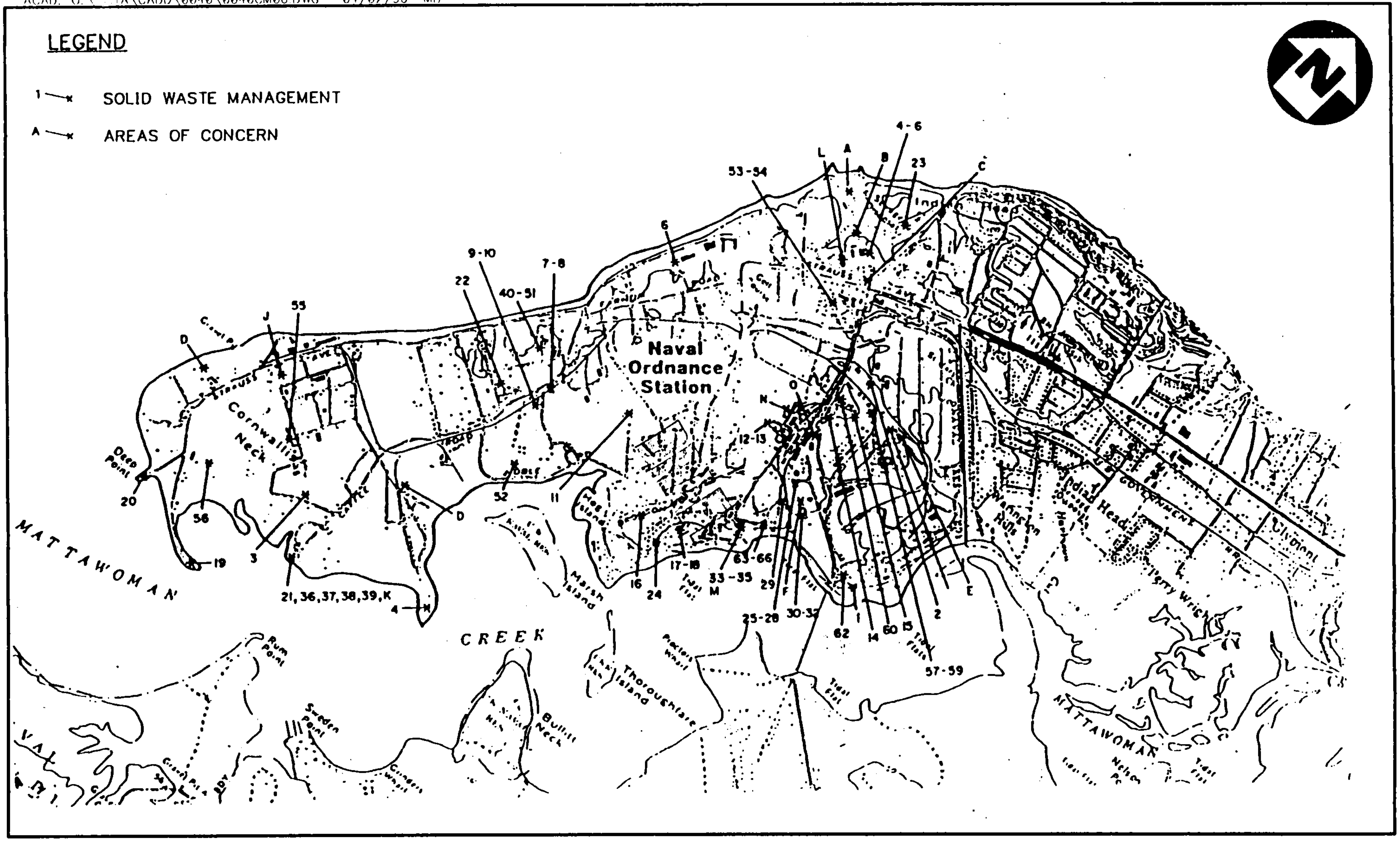

FIGURE J–1

LOCATION MAP

INDIAN HEAD, MARYLAND

0 1 2

SCALE IN MILES

Brown & Root Environmental

Date: April 5, 1996

Underground Storage Tanks at Transportation Department (Figure J-1, Sites 4 & 5)

These units consist of one 550-gallon underground storage tank (SWMU No. 4) behind the automotive shop (Building 290), and a second 1,000-gallon underground storage tank (SWMU No. 5) behind the heavy equipment shop (Building 525). The wastes managed at this unit include waste oils from the transportation equipment maintenance branch. Waste oil from equipment maintenance is placed in a basin approximately 36 inches by 18 inches by 12 inches deep inside the shops. This area is currently active.

Used Battery Accumulation Area (Building 290) (Figure J-1, Site 6)

The Transportation Department automotive shop (Building 290) uses an area outside the building for accumulation of used batteries. The batteries are stored on wooden pallets over a concrete driveway. The area is uncovered and measures approximately 6 feet wide by 10 feet long.

The unit is active.

Drain System and Sedimentation Trap at the Biazzi Plant (Building 766) (Figure J-1, Site 7)

This is the location of the Biazzi Plant, Nitroglycerine (NG) Plant Office (Building 766), constructed in 1953. Wastewater, originating from two sinks inside the laboratory building, was discharged through the laboratory plumbing, which drained to a manhole located outside the building. The manhole then emptied into a 3,200 foot ditch which flowed to Mattawoman Creek at NPDES outfall IW 31.

Presently, waste mercury generated at this unit is stored in a drum at the drum accumulation area (SWMU No. 8) outside the laboratory (Building 766) prior to transport to Building 455 (SWMU No. 2), where it is stored before offsite shipment. A recent study estimated that 60 to 100 pounds of mercury were deposited in the drainage ditch and estuary. Additional wastes managed at this unit include suspended solids, oil, and grease. These wastes are discharged under an National Pollutant Discharge Elimination System (NPDES) permit. The unit is active.

Drum Accumulation Area (Building 766) (Figure J-1, Site 8)

The laboratory in Building 766 of the Biazzi Plant uses a drum accumulation area for temporary storage of drummed waste. The accumulation area is approximately 6 feet wide by 6 feet long. It is located under a roof on a concrete pad. The waste is primarily contaminated with mercury and nitrated esters such as nitroglycerine. The unit is active.

Spent Acid Storage Tanks at the Biazzi Plant (Figure J-1, Sites 9 & 10)

SWMUs No. 9 and No. 10 are two aboveground tanks for storage of spent acid at the Biazzi Plant. The tanks are located outdoors over a concrete pad. The pad is constructed with curbs approximately 12 inches high. Each tank has a capacity of approximately 15,000 gallons or 140,000 pounds of spent acid. The tanks contain a sulfuric acid and water mixture generated in the production of NG. The spent acid storage tanks are active units.

Town Gut Landfill (Figure J-1, Site 11)

This site is the location of a landfill that includes two unlined plots, 1.5 and 1.8 acres in size, divided by an asphalt road (the new Atkins Road Extension). The total fill area is estimated to be approximately 1 acre.

The wastes managed at this unit include landscaping waste, fill material, rubble, paint and varnishes (approximately 1,000 gallons), chemical waste, demolition waste, and arsenic waste (Ref. 1). This unit is inactive.

Paint Solvents Disposal Area (Navy Assessment and Control of Installation Pollutants [NACIP] Site No. 13) (Figure J-1, Site 12)

This is the site of the Paint Shop (Building 870), which was constructed in 1953. According to Reference 1, between 1953 and 1979, approximately 115 gallons per year of kerosene, mineral spirits, lacquer thinners, and solvents may have been deposited in a 200-square-foot depressed area, approximately 2 feet below grade, located 50 feet behind the Paint Shop. It is also estimated that approximately 1 percent of the 3,380 gallons of paint used annually which may have been washed off during paint equipment cleaning operations were placed over bare soil areas behind Building 870. Waste oil and paint from Building 870 are presently stored on a concrete pad. This area is inactive.

Drum Accumulation Area (Building 870) (Figure J-1, Site 13)

The unit is a 12 foot by 14 foot concrete slab located approximately 20 feet behind Building 870.

This unit is used for the management of waste paints, gasoline, kerosene, solvents, lacquers and thinners from Building 870. Wastes are collected in drums for offsite disposal. This is an active RCRA unit.

Waste Acid Disposal Pit (Figure J-1, Site 14)

This unit is a former chemical disposal pit located 50 feet northeast of the Solvent Storehouse (Building 881) and 75 feet northwest of the Test Paper Manufacturing Building (Building 444). Facility personnel defined a brick and concrete manhole over a concrete pit as the former waste acid disposal pit. The wastes managed at this unit included undetermined quantities of waste acids and chemicals. This unit is inactive.

Fluorine Laboratory (Building 502) (Figure J-1, Site 15)

This site is the location of the Fluorine Laboratory (Building 502), constructed in 1942. Building 502 houses a laboratory to develop, provide, and analyze bench-scale quantities of experimental chemicals and fuels.

In addition, the Fluorine Laboratory maintains an area for temporary accumulation of explosive scrap and various hazardous wastes generated during laboratory projects. Personnel from Building 502 stated that the waste materials generated from the laboratories are stored on site for transport to either the burn point (SWMU No. 19) or container storage unit (SWMU No. 2).

An estimated 4,600 gallons of wastewater was discharged from this unit weekly. The wastewater contained mercury, lead, oil, and grease. Building 502 currently generates 3 to 6 gallons of waste per day, including 1,5-diazido-3-nitraza-pentane, ethyl acetate, and acetone. The waste explosives and propellants are usually stored in a 1-gallon plastic bottle prior to transportation to the burn point (SWMU No. 19). Waste solvents are transported for storage at Building 455 (SWMU No. 2). Wastewater generated in the building is presently neutralized prior to discharge to NPDES permitted outfall. This is an active unit.

It is estimated that less than 1 pound of mercury and approximately 64 pounds of lead have been discharged during the operating life (over 40 years) of the unit to date.

Bronson Road Landfill (Figure J-1, Site 16)

This inactive landfill is located in a 2-acre abandoned gravel mining pit near the terminus of Bronson Road, approximately 500 feet from the Mattawoman Creek. The site is surrounded by 20-foot cliffs on three sides. This site was filled using trench excavation methods and is estimated to contain approximately 1,500 tons of trash and various quantities of paint sludges, asbestos, and barium sulfate. The wastes managed at this unit include solid waste, primarily asbestos, paint sludge, possibly zinc and lead, and nonchlorinated solvents. Facility personnel were uncertain as to the reported presence of barium sludge. This site is currently inactive.

Drainage System Oil Water Separator and Oil Storage Tank (Extrusion Plant) (Figure J-1, Sites 17 & 18)

This site is the location of six buildings, referred to as the Press Line (Building 560 through 566), constructed in 1943. In 1981, an oil/water separator was installed. The oil/water separator is constructed of concrete and is partially below grade. It measures approximately 10 feet long by 6 feet wide by 6 feet deep. The waste managed at this unit is waste collection from wastewater generated by the Extrusion Plant. The extrusion plant is an active unit. Three new separators have been installed. Two of the separators handle explosively contaminated waters and one handles nonexplosively contaminated water from the press line.

Strauss Avenue Thermal Treatment Point (SAATP) (Figure J-1, Site 19)

The SATTP, also referred to as the Cast Plant Burn Point, is one of three thermal treatment OB areas located at the installation. The SATTP is used for thermal destruction of explosive scrap and propellant generated throughout the Station. The burn point is located on the end of a peninsula that extends into Mattawoman Creek. It is an area of bare ground approximately three/fourths of an acre in size where the waste is collected and "thermally treated."

The waste is highly reactive and flammable. This is an active unit.

Safety Burn Point (Figure J-1, Site 20)

The Safety Burn Point is a formerly used Thermal Treatment OB area which operated similarly to the Cast Plant Burn Point (SWMU No. 19). The Safety Burn Point is located west of the Cast Plant Burn Point on a small peninsula extending into the Potomac River. The unit is undergoing closure.

Caffee Road Thermal Treatment Point (CRTTP) (Figure J-1, Site 21)

The CRTTP is a thermal treatment open burn area for decontamination of scrap metal potentially contaminated with explosive. The unit lies at the end of Caffee Road on top of the inactive Caffee Road Landfill (SWMU No. 37) and approximately 200 yards from Mattawoman Creek.

This unit is used for the thermal treatment of solids, including wood and metal contaminated with explosives. The contaminated material is burned with waste oil to aid combustion. Thermally treated material is periodically collected and sold as scrap. This is an active burn point.

Slurry Mix Building Wastewater Discharge System (Building 682) (Figure J-1, Site 22)

This site is the location of the Slurry Mix Building (Building 682) constructed in 1948. Facility processing procedures included dewatering HMX ($C_4H_8N_8O_8$), which was purchased in a slurry form and dewatered in an eductor vacuum filter.

Contaminants known to be in the eductor wastewater included phthalate esters, nitrate esters, amines, lead, oil, and grease, as well as HMX. HMX is similar to cyclonite (RDX) in chemical and physical properties. Both are major components of plastic explosives. The major hazard associated with HMX is its explosive characteristics. This area is currently inactive.

Sewage Treatment Plant (Figure J-1, Site 23)

The Sewage Treatment Plant consists of primary and secondary clarification, anaerobic digestion, and activated sludge. Sludge from the digester and settling tanks, and oil, grease, and grit from the grit chambers are treated with a polymer and dried in sludge-drying beds.

This unit manages all domestic sewage for the IHDIVNAVSURFWARCEN. The effluent from the sewage treatment plant is discharged to a ditch that feeds into the Potomac River. Sludge from the drying beds is accumulated in dumpsters for offsite disposal. This is an active unit.

In addition, small quantities of hazardous wastes, for example, wastes from laboratory procedures, are discharged to the sewage treatment plant.

Spent Hexane/Acetone Accumulation Area (Extrusion Plant) (Figure J-1, Site 24)

This unit is a temporary accumulation area for spent hexane and acetone from the Extrusion Plant. Storage in the unit is either in drums or a tank, estimated at 1,000 gallons. The unit is constructed of concrete with a floor and 2-foot-high containment walls. It is constructed with two containment areas: one for the tank, and the other for storage of drums. The unit measures approximately 30 feet long by 25 feet wide. The unit is active.

Fly Ash Baghouse (Goddard Power Plant) (Figure J-1, Site 25)

The Power Generation Branch supplies power to IHDIVNAVSURFWARCEN. The Goddard Power plant (Building 873) was built in 1957. This plant has three boilers, each of which is rated at 150,000 pounds/hour. In addition, two steam-operated 5,000-kilowatt generators produce electricity, one on a continuous basis.

Wastes managed at the unit include coal dust, fly ash, and bottom ash. These waste materials commonly contain heavy metals. This is an active unit.

Trench Drain and Oil/Water Separator at Goddard Power Plant (Figure J-1, Site 26)

This unit is located outside the Goddard Power Plant at the fly ash loading unit (SWMU No. 25) and includes a concrete trench drain with metal grating and two concrete oil/water separator tanks. The drain and separators are used to collect oily runoff from the immediate area around the fly ash collection and loading unit. The two oil/water separators have capacities of approximately 200 gallons each. The oil is separated from the water using a series of weirs and gravity separation. The waste oil from the separators are pumped to drum and disposed off site. This is an active unit.

Waste Oil Storage Area (Goddard Power Plant) (Figure J-1, Site 27)

This unit is located at the fuel oil storage area at Goddard Power Plant. The area is approximately 150 feet by 50 feet wide and includes metal drums of waste oil sitting on the soil surface.

The waste oil is taken to Building 938 for recycling. This unit is active.

Ash Precipitator System at Goddard Power Plant (Figure J-1, Site 28)

The Goddard Power Plant operates an ash handling system to control the quantity of fly ash released into the atmosphere in conjunction with the burning of coal for the generation of electricity. The ash handling system has a capacity of 10 tons per hour of bottom ash and 15 tons per hour of fly ash. The ash handling system includes a primary precipitator to control the release of large particulate, and an electrostatic precipitator that is used to control the release of fine ash. Ash from the precipitators is transported to a 200-ton-capacity storage silo (SWMU No. 25).

The ash commonly contains heavy metals; however, no analysis was available on this material. The ash precipitator at the power house is an active unit.

Acid Neutralization Tank (Tank No. 1715, Goddard Power Plant) (Figure J-1, Site 29)

The Acid Neutralization Tank, Tank No. 1715, is located at the Goddard Power Plant. The tank is used for neutralization of wastewater, which contains sulfuric acid from the power plant. Following neutralization, the wastewater is discharged through an NPDES outfall. The tank is located outdoors and is constructed of steel. The volume of the tank was estimated to be 100,000 gallons. The unit is active.

Coal Storage Area Collection Sump and Neutralization Pits (Figure J-1, Sites 30, 31, & 32)

Runoff from the coal storage area (AOC F) is managed by a system of collection and treatment units, including a collection sump (SWMU No. 30), a holding pit (SWMU No. 31), and a neutralization pit (SWMU No. 32). The collection sump is constructed of concrete, and the sump directs runoff from the storage area to the holding pit. Periodically, runoff from the holding pit is transferred to the neutralization pit, where caustic soda is used to raise the pH of the runoff. The neutralized water is then discharged to an NPDES outfall. Sludge from the neutralization pit is removed from the pit and disposed off site in West Virginia. The holding and neutralization pits measure approximately 75 feet by 50 feet and are lined with a synthetic liner and stone riprap. This unit is active.

Wastewater Sump and Settling Tanks (Building 497) (Figure J-1, Sites 33, 34, & 35)

These wastewater handling units are located in Building 497, the Organic Chemical Plant. The primary product of the plant is nitroguanidine.

The sump is constructed of concrete, covered, and is located inside the chemical plant. The tanks are constructed of steel on a concrete base, are uncovered, and are located outdoors. The tanks were estimated to be 5,000 gallons each.

The wastewater contains solid particles of both nitroguanidine and methylcellulose. The plant and these units are presently inactive.

<u>Radicator (Classified Paper Incinerator)</u> (Figure J-1, Site 36)

The Radicator is an incinerator used for destruction of classified paper materials at the IHDIVNAVSURFWARCEN. The unit is located outdoors at the end of Caffee Road. It is constructed of steel and measures approximately 20 feet long x 10 feet wide.

The unit is presently active.

<u>Caffee Road Landfill</u> (NACIP Site No. 37)

The Caffee Road Landfill is situated at the end of Caffee Road, extending from approximately 200 yards southwest of the end of the road to the edge of the unnamed creek that enters Mattawoman Creek.

This unit was used for the disposal of bulk metallic items and trash, rocket motor casings, exploded building debris, rifles, demilitarized ordnance, propellant grains residue, and open burning residues (e.g., from burn points such as SWMUs No. 19 and No. 20). The surface above the landfill is now used as the Decontamination Burn Point (SWMU No. 21) and a large collection of flashed metal parts is located atop the unit. The metal parts are periodically removed for sale by an offsite contractor. This unit is inactive.

<u>Caffee Road Waste Oil Storage Area</u> (Figure J-1, Site 38)

The unit was used for storage of waste oil from vehicles and machinery in drums. The oil was used to start and maintain the fire at the Caffee Road Decontamination Burn Point (SWMU No. 21). This practice no longer takes place. This unit is active.

<u>Drum Storage Area (Building 314)</u> (Figure J-1, Site 39)

Building 314 is the carpenter shop located in the Public Works area of the facility. A collection of drums was observed behind the shop. The uncovered gravel area, which measured approximately 10 feet by

10 feet, included approximately six drums, two of which were partially full. The contents of the drums were not known by the IHDIVNAVSURFWARCEN representatives. This area is active.

Wastewater Collection/Treatment Tanks (Moser Plant) (Figure J-1, Sites 40, 41, 42, 43, 44, 45, & 46)

These seven units are used for the collection and treatment of wastewater generated from the production of nitrated esters (e.g., nitroglycerin, nitrocellulose) at the Moser plant. The wastewater contains concentrations of explosive residue from the production process and may be slightly acidic. The tanks are used to collect the wastewater, settle the explosive residue, and neutralize the acidity, if necessary. The tanks include two 300-gallon tanks, one 1,000-gallon tank, and one 200-gallon tank. The tanks were all constructed of steel, located on concrete floors, and are covered. According to the IHDIVNAVSURFWARCEN representative, three additional tanks of the same design and construction are located in the process area.

The settled explosive residue from the wastewater is absorbed onto wood chips and burned at the Strauss Avenue Thermal Treatment Point (SWMU No. 19). The water is discharged to an NPDES outfall after settling. The units are active.

Spent Acid Storage/Treatment Tanks (Moser Plant) (Figure J-1, Sites 47, 48, 49, 50, & 51)

These five units are used for the collection and treatment of spent acid generated during production of nitrated esters at the Moser Plant. The tanks include three spent acid tanks, including one 150-gallon and two 250-gallon tanks, one 200-gallon slum recovery tank, and one 6,000-gallon neutralization tank (divided into two compartments). The tanks are constructed of steel, located indoors, and are covered. The level in the tanks is controlled by batch flow to the units. The wastewater from neutralization is discharged to an NPDES outfall. The IHDIVNAVSURFWARCEN representative stated that no sludge was generated by the neutralization process. The units are active.

Nitroglycerin Slums Storage Building (Building 891) (Figure J-1, Site 52)

The Nitroglycerin Slums Storage Building (Building 891) is used for storage of nitroglycerin residue collected during manufacture of the product. Nitroglycerin that is wasted during the production process is absorbed into wood chips and collected in plastic bags, which are then placed in covered containers. The wood chips contaminated with nitroglycerin are also known as "slums." The building measures approximately 8 feet x 10 feet and is constructed of concrete and block. The unit is active.

Spent Fixer Storage Tanks (Building 266) (Figure J-1, Sites 53 & 54)

Building 266 is a storehouse commonly known at the installation as the "Soda Shed." The building houses two tanks, which are used for storage of spent photographic developing fixer generated from photographic and X-ray operations (SWMUs #55 and #56). The spent fixer is stored in the 500- and 100-gallon tanks prior to and following recovery of silver by an electrolytic recovery process. The most significant constituent in the spent fixer is silver, but it may also contain sodium thiosulfate and hydroquinone. The open-topped tanks are constructed of polyurethane and are located inside the building. The floor of the room that houses the tanks is concrete, coated with rubber. The units are active.

Spent Fixer Storage Tank (Building 731) (Figure J-1, Site 55)

This is the site of the Grain Manufacture and X-ray Building (Building 731), constructed in 1953. The spent fixer and developer is stored in a 500-gallon polyurethane tank located at the rear of the building. Waste managed at this unit is spent photographic fixer and developer which contains compounds such as hydroquinone, sodium thiosulfate and silver. The covered tank is located outside on bare soil. The spent fixer is collected weekly and transported to Building 266 (SWMUs No. 53 and No. 54), where silver is recovered from the spent solution. The storage tank is active.

Spent Fixer Storage Tank (Building 1140) (Figure J-1, Site 56)

Building 1140 is the location of the control building for the Radiographic Facility Accelerator. Spent photographic solutions are discharged to a 200-gallon polyurethane tank located outside the building. The tank is covered and rests on bare soil. The wastes managed at this unit include spent photographic developer and fixer, which contains hydroquinone, sodium thiosulfate, and silver. The storage tank is active.

Asbestos Storage Building (Building 296) (Figure J-1, Site 57)

Building 296 was previously a process building in the plant that manufactured single-based propellants. This product is no longer produced, and buildings in the plant area are vacant. Building 296 is a temporary storage point for asbestos collected throughout the Installation. Asbestos is generated from remodeling activities at the Station primarily from removal of old pipe and building insulation. The asbestos is stored in plastic bags inside the building prior to offsite disposal. The building occupies approximately 5,084 square feet and is constructed of concrete and brick. This area is currently active.

Asbestos Storage Dumpsters (Figure J-1, Sites 58 & 59)

Two dumpsters for storage of asbestos are located outside Building 296. The dumpsters are covered, located on soil, and are constructed of steel. The volume of each dumpster is approximately 80 cubic feet. The dumpsters are moved to building locations where asbestos is being removed and are used as temporary receptacles for asbestos storage bags. The bags are subsequently stored in Building 298 (SWMU No. 57) prior to offsite disposal. The units are active.

Accumulation Area(s) for Laboratory Wastes (Building 600) (Figure J-1, Site 60)

This is the location of the Research and Development Building (Building 600), which contains chemical research laboratories among other division offices. Reportedly, waste chemicals were disposed into the plumbing system, where they combined with sanitary sewage and flowed to the IHDIVNAVSURFWARCEN sewage treatment plant.

The wastes managed at this unit(s) are laboratory wastes, including hydrochloric and sulfuric acid, dimethylamine, acrylonitrile, chlorine, methyl chloride, chloroform, carbon tetrachloride, acetaldehyde, dioxane, cyclohexane, dimethyl formamide, toluene, pyridine, and butyl acetate.

Analysis of the wastewater detected amines (RNH_3), metals (cadmium, lead, zinc, copper, mercury, silver), cyanides, nitrate esters (RNO_3), trichlorethylene (TCE), and methylene chloride. Mercury, zinc, and silver were also found to be present in low concentrations.

The building and the waste storage areas in the laboratories are active.

Building 588 Area (Figure J-1, Site 61)

This site is the location of the Rocket Motor Loading Building (Bldg. 588), constructed in 1944, which formerly contained facilities used for X-ray film developing. Building 588 is also presently the location of a temporary waste accumulation area. The area is a concrete pad located adjacent to the building for storage of drummed wastes. The drummed wastes are collected and transported by IHDIVNAVSURFWARCEN personnel to the Container Storage Unit (SWMU No. 2).

Spent photographic solution includes sodium thiosulfate, hydroquinone, and silver. The drums managed at the temporary accumulation pad typically contain solvents. Discharge of the spent photographic solution ceased in approximately 1964. The temporary storage pad is active.

Thermal Destructor 1 (Figure J-1, Site 62)

Thermal Destructor 1 is located at Building 1584. This unit is a propane-fired incinerator that burned 1.3 million pounds per year of hydrazine-contaminated water from 1976 to 1979. This unit is located outdoors and was constructed on a concrete slab resting on clay soil. It is situated on a flat terrain approximately 400 feet from the banks of the Mattawoman Creek. The unit is inactive.

Thermal Destructor 2 (Figure J-1, Site 63)

Thermal Destructor 2, also known as the Prenco unit, is located at Building 1595. The Thermal Destructor is a propane-fired incinerator that burned 1.3 million pounds per year of water contaminated with hydrazine fuel. This facility operated from 1976 until 1978. This unit was constructed on a concrete slab resting on clay soil. It is situated on flat terrain approximately 500 feet from the bank of the Mattawoman Creek. A small tributary to the creek is located adjacent to the unit, approximately 50 feet downslope. This unit is inactive.

Wastewater Storage Tanks (Building 1596) (Figure J-1, Sites 64, 65, & 66)

The Wastewater Storage Tanks located in Building 1596 were used for storage of water contaminated with hydrazine fuel. The water was incinerated in Thermal Destructor 2 (SWMU No. 63). The tanks are located indoors over concrete flooring. They are constructed of polyurethane and are approximately 10,000-gallon capacity each. The units are presently inactive.

Temporary Waste Accumulation Areas (Figure J-1, Site 67)

The IHDIVNAVSURFWARCEN uses a number of temporary waste accumulation areas throughout the facility. A typical unit is constructed of concrete, measures approximately 10 feet by 10 feet, and is not covered. The areas are used for the temporary accumulation of wastes, typically in drums or storage containers, prior to collection, and transported to other waste management units (e.g., SWMUs #2 and #19). The exact number of this type of units was not known by the IHDIVNAVSURFWARCEN representative; however, given the size and number of process areas generating wastes at the facility, the number is estimated to be approximately 50 units. The units are used for storage periods of less than 90 days, and according to the IHDIVNAVSURFWARCEN representative, wastes are usually collected from the units on a weekly basis. Various waste streams are managed at the units including waste solvents, paints, metals, and explosive wastes. The units are presently active.

Wastewater Catch Basins and Tanks (Figure J-1, Site 68)

Several process buildings at IHDIVNAVSURFWARCEN use catch basins and tanks for detention and settling of wastewater generated at the plant. The catch basins are commonly covered concrete tanks that are partially below ground. A representative catch basin measures 6 feet long by 6 feet wide by 10 feet deep. Wastewater flows through the catch basin where solids, generally explosive residues or chips, settle out. The water phase is discharged to an NPDES outfall, and the settled residues are periodically collected and handled as explosive wastes. The wastes managed at this unit include wastewater-contaminated explosive residues. The units are active.

Temporary Accumulation Dumpsters for Explosive Scrap (Figure J-1, Site 69)

The IHDIVNAVSURFWARCEN uses metal dumpsters for collection of explosive scrap from manufacturing and associated operations throughout the Station. According to the IHDIVNAVSURFWARCEN representative, there are approximately 50 to 60 dumpsters. The dumpsters are color coded (blue or yellow) for use only as storage for explosive scrap. They are constructed of metal, measure approximately 6 feet long by 4 feet wide by 4 feet deep, and are typically located over concrete or asphalt. The explosive scrap contained in a water bath is in the dumpster. According to IHDIVNAVSURFWARCEN personnel, water must be present in the dumpsters for safety reasons (i.e., dry propellant scrap is an explosive hazard). When filled, the dumpster is transported to the burn point (SWMU No. 19), where the water is filtered and discharged through an NPDES outfall and the filtered explosive scrap burned at the burn point. The units are inactive.

Temporary Accumulation Buildings for Drummed Explosive Scrap (Figure J-1, Site 70)

The IHDIVNAVSURFWARCEN has 51 storage buildings for accumulation of explosive scrap in metal cans. The storage locations are wooden sheds, all of similar design, constructed over concrete pads. The buildings typically measure approximately 6 feet by 6 feet and are covered. The metal cans (commonly called "G.I. cans") are about 30 gallons in size and are color coded blue or yellow for use only as storage for explosive scrap. Explosive liquid scrap is typically absorbed onto wood chips and collected in nonconductive rubber bags, placed in the metal cans, and stored in the accumulation area. The IHDIVNAVSURFWARCEN representative stated that the cans were removed to the burn point (SWMU No. 19) daily for safety reasons. The units are active.

Accumulation Dumpsters for Metal Scrap (Figure J-1, Site 71)

The IHDIVNAVSURFWARCEN uses metal dumpsters for storage of scrap metal generated at the facility. These dumpsters are primarily located at public works and machine shops on-Station. The exact number of dumpsters used for this purpose is unknown. The metal in the dumpsters is periodically collected for sale off the Station.

There is no evidence to indicate that hazardous wastes or constituents are present in the metal scraps. The units are active.

Oil/Water Separators (Figure J-1, Site 72)

Several wastewater discharge lines at the IHDIVNAVSURFWARCEN include an oil/water separator for removal of floating oil from the wastewater prior to discharge through an NPDES outfall. The total number of oil/water separators is not certain; however, the Industrial Wastewater Treatment Study lists at least 15 separators associated with various buildings and process lines. It is anticipated that additional separators exist. The units are typically constructed of concrete and are generally covered with a metal lid.

The unit separates floating oil from wastewater generated by various process areas on the Station. Waste oil is collected at the units and either used on site or disposed of off site. The units are generally active.

Refuse Collection Dumpsters (Figure J-1, Site 73)

The IHDIVNAVSURFWARCEN uses a total of 154 dumpsters for collection of general refuse generated on-Station. The dumpsters are color coded green, which designates general refuse. The dumpsters are constructed of steel, have closeable tops, and measure approximately 6 feet long by 4 feet wide by 4 feet deep.

Refuse collected in the dumpsters includes spent paint filters which may contain heavy metals from paint booths at the Station. The Station was issued a permit from Charles County, Maryland, allowing disposal of the filters in the county landfill. The dumpsters are active.

Unlined Overland Drainage Ditches (Figure J-1, Site 74)

This unit consists of the unlined overland drainage ditches used throughout the facility. Many of the wastewater from process areas on IHDIVNAVSURFWARCEN are carried in unlined ditches to the point of discharge (NPDES outfall) into either Mattawoman Creek or the Potomac River. Facility representatives stated that the ditches were used for both treated (e.g., neutralized or settled) and untreated wastewaters from manufacturing and process area operations (e.g., equipment/building washdowns). The quality and quantity of wastewater varies with each plant and the product it is producing. The ditches are active.

Torrense Road (Figure J-1, Site 75)

Waste oil was reportedly applied to Torrense Road, which is located on the northern end of the Indian Head peninsula. Torrense Road is a 20-foot-wide, gravel road bisecting the Old Navy Proving Ground. Prior to 1965, waste oil from IHDIVNAVSURFWARCEN Transportation Branch Buildings was reportedly applied to unpaved roads behind Building 290 (Public Works Department Maintenance Garage) for dust control. Waste oils from these facilities were generated at a rate of approximately 7,700 gallons annually and consisted of crankcase, hydraulic, transmission, and motor oils. This site is inactive.

Lloyd Road Oil Spill Site

This site consists of a series of oil spills primarily occurring near Lloyd Road in the vicinity of the Public Works Department maintenance garage area, Building 290. Waste oil from the Public Works maintenance operations was deposited in a dumpster until early 1981. Waste oil consisted of fuel oil, motor oil, and kerosene. These waste oils overflowed the dumpster on two or three occasions, and the total amount of spillage is estimated at between 50 and 100 gallons. This site is inactive.

NG Slums Burning Site (Greenslade Road)

This area is the location of the former NG Burning Site, a 50-foot-wide strip along the shoreline of the Greenslade Road Peninsula surrounded by Mattawoman Creek. The 1/2-acre, 400-foot strip of land was reportedly used as a burning ground for NG slums generated by the nitroglycerin plant. The site is inactive.

Temporary Solvent Storage at Organic Chemical Plant (Building 497) (Figure J-1, Site 78)

During inspection of the Organic Chemical Plant (Building 497), it was observed that a collection of drums was being stored inside the building. There were approximately six drums in the building, and they were labeled as solvents. The building is presently inactive and undergoing minor construction modifications. The IHDIVNAVSURFWARCEN representatives stated that the waste was being generated during the building modifications and that the drums were being temporarily stored at that location pending transportation to the active container storage unit (SWMU No. 2). This area is currently active.

J-2 AREAS OF CONCERN

Patterson Avenue Oil Spill Site (Figure J-1, Site A)

This site is reported to be the location of an oil spill from an oil tanker truck. Approximately 10,000 gallons of an unspecified fuel oil were spilled when the vehicle overturned in front of Building 320, in approximately 1958. IHDIVNAVSURFWARCEN cleanup efforts recovered an unknown amount of the spilled oil. It is unknown how cleanup of the spill was confirmed. A site inspection conducted in 1981 did not indicate any signs of spillage or vegetation stress in this area. During the Visual Site Inspection (VSI), no remaining signs of release in the area were observed. This site is active.

Nitration Building Area (Building 675) (Figure J-1, Site B)

The former Nitration Building was the site of a nitroglycerin explosion, which demolished the building during NG production in September 1971. During the VSI, IHDIVNAVSURFWARCEN representatives stated all explosive residuals were decontaminated either explosively (i.e., by detonation) or by burning. All demolition material and debris were buried at the end of the Caffee Road Landfill (SWMU No. 37).

The area is now the location of four magazines used for storage of ordnance. The area has been reclaimed, and there are presently no signs of release or disturbance. This site is inactive.

Single-Base Propellant Grains Spill Area (Figure J-1, Site C)

This is the location of a 14-acre area near the single-base powder production area in the vicinity of the Powder Dry Houses. Team site reconnaissance, conducted in 1982, indicated the presence of nitrocellulose propellant grain contamination probably originating from spillage during transportation of the finished product. The report indicated that the propellant grains were present only in small quantities, and do not endanger the water supply, biological receptors, or humans given that nitrocellulose is insoluble in water and nontoxic. Visual inspection found no signs of released or spilled material in the area. The production area is no longer active and, according to IHDIVNAVSURFWARCEN representatives, the buildings have been "mothballed." This site is inactive.

Coal Storage Area (Figure J-1, Site D)

This area is located southeast of the Power Plant and is the storage area for coal used to fire the plant. The Coal Storage Area is an area approximately 1 acre in size where coal is stored on bare ground. Surface drainage from the area is directed by ground contour to collection and treatment structures (SWMUs Nos. 30, 31, and 32). Visual inspection showed the coal to be contained within the area and runoff to be contained within the runoff control and containment units. This area is active.

Thorium Spill Area (Building 900, Site E)

Building 900 is operated by the Naval School, Explosive Ordnance Disposal. The mission of the school is instruction to military personnel on the disposal (e.g., application and detonation of explosive devices) of explosive ordnance.

There had been some surface soil contamination caused by an ordnance training session, near Building 900. Discussion with IHDIVNAVSURFWARCEN representatives indicated that thorium contamination was the result of routine training exercises at the school during approximately 1982 and 1983. The contaminated soil was collected and stored in drums. Soil was removed until no readings were detected above background. The contaminated soil was disposed of off site in the state of Washington. A building has since been constructed at that location. Visual inspection found no signs of release. This site is inactive.

The Valley Firing Range (Figure J-1, Site F)

The naturally occurring valley along Torrense Road was the site of test firing of naval guns. Magazines, firing points, and a railroad were all built along this valley for about one-half mile beginning at the Potomac River. Firing of guns lasted from 1891 to 1921, by which time proving-ground activities had been shifted down river to Dahlgren, Virginia. The report indicates that shells were fired into butts in the valley walls as well as down river over the Stump Neck area.

IHDIVNAVSURFWARCEN representatives stated that very little information is available on the use of the area, and as previously stated, the practice ceased in 1921. No material has been removed from the area as waste material. Inspection showed no visible signs of waste management activity in the area.

Sand Blasting Sand Storage Area (Figure J-1, Site G)

Sand blasting is used to remove paint from rocket motor casings. Sand blasting sand commonly contains heavy metals. According to IHDIVNAVSURFWARCEN representatives, the sand is collected and continuously recycled to the sand blast equipment, a practice which results in no waste sand. The process is presently being converted to use of a plastic medium (i.e., to replace the sand) for removal of the paint. The equipment is located indoors on a floor and containment area constructed of steel and concrete. It was not in operation at the time of the VSI, and no sand was observed in the sand blast area. This site is active.

Drum at Fuel Storage Area (Figure J-1, Site H)

During visual inspection of the vehicle maintenance area (Building 290), a single drum containing an unidentified liquid was observed adjacent to the nearby fuel storage area. The drum was not labeled or marked, and IHDIVNAVSURFWARCEN representatives were unable to define the contents. There was no indication, however, that the contents of the drum was a waste (i.e., no signs that activities in the area would generate a waste). The drum was located outdoors on an asphalt roadway. There was no apparent leakage from the drum and visual inspection found no signs indicating that the area was routinely used for storage of drums. This site is active.

Storage Building at Machine Shop (Figure J-1, Site I)

Building 796 is located adjacent to the Machine Shop (Building 268) in the Public Works area of the facility and is described as the Oil and Coolant Storehouse. The building is used for storage of product oils and coolants used in machining metals. Several pieces of equipment and miscellaneous materials were noted in the building; however, there were apparently no wastes stored inside. The building has a concrete floor and represents a low potential for release. This site is active.

Ballistic Test Area (Figure J-1, Site J)

Ballistic test areas have been provided for the testing and evaluation of products produced by IHDIVNAVSURFWARCEN and other Navy suppliers since 1940. Tests in static test bays generate gaseous and solid residuals from the combustion of rocket motors. Gaseous exhaust from rocket firing is emitted to the air, and solid residual material consists of the empty rocket casings that are returned to the production facilities. According to the IHDIVNAVSURFWARCEN representative, there are a total of four test bays: two for testing large rocket motors and two for testing small rocket motors. Visual inspection of one of the test bays found no signs of release. The test bays are constructed of concrete and are partially covered with a roof. This site is active.

Abandoned Drain Lines from Nitrocellulose Production Facilities (Figure J-1, Site K)

This site is the location of abandoned nitrocellulose production facilities located on the northern end of the Indian Head peninsula. The buildings were constructed in the late 19th century and early 1900s, and many of the original facilities have been removed. Nitrocellulose was produced for smokeless powder in naval cannons. The white water, with finely divided nitrocellulose, settled and became a part of the silt in the creek. There was some concern that nitrocellulose, which is practically insoluble in water, may have deposited in abandoned drain lines located near the old nitrocellulose plant sites.

According to the IHDIVNAVSURFWARCEN representative, the production line has been inactive for several years. The IHDIVNAVSURFWARCEN representative stated that the abandoned drain lines from the production facility were aboveground, overhead lines which have been decommissioned and removed. This site is inactive.

Fuel Oil Tank Secondary Containment Area (Goddard Power Plant) (Figure J-1, Site L)

This area is the secondary containment structure for fuel oil storage tanks at the Goddard Power Plant. The structure is constructed with a concrete floor and walls approximately 2 feet high. The containment area prevents the release of spilled fuel oil. A large amount of oil was observed in the containment area. Discharge from the unit is provided through an outlet to the wastewater drainage system. The outlet is equipped with a valve to prevent discharge of fuel oil or contaminated water.

Oil stains and water with a floating layer of oil were observed within the containment area. This site is active.

Disposed Metal Parts Along Mattawoman Creek (Figure J-1, Site M)

This site is the location of discarded metal parts along the Mattawoman Creek shoreline. Disposed materials included rocket motor casings, shipping containers, empty drums, and various metal parts reportedly placed along a 1,000-foot length of shoreline east of the CRTTP (SWMU No. 21) beginning circa 1960 until the early 1980s. Rusted large metal parts in the vicinity of the reported disposal area were also found. Many of the submerged materials were covered over with bottom sediments.

According to IHDIVNAVSURFWARCEN representatives, the metal parts were supposed to be removed in late 1988 or early 1989 under the direction of the Army Corps of Engineers and the Fish and Wildlife Department. This site is active.