N00164.AR.000037
NSWC CRANE
5090.3a

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO ATTENTION OF:
5HR-13

20 DEC 1989

CERTIFIED MAIL: P 611 589 516
RETURN RECEIPT REQUESTED

Captain C.E. Johnson
Commanding Officer
Department of the Navy
Naval Weapons Support Center
Crane, Indiana 47522-5000

RE: Final RCRA Permit
Naval Weapons Support Center
Crane, Indiana
IN5 170 023 498

Dear Captain Johnson:

Enclosed is a copy of the Federal Portion of the final permit issued under the Resource Conservation and Recovery Act (RCRA) as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984. Any noncompliance with this permit constitutes a violation of HSWA, and is grounds for enforcement action, permit termination, or other appropriate action.

The duration of this permit is five (5) years. However, the United States Environmental Protection Agency (U.S. EPA) may modify, revoke and reissue, or terminate this permit based on causes specified in Title 40 of the Code of Federal Regulations (40 CFR) Sections 270.41, 270.42, and 270.43, and in Section 3005(c)(3) of the amended RCRA.

This permit is effective as issued, as of the date indicated on the cover page of the permit. 40 CFR 124.19 explains the rights of appeal concerning this permit.

A copy of U.S. EPA's Response to Comments has also been enclosed, explaining all changes made between the draft permit and the final permit.

If you have any questions, please contact Ms. Carol Ann Witt of my staff, at (312) 886-6146, for assistance.

Sincerely,

for Basil G. Constantelos, Director
Waste Management Division

cc: Kathy Prosser, IDEM w/enclosure
Jim Hunsicker, USN
Bill Muno, REB

RESPONSE TO COMMENTS ON THE DRAFT FEDERAL PERMIT
FOR
NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA
IN5 170 023 498

I. INTRODUCTION

The public comment period commenced on September 30, 1989, with a public notice in the Bedford Times of Bedford, Indiana. This notice requested public comments on the draft permit decision for the Naval Weapons Support Center facility, in Crane, Indiana, and announced that a public hearing would be held on November 2, 1989, at the Bedford City Hall, in Bedford, Indiana. The public comment period ended on November 14, 1989.

Comments on the draft decision were submitted by the following:

1. James E. Conley, Department of the Navy
2. David C. Hudak, Department of the Interior

Comments at the public hearing were given by the following:

1. Jim Hunsicker, Department of the Navy

This document is in response to comments on the draft Federal permit, and changes made to finalize the permit. These changes are underlined.

II. COMMENTS AND RESPONSES

1. Condition II.B.2. Dioxin Management Containment

   a. Comment: The Department of the Navy commented that:

   "As identified in (B-2. Containment), Naval Weapons Support Center Crane (NWSCC) will place the wastes, containing dioxin, inside the metal containment systems shown in Attachment II as an interim measure to provide run-on protection as well as additional containment.

   NWSCC has comments pertaining to this that will be addressed with the Indiana Department of Environmental Management (IDEM).

   IDEM has indicated that these metal containers have not been approved by them for use. NWSCC will provide information to IDEM to have these metal containment systems known as "Enviropac" approved as an interim measure to prevent run-on."

Response:

As stated in the draft Federal permit, the United States Environmental Protection Agency (U.S. EPA) is requiring the triple or quadruple packed dioxin waste containment drums to be stored inside the metal containment systems shown in Attachment II of the draft Federal permit. These containment systems provide leak detection monitors and covers to prevent any run-on or run-off, and are suitable for the purpose of secondary containment. The U.S. EPA stated that the drums within the containment systems would then be stored within the outside liquid storage pad. This is to provide a concrete base under the systems, instead of gravel, and also provides a degree of tertiary containment. The U.S. EPA wants the dioxins transferred to the new pad once one is constructed. The U.S. EPA believes the containment proposed in the draft Federal permit is sufficient to protect human health and the environment. Refer to the IDEM's Response to Comments and the following change to clarify the construction requirements under the State portion of the RCRA permit that must be met.

Changes: The following has been added to Condition II.B.2.

"All containers storing dioxin-containing wastes shall be contained inside the metal containment systems shown in Attachment II (Enviropacs), and shall be stored within the outside liquid storage pad. This type of containment shall be used until a new liquid storage pad is constructed to replace the present containment system outside the storage building, and as approved by both the U.S. EPA and the IDEM. Dioxin wastes may only be stored in designated areas approved by the Agency until the construction of a new storage building.

The Permittee must comply with the State requirements for construction of a canopy on top of the existing outside storage pad, refer to Condition I.D.12. and Attachment 6 of the State portion of the RCRA permit."

2. **Condition IV.F. Corrective Action Activities**

The following comments were received from the United States Department of the Interior, Fish and Wildlife Service (U.S. DOI):

a. Comment: Ammunition Burning Ground

"There appear to be wetlands associated with Little Sulfur Creek in addition to the obvious concern for water quality downgradient of this SWMU. The Service would be interested in reviewing fish and wildlife aspects of the proposed sample plan for soil and surface waters. The Service should be coordinated with on any remedial or construction activities in the stream or wetlands."

Response:

The U.S. EPA agrees with the U.S. DOI that they should be involved in any remedial or construction activities in the streams or wetlands at the facility, and will inform the U.S. DOI of plans and activities to coordinate their review. Wildlife impacts will be evaluated as a part of the surface water investigations.

Changes:

None.

b. Comment: Old Rifle Range

"There are wetlands adjacent to this area which are associated with Turkey Creek. An adequate ground water monitoring and soil sampling plan will likely indicate whether or not surface waters/wetlands are being impacted. The Service would be interested in reviewing the proposed soil sampling plan."

Response:

The U.S. EPA will coordinate a review of the soil and ground water sampling plans for this area.

Changes:

The following has been added to clarify and assure that if cross-media contamination occurs to the surface water body, that it will be investigated.

Condition IV.F.3.d.

"Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous wastes or constituents in that media."

c. Comment: Dye Burial Grounds

"Due to the proximity to intermittent tributaries to Little Sulfur Creek, ground water discharge areas should be determined and sampled. In order to accurately assess any impacts to Little Sulfur Creek, it would be prudent to take a few extra surface water samples near potential Dye Burial discharges during the surface water sampling for the Ammunition Burning Ground."

Response:

The U.S. EPA and the Navy expect to merge the Dye Burial Ground (DBG) and the Ammunition Burning Ground (ABG) areas as soon as it is confirmed that the ground water flow paths established are the same. Because the DBG is on a hill adjacent to the ABG, the same surface water sampling points will probably be established. If any new discharge points are found, they will be investigated.

Changes:

The following has been added to clarify and assure that if cross-media contamination occurs to the surface water body, that it will be investigated.

Condition IV.F.5.d.

"Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous wastes or constituents in that media."

d. <u>Comment</u>: Old Burning Pit

"The proposed ground water monitoring plan for this area must address hydrological connections to Oberli Lake and Culpepper Brook. If contaminants are found in the ground water, sampling efforts should be expanded to include surface water areas."

<u>Response</u>:

The Release Characterization for Ground Water established under this permit will require an evaluation of all flow paths in the area, and define the rate and extent of contamination. If cross-media contamination is evident, or expected, it will be investigated.

<u>Changes</u>:

The following has been added to clarify and assure that if cross-media contamination occurs to the surface water body, that it will be investigated.

Condition IV.F.6.e.

"<u>Cross-media Investigations</u>

<u>If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous wastes or constituents in that media."</u>

e. <u>Comment</u>: McComish Gorge

"Although the Service is uncertain as to the activities that occurred at this site, it is apparent that wetlands are present. It would be expected that the surface water and shallow groundwater in this area could be considered the same, and to adequately address soil contamination in this area, it would be prudent to sample sediments of Culpepper Brook."

<u>Response</u>:

McComish Gorge was a burrow pit that was filled in with ordinance and non-ordinance type wastes. Specific quantities are not available. The area has been preliminarily investigated by the Navy, and ground water monitoring wells are present in the area. Within the ground water investigation, if surface water is cross-contaminated, it will be investigated. See Condition IV.F.7. which allows for other phases (i.e., surface water to be investigated).

<u>Changes</u>:

None.

f. <u>Comment</u>: Mustard Gas Burial Grounds

"There are intermittent streams adjacent to this area and wetlands within 800 feet associated with a tributary to Goldsberry Hollow. The Service is uncertain as to the significance of contaminants disposed of here, especially in regards as to what, if any, are the potential impacts to aquatic and terrestrial fauna. If there is a potential for significant risks such that there is a need to examine ground water quality, it would be prudent to determine where shallow ground water discharges to surface water and then examine both water and sediment in those areas."

<u>Response</u>:

This area was used dispose of neutralized mustard gas bombs and thorium nitrate. The thorium nitrate was removed in 1980 and sent to an NRC approved landfill. There may have been residues of contamination left. The Navy has done some preliminary investigations to the ground water which show trace organics. The RFI investigations in the permit will establish all ground water flow paths. If surface water is a cross-media impact, it will be investigated.

<u>Changes</u>:

The following has been added to clarify and assure that if cross-media contamination occurs to the surface water body, that it will be investigated.

Condition IV.F.8.d.

"<u>Cross-media Investigations</u>

<u>If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or</u>

presence of hazardous wastes or constituents in that media."

g. Comment: Rockeye

"The Service is uncertain as to the historic activities on this site, and therefore these comments are only cursory. Rockeye is situated in the headwaters of First Creek, Turkey Creek and Sulfur Creek. It is quite likely that since ground water monitoring is being required, and since the shallow ground water is likely discharging to the intermittent headwater tributaries to these creeks, it would seem prudent to sample sediment and water (when present) in these tributary creeks."

Response:

The contamination at this site was from an old discharge point from the plant, which has been converted into a pretreatment system discharging into the base sewer system. The Navy has been doing extensive ground water monitoring to establish the rate and extent of the plume. The constituents of concern are TNT, RDX, and HMX. There is no evidence that the plume has reached a surface water body at this time, therefore sediment samples are not appropriate. The soil and ground water sampling in the permit is sufficient at this time. If cross-media contamination is possible, it will be investigated.

Changes:

The following has been added to clarify and assure that if cross-media contamination occurs to the surface water body, that it will be investigated.

Condition IV.F.9.d.

"Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous wastes or constituents in that media."

h. Comment: Load and Fill Areas Building 106 Pond

"There appear to be wetlands associated with an intermittent tributary to Boggs Creek on this site. Although the Service is uncertain as to the condition of the "pond", if a surface water area is contaminated, impacts to wildlife are possible.

It is hoped that if this is the case, the schedule for the monitoring report could be accelerated or temporary measures would be taken to reduce wildlife access/impacts. Because soil sampling will be required, and since it appears that wetlands are present, it seems prudent to require surface water sampling also."

Response:

The pond was constructed by the Navy and appears to have a clay liner. Acid and Caustics wastewaters were stored in the pond. The Navy will be doing further characterization of the sediments and underlying soils. The area is fenced to prevent wildlife access, and smaller life does not appear to be affected from the standing water. Within the permit, Condition IV.F.11.c. allows for cross-media investigations if necessary.

Changes:

None.

i. Comment: Sanitary Landfill and Lithium Battery Area

"There is an intermittent tributary to Seed Tick Creek in or adjacent to this area, and it is likely that surface water is receiving shallow ground water during high flows. It is expected that leachate, if any, would also enter this tributary. As a requirement of upgrading monitoring for the landfill, surface water, tributary soil and leachate should also be analyzed."

Response:

Ground water monitoring is currently required under State regulations for solid waste landfills. Leachate is analyzed to characterize its treatment in the main wastewater treatment plant on-site. The U.S. EPA has discussed with the Navy options for converting the unlined leachate collection ponds into tanks or lined ponds. The U.S. EPA shall consider the sampling suggested when we review the Phase I Report.

Changes:

None.

j. Comment: Pyrotechnic Test Area

"There are extensive wetlands associated with Boggs Creek throughout this site. The Service would be interested in reviewing the proposed sampling plans for soil and surface waters. The Service should be coordinated with on any remedial or construction activities in the creek or wetlands."

Response:

See Response to Comment 2.a. Permit Condition IV.F.19.b. allows for a surface water body investigation.

Changes:

None.

k. Comment: DRMO Storage Lot

"There are wetlands associated with Turkey Creek on this site. It is likely that this site adversely impacts water quality in Turkey Creek. The Service recommends that the schedule for the monitoring report be accelerated from the proposed 2.5-year deadline. The Service would be interested in reviewing the proposed sampling plans for soil and surface waters. The Service should be coordinated with on any remedial or construction activities in the creek or wetlands."

Response:

See Response to Comment 2.a. The U.S. EPA believes that the established schedule requires the Navy to investigate the areas with the greatest potential impact to the environment first. In order to accelerate the schedule for this area, another area of potentially greater environmental impact would be sacrificed temporarily. We do not believe that a change in the schedule is more protective at this time, or that the existing time schedule is unreasonable.

Changes:

None.

l. Comment: Sludge Drying Bed A

"There are wetlands associated with Boggs Creek on this site. There is a potential that during the sludge-drying process, contaminants migrated from this site via percolation and/or surface runoff. Ground water discharges should be identified.

Due to the time delay in scheduling completion of the monitoring report (2.5 years), the Service recommends a preliminary review of the site be conducted to assess existing or potential impacts to aquatic and terrestrial fauna to determine if there is a need for temporary measures to reduce wildlife access/impacts."

Response:

The U.S. EPA performed a preliminary review of the site in its RCRA Facility Assessment (RFA) to determine further Corrective Action activities. We do not believe there is any imminent endangerment to wildlife at this time. The investigation required in the permit will establish necessary actions. See also response to comment 2.k.

Changes:

None.

m. Comment: Sludge Drying Bed B

"There appear to be wetlands on or adjacent to this site associated with Culpepper Brook. There is a potential that during the sludge-drying process, contaminants migrated from this site via percolation and/or surface runoff. Ground water discharges should be identified. Due to the time delay in scheduling completion of the monitoring report (2.5 years), the Service recommends a preliminary review of the site be conducted to assess existing or potential impacts to aquatic and terrestrial fauna to determine if there is a need for temporary measures to reduce wildlife access/impact."

Response:

See Response to Comment 2.1. Also, this unit has a concrete curb around it to help prevent run-off, and a fence around it to prevent wildlife entry.

Changes:

None.

n. Comment: Highway 58 Dump A

"The Service is uncertain as to the nature of contaminants disposed of at this site, but due to the proximity to the intermittent tributary of Turkey Creek, potential water quality impacts could exist. The monitoring report should include an evaluation of this area on aquatic and terrestrial fauna for further review."

Response:

The site was used for solid waste disposal and has a potential for other types of wastes. In a preliminary review, the Navy installed several ground water monitoring wells. The Phase I Environmental Monitoring Report shall establish the conditions at the site.

Changes:

None.

o. Comment: Highway 58 Dump B

"The Service is uncertain as to the nature of contaminants disposed of at this site, but there are wetlands present on this site associated with an intermittent tributary of Turkey Creek. The Service recommends a preliminary review of the site be conducted to assess existing or potential impacts to aquatic and terrestrial fauna to determine if there is a need for temporary measures to reduce wildlife access/impacts."

Response:

The site was used for solid waste disposal and has a potential for other types of wastes. In a preliminary review the Navy installed several ground water monitoring wells. The Phase I Environmental Monitoring Report shall establish the conditions at the site.

Changes:

None.

p. Comment: PCP Dip Tank

"Due to the proximity of this site to Greenwood Lake and the potential for serious impacts to human health (via drinking water, direct contact, and food chain) and natural resources (Lake Greenwood's fishery, the nesting bald eagles, and other wildlife species), the Service recommends that the due date for the monitoring report be rescheduled for completion within 180 days of the issuance of this permit."

Response:

The PCP Dip Tank no longer exists in the area, and so the high potential of risk does not exist. The Navy has performed preliminary soil sampling in the area and a significant threat is not evident. The permit conditions and schedule are adequate. All potential wildlife affects based on the investigation shall be evaluated.

Changes:

None.

q. Comment: Land Farm

"The Service is uncertain as to the activities which took place on this site, however, there appear to be wetlands associated with a pond and tributary to Seed Tick Creek. The monitoring report should include an evaluation of this area on aquatic and terrestrial fauna for further review."

Response:

This site is regulated under the State water program. Sludges from the main wastewater treatment plant are applied to the ground under specific permit conditions. No ground water monitoring is required by the State, so the U.S. EPA shall investigate this media. The Phase I Environmental Monitoring Report shall establish conditions at the site.

Changes:

None.

r. Comment:

The U.S. DOI commented that they do not have concerns at this time with the following sites:

Demolition Area
Pest Control/R-150 Tank
Old Storage Building 225
Mine Fill A
Mine Fill B
Roads and Grounds Area
Cast High Explosives Fill/Incinerator Complex
PCB Capacitor Burial/Pole Yard
Load and Fill Area Buildings
CAAA QA/QC Test Area
Lead Azide
Battery Shop
Illuminant Building 126
Maintenance Shop

Response:

If any of the sites stated above develop into cross-media investigations concerning surface water, the U.S. EPA will inform the U.S. DOI and coordinate their review.

Changes:

None.

3. General Corective Action

a. Comment:

The U.S. DOI requested that a representative from the Service be taken on a tour of the Solid Waste Management Units (SWMUs) at some later date in order to provide more valuable reviews and technical assistance.

Response:

The U.S. EPA believes that having the U.S. DOI representative fully aware of the situation at the SWMUs of concern would be very appropriate. The U.S. EPA shall make arrangements with the Navy and the Army for a site visit.

Changes:

None.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

Name of Permittee: Owner: United States Department of Navy
Operator: United States Department of Navy

Facility Location: Street Address: (None)
City, State: Crane, Indiana

EPA Identification Number: IN5 170 023 498

Issuance Date: 20 DEC 1989

Authorized Activities:

Pursuant to the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, (42 U.S.C. §6901, et seq.), and regulations promulgated thereunder by the United States Environmental Protection Agency (U.S. EPA) (codified in Title 40 of the Code of Federal Regulations (CFR)), Federal permit conditions (hereinafter called the permit) of the RCRA permit are issued to United States Department of Navy (USN) (hereinafter called the Permittee), for the facility Naval Weapons Support Center (NWSC) located at Crane, Indiana.

The RCRA permit contains both the effective Federal permit conditions (contained herein) and the effective State permit conditions issued by the State of Indiana's RCRA program authorized under 40 CFR Part 271 (hereinafter called the State permit). When both this permit and the State permit are effective, the Permittee has an effective RCRA permit which authorizes the Permittee to conduct hazardous waste management activities as specified in the RCRA permit.

Permit Approval:

On January 31, 1986, the State of Indiana received final authorization pursuant to Section 3006 of RCRA, 42 U.S.C. §6926, and 40 CFR Part 271, to administer the pre-HSWA RCRA hazardous waste program. Since the State of Indiana has not yet received authorization to administer the entire hazardous waste program requirements of HSWA, additional permit conditions must be issued by the U.S. EPA to address these new requirements. These additional conditions are contained in this permit.

The Permittee must comply with all terms and conditions of this permit. This permit consists of the conditions contained herein (including those in any attachments) and the applicable regulations contained in 40 CFR Parts 260, 261, 262, 264, 266, 268, 270, and 124, and applicable provisions of HSWA.

This permit is based on the assumption that the information submitted in the permit application attached to the Permittee's letter, dated October 12, 1984, and in any subsequent amendments (hereinafter referred to as the application), and in the certification regarding potential releases from solid waste management units, dated June 13, 1985, is accurate. Any inaccuracies found in this information may be grounds for the termination, revocation and reissuance, or modification of this permit (see 40 CFR §270.41, §270.42 and §270.43) and potential enforcement action. The Permittee must inform U.S. EPA of any deviation from or changes in the information in the submitted information.

Effective Date:

The RCRA permit is effective when both this permit and the State permit are effective. This permit is effective as of thirty days after service of notice, unless a review is requested under 40 CFR §124.19 (unless no comments requested a change in the draft permit in which case the permit shall become effective immediately upon issuance), and shall remain in effect for 5 years, unless revoked and reissued, or terminated (40 CFR §270.41, §270.42, and §270.43), or continued in accordance with 40 CFR §270.51.

Issued this 20th day of Dec. 1989,

by Norman Niedergang.
for Basil G. Constantelos, Director
Waste Management Division

United States Department of Navy
Naval Weapons Support Center
Crane, Indiana

PERMIT INDEX

PERMIT CONDITIONS:

ATTACHMENTS:

PERMIT CONDITIONS

I. STANDARD CONDITIONS

(Note: The regulatory citations in parentheses are incorporated by reference)

A. EFFECT OF PERMIT (40 CFR §§270.4(a) and 270.30(g))

The Permittee is allowed to manage hazardous waste in accordance with the conditions of this permit. Any management of hazardous waste not authorized in this permit is prohibited.

Compliance with this permit during its term constitutes compliance, for the purposes of enforcement, with Subtitle C of RCRA, except for those requirements not included in the permit which become effective by statute, or which are promulgated under 40 CFR Part 268 restricting the placement of hazardous waste in or on the land. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any order issued or any action brought under Sections 3013, or 7003 of RCRA, Sections 104 or 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 U.S.C. §9601 et seq., commonly known as CERCLA), or any other law providing for protection of public health or the environment.

B. PERMIT ACTIONS (40 CFR §270.30(f))

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR §270.41, §270.42, and §270.43. This permit may also be reviewed and modified at any time by the U.S. EPA to include any terms and conditions determined necessary to protect human health and the environment pursuant to Section 3005(c)(3) of RCRA. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes, or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of any permit condition.

C. SEVERABILITY (40 CFR §124.16)

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

D. DUTIES AND REQUIREMENTS

1. Duty to Comply. (40 CFR §270.30(a))

The Permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any permit noncompliance, other than noncompliance authorized by an emergency permit, constitutes a violation of RCRA and HSWA and is grounds for enforcement action, permit termination, revocation and reissuance, modification, denial of a permit renewal application, or other appropriate action.

2. Duty to Reapply. (40 CFR §270.30(b))

The Permittee shall submit a complete application for a new permit at least 180 days before this permit expires unless: a) the Permittee no longer wishes to operate a hazardous waste management facility; b) the Permittee is no longer required to have a RCRA permit; or c) permission for a later date has been granted by the Regional Administrator. The Regional Administrator shall not grant permission for applications to be submitted later than the expiration date of the existing permit.

3. Permit Expiration. (40 CFR §§270.13, 270.14, and 270.51)

This permit and all conditions herein will remain in effect beyond the permit's expiration date only if the Permittee has submitted a timely, complete application (per 40 CFR §270.10 and applicable sections of §§270.14 through 270.29): a) to both the U.S. EPA and the State; and b) through no fault of the Permittee, the Regional Administrator and the State have not issued a new permit, as set forth in 40 CFR §270.51.

4. Need to Halt or Reduce Activity Not a Defense. (40 CFR §270.30(c))

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

5. Duty to Mitigate. (40 CFR §270.30(d))

In the event of releases or other noncompliance with the permit, the Permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health and the environment.

6. Proper Operation and Maintenance. (40 CFR §270.30(e))

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

7. Duty to Provide Information. (40 CFR §§270.30(h) and 264.74)

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

8. Inspection and Entry. (40 CFR §270.30(i))

The Permittee shall allow the Regional Administrator, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

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

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

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

d. Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by RCRA, any substances or parameters at any location.

9. Monitoring and Recordkeeping. (40 CFR §§270.30(j), 270.31, 264.73, and 264.74)

The Permittee shall retain all reports, records, or other documents, required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the reports, records or other documents. Corrective Action records must be maintained at least 3 years after all Corrective Action activities have been completed. These periods may be extended by request of the Regional Administrator at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility.

10. Reporting Planned Changes. (40 CFR §270.30(l)(1))

The Permittee shall give notice to the Regional Administrator of any planned physical alterations or additions to the permitted facility, as soon as possible, before construction of such alteration or addition is commenced.

11. Anticipated Noncompliance. (40 CFR §270.30(l)(2))

The Permittee shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. Such notice does not constitute a waiver of the Permittee's duty to comply with permit requirements.

12. Transfer of Permits. (40 CFR §270.30(l)(3))

This permit may be transferred by the Permittee to a new owner or operator only after providing notice to the Regional Administrator and only if the permit is modified, or revoked and reissued, pursuant to 40 CFR §270.40(b), §270.41(b)(2), or §270.42(a). Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of 40 CFR Parts 264, 268, and 270 (including all applicable corrective action requirements), and shall provide a copy of the RCRA permit to the new owner or operator.

13. Compliance Schedules. (40 CFR §270.30(l)(5))

The Permittee shall comply with all interim and final requirements contained in any compliance schedule of this permit. In the event of noncompliance together with a progress report shall be submitted no later than 14 days following the scheduled date.

14. <u>Twenty-four Hour Reporting</u>. (40 CFR §§270.30(1)(6) and 270.33)

The Permittee shall report to the Regional Administrator any noncompliance with the permit which may endanger human health or the environment. Any such information shall be reported orally within 24 hours from the time the Permittee becomes aware of the circumstances. This report shall include the following:

a. Information concerning the release of any hazardous waste which may endanger public drinking water supplies; and

b. Information concerning the release or discharge of any hazardous waste, or of a fire or explosion at the facility, which could threaten the environment or human health outside the facility. The description of the occurrence and its cause shall include:

(1) Name, address, and telephone number of the owner or operator;

(2) Name, address, and telephone number of the facility;

(3) Date, time, and type of incident;

(4) Name and quantity of material(s) involved;

(5) The extent of injuries, if any;

(6) An assessment of actual or potential hazard to the environment and human health outside the facility, where this is applicable; and

(7) Estimated quantity and disposition of recovered material that resulted from the incident.

A written submission shall also be provided within 5 days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the periods of noncompliance (including exact dates and times); steps taken to minimize impact on the environment; whether the noncompliance has been corrected, and if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate and prevent recurrence of the noncompliance. The Permittee need not comply with the 5-day written notice requirement if the Regional Administrator waives the requirement. Upon waiver of the 5-day requirement, the Permittee shall submit a written report within 15 days of the time the Permittee becomes aware of the circumstances.

15. Other Noncompliance. (40 CFR §270.30(1)(10))

The Permittee shall report all other instances of noncompliance not otherwise required to be reported above within 15 days of when the Permittee becomes aware of the noncompliance. The reports shall contain the information listed in Condition I.D.14.

16. Other Information. (40 CFR §270.30(1)(11)

Whenever the Permittee becomes aware that it failed to submit any relevant facts, or submitted incorrect information to the Regional Administrator in the permit application or in any reports, records, or other documentation provided to the Regional Administrator, the Permittee shall promptly submit such facts or information.

17. Submittal of Reports or Other Information. (40 CFR §§270.30(1)(7), (8), and (9), and 270.31)

All reports or other information required to be submitted pursuant to this permit shall be sent to:

RCRA Activities
U.S. EPA, Region V
Post Office Box A-3587
Chicago, Illinois 60690-3587

E. SIGNATORY REQUIREMENT (40 CFR §270.30(k))

All reports or other information requested by the Regional Administrator shall be signed and certified as required by 40 CFR §270.11

F. CONFIDENTIAL INFORMATION

In accordance with 40 CFR §270.12 and 40 CFR Part 2, Subpart B, any information submitted to the U.S. EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions, or, in the case of other submissions, by marking the words "Confidential Business Information" on each page containing such information. If no claim is made at time of submission, the U.S. EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2.

G. WASTE MINIMIZATION

The Permittee shall certify at least annually that the Permittee has a program in place to reduce the volume and toxicity of hazardous waste that the Permittee generates to the degree determined by the Permittee to be economically practicable; and the proposed method of treatment, storage, or disposal is that practicable method currently available to the Permittee which minimizes the present and future threat to human health and the environment, in accordance with 40 CFR §264.73(b)(9) and Section 3005(h) of RCRA, [42 U.S.C. §6925(h)]. The certification shall be recorded, as it becomes available, and maintained in the operating record until closure of the facility.

In addition, the Permittee's biennial report shall contain the following:

1. A description of the efforts undertaken during the year to reduce the volume and toxicity of waste generated, as required by 40 CFR §264.75(h);

2. A description of the changes in volume and toxicity of waste actually achieved during the year in comparison to previous years, as required by 40 CFR §264.75(i). Information for the years prior to 1984 is only required to the extent such information is available; and

3. The certification signed by the owner or operator of the facility or his authorized representative, as required by 40 CFR §264.75(j).

II. GENERAL FACILITY CONDITIONS

A. WASTE ANALYSIS (40 CFR §264.13 and Part 268)

The Permittee shall follow the conditions of the Waste Analysis Plan and Land Disposal Plan in Attachment I.

B. DIOXIN MANAGEMENT

1. Containers

In accordance with 40 CFR Part 264.175(d), storage areas that have containers holding U.S. EPA hazardous waste number F027, that do not contain free liquids, must have a containment system designed and operated as follows, and detailed in Attachment II.

a. A base must underly the containers which is free of cracks gaps and is sufficiently impervious to contain leaks, and accumulated precipitation until the collected material detected and removed;

b. The base must be sloped or the containment system must be otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation, unless the containers are elevated or are otherwise protected from contact with accumulated liquids;

c. The containment system must have sufficient capacity to contain 10 percent of the volume of containers, or the volume of the largest container, whichever is greater. Containers that do not contain free liquids need not be considered in this determination;

d. Run-on into the containment system must be prevented unless the collection system has sufficient excess capacity, in addition to that required in 40 CFR Part 264.175(b)(3), to contain any run-on which might enter the system; and

e. Spilled or leaked waste and accumulated precipitation must be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system.

2. Containment

All containers storing dioxin-containing wastes shall be contained inside the metal containment systems shown in Attachment II (Enviropacs), and shall be stored within the outside liquid storage pad. This type of containment shall be used until a new liquid storage pad is constructed to replace the present containment system outside the storage building, and as approved by both the U.S. EPA and the IDEM. Dioxin wastes may only be stored in designated areas approved by the Agency until the construction of a new storage building.

The Permittee must comply with the State requirements for construction of a canopy on top of the existing outside storage pad, refer to Condition I.D.12 and Attachment 6 of the State portion of the RCRA permit.

III. LAND DISPOSAL REQUIREMENTS

The Permittee shall comply with the applicable self-implementing requirements of 40 CFR Part 268, and all applicable requirements which become effective by statute (RCRA Section 3004), and the requirements outlined in Attachment I (Waste Analysis Plan and Land Disposal Plan).

For the purposes of this Section, at NWSC, "generators" refers to on-site and off-site producers of hazardous waste (i.e., requiring Corrective Action cleanup of Solid Waste Management Units (SWMUs); "treatment facilities" refer to the Waste Water Treatment Plant (WWTP), the Demolition Range, the Rifle Range, the Ammunition Burning Grounds, and any other facilities designed for the purpose of treatment of Corrective Action or Land Ban wastes, "land disposal facility" refers to off-site hazardous waste landfills, and "storage facility" refers to the Central Storage Facility.

A. <u>GENERAL WASTE ANALYSIS/DILUTION PROHIBITION</u>

1. Before the Permittee treats, stores, or disposes of any hazardous waste, the Permittee must obtain a detailed chemical and physical analysis of a representative sample of the waste. At a minimum, this analysis must contain all the information which must be known in order to treat, store, or dispose of the waste in accordance with the requirements of 40 CFR Parts 264 and 268, and with the conditions of this permit.

IV. CORRECTIVE ACTION REQUIREMENTS (See Attachment III including Map I)

Within the facility boundaries, there are individual Solid Waste Management Units (SWMUs) that need to satisfy detailed Corrective Action requirements. These individual SWMUs will be referred to by their description, location, or common name (see Attachment III, Compliance with RCRA Section 3004). Each of the SWMUs identified will have specific Corrective Action Phases associated with them for individual or combined media as applicable (i.e., air, soil, ground water, or surface water). The Corrective Action Phases are as follows:

1) Interim Measures Study (IMS), if applicable

2) Interim Measures Implementation (IMI);

3) RCRA Facility Investigation (RFI);

4) Corrective Measures Study (CMS);

5) Corrective Measures Implementation (CMI); and

6) Corrective Action Monitoring Plan (CAMP), if applicable.

A. <u>CORRECTIVE ACTION AT THE FACILITY</u>

In accordance with RCRA Section 3004(u) and the regulations promulgated pursuant thereto, the Permittee must institute Corrective Action as necessary to protect human health and the environment for all releases of hazardous waste(s) or constituents from any SWMU at the facility, regardless of the time at which waste was placed in such unit.

B. <u>CORRECTIVE ACTION BEYOND THE FACILITY BOUNDARY</u>

In accordance with RCRA Section 3004(v) and the regulations promulgated pursuant thereto, the Permittee must implement Corrective Action(s) beyond the facility property boundary, where necessary to protect human health and the environment, unless the Permittee demonstrates to the satisfaction of the Regional Administrator that, despite the Permittee's best efforts, the Permittee was unable to obtain the necessary permission to undertake such actions. The Permittee is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied. On-site measures to address such releases will be addressed under the RCRA Facility Investigation, Corrective Measures Study, and Corrective Measures Implementation phases, as determined to be necessary on a case-by-case basis.

C. Financial Assurance

The Permittee is exempt from requiring financial assurance for corrective action activities in accordance with 40 CFR §264.140(c).

D. Newly Identified Solid Waste Management Units

1. Information Requirements

a. General Information

The Permittee shall notify the Regional Administrator, within 30 days of discovery, of the following information requirements for any new Solid Waste Management Unit (SWMU) identified at the facility, in accordance with 40 CFR §270.14(d).

(1) The location of the unit on the site topographic map;

(2) Designation of the type of unit;

(3) General dimensions and structural description (supply any available drawings);

(4) When the unit was operated; and

(5) Specification of all wastes that have been managed at the unit, to the extent available.

b. Release Information

The Permittee must submit all available information pertaining to any release of hazardous wastes or constituents from the SWMU.

2. Corrective Action Requirements

If a newly identified SWMU has released or is releasing hazardous waste(s) or constituents, the Permittee must perform a RCRA RFI Release Characterization (to define the rate and extent of contamination), following the schedules and reporting requirements identified in Condition V.F.31., and any subsequent phases of Corrective Action as required by the Regional Administrator.

F. CORRECTIVE ACTION ACTIVITIES

1. Ammunition Burning Grounds Area (ABG) (this includes the old burning grounds, two closed surface impoundments, the closed waste pile, the Subpart X units, and any other SWMUs in the defined area) SWMU.

a. Modified RFI Phase III Release Characterization for Ground Water

The Regional Administrator hereby approves the hydrogeologic investigation to define the stratigraphy in the ABG, and the tracer test to define the flow pathways for ground water in the area. These documents and investigations (see Attachment III) take the place of the RFI Phase III Task B Hydrogeologic Report.

The Permittee shall submit a written Modified RFI Phase III Release Characterization Work Plan to the Regional Administrator, within 90 days after the effective date of this permit, to schedule the submittal of the draft and final Tracer Test Report and any progress reports, to establish the ground water monitoring program for the ABG (including potential modifications to the present system), and to propose alternate flow pathway determinations, or a new tracer test, if the original tracer test does not work, to determine the rate and extent of migration of hazardous waste or hazardous constituents and the concentrations of the hazardous waste or hazardous constituents in the ground water. The contents of this Modified RFI Phase III Work Plan should be consistent with the projects described in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the Modified RFI Phase III Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 45 days of the Regional Administrator's approval of the Modified Phase III Work Plan, the Permittee shall implement the Modified RFI Phase III Work Plan according to the terms and schedule in the Modified RFI Phase III Work Plan. The Regional Administrator will determine, based on the Modified RFI Phase III Final Release Characterization Report, whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

b. RFI Phase III Release Characterization for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase III Release Characterization Work Plan to the Regional Administrator, within 180 days after the effective date of this permit, to determine the rate and extent of migration of hazardous waste or hazardous constituents and the concentrations of the hazardous waste or hazardous constituents in the soil. The contents of this RFI Phase III Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase III Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase III Work Plan, the Permittee shall implement the RFI Phase III Work Plan according to the terms and schedule in the RFI Phase III Work Plan. The Regional Administrator will determine, based on the RFI Phase III Final Release Characterization Report, whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

c. RFI Phase II Release Assessment for Surface Water Bodies

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator within 180 days after the effective date of this permit, to document the absence or presence of hazardous waste or hazardous constituents in the surface water bodies. The content of this RFI Phase II Work Plan is outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections and modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future release do not occur.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit modifications, as appropriate (See Condition V.F.31.).

2. Demolition Area SWMU

a. RFI Phase II Release Assessment for Ground Water

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator within 120 days after the effective date of this permit, to document the absence or presence of hazardous waste or hazardous constituents to the ground water. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

b. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases III, CMS and CMI studies, and Permit Modifications, as appropriate (see Condition V.F.31.).

3. Old Rifle Range SWMU

a. RFI Phase III Release Characterization for Ground Water

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase III Release Characterization Work Plan to the Regional Administrator, within 120 days after the effective date of this permit, to determine the rate and extent of migration of hazardous waste or hazardous constituents and their concentrations in the ground water. The contents of this RFI Phase III Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase III Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 45 days of the Regional Administrator's approval of the RFI Phase III Work Plan, the Permittee shall implement the RFI Phase III Work Plan according to the terms and schedule in the RFI Phase III Work Plan. The Regional Administrator will determine, based on the RFI Phase III Final Release Characterization Report, whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan, within 150 days after the effective date of this permit, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modifications, as appropriate (see Condition V.F.31.).

d. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous wastes or constituents in that media.

4. Pest Control/R-150 Tank Area SWMU

a. RFI Phase III Release Characterization for Ground Water

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase III Release Characterization Work Plan to the Regional Administrator, within 390 days after the effective date of this permit, to determine the rate and extent of migration of hazardous waste or hazardous constituents and the concentrations of the hazardous waste or hazardous constituents in the ground water. The contents of this RFI Phase III Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase III Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 45 days of the Regional Administrator's approval of the RFI Phase III Work Plan, the Permittee shall implement the RFI Phase III Work Plan according to the terms and schedule in the RFI Phase III Work Plan. The Regional Administrator will determine, based on the Phase III Final Release Characterization Report, whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

b. <u>RFI Phase III Release Characterization for Soil</u>

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase III Release Characterization Work Plan to the Regional Administrator, <u>within 330 days after the effective date of this permit</u>, to determine the rate and extent of migration of hazardous waste or hazardous constituents in the <u>soil</u>. The contents of this RFI Phase III Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase III Work Plan. <u>Within 30 days of receipt of such comments</u>, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. <u>Within 45 days of the Regional Administrator's approval of the RFI Phase III Work Plan</u>, the Permittee shall implement the RFI Phase III Work Plan according to the terms and schedule in the RFI Phase III Work Plan. The Regional Administrator will determine, based on the Phase III Final Release Characterization Report, whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

c. <u>Other Corrective Action Phases</u>

The Permittee shall follow the Corrective Action steps for CMS and CMI studies, and Permit Modifications, as appropriate (see Condition V.F.31.).

5. <u>Dye Burial Grounds (DBG) SWMU</u>

a. <u>Interim Measures (IMs)</u>

The Permittee shall implement the IM of SWMU source location, in order to define the exact location of the SWMU. <u>Within 210 days after the effective date of the permit</u>, the Permittee shall submit an IM Work Plan to the Regional Administrator. The IM Work Plan shall include the method of locating the source, quality assurance/quality control plan, a health and safety plan, and a data management plan. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the IM Work Plan. <u>Within 30 days of receipt of such comments</u>, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments. <u>Within 30 days of the Regional Administrator's approval of the IM Work Plan</u>, the Permittee shall implement the IM Work Plan according to the terms and schedule in the IM Work Plan.

b. RFI Phase III Release Characterization for Ground Water

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase III Release Characterization Work Plan to the Regional Administrator, within 240 days after the effective date of this permit, to determine the rate and extent of migration of hazardous waste or hazardous constituents and the concentrations of the hazardous waste or hazardous constituents in the ground water. The contents of this RFI phase III Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase III Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 45 days of the Regional Administrator's approval of the RFI Phase III Work Plan, the Permittee shall implement the RFI Phase III Work Plan according to the terms and schedule in the RFI Phase III Work Plan. The Regional Administrator will determine, based on the RFI Phase III Final Release Characterization Report, whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

c. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for CMS and CMI studies, and Permit Modifications, as appropriate (see Condition V.F. 31.).

d. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous wastes or constituents in that media.

6. Old Burning Pit SWMU

a. Interim Measures (IMs)

The Permittee shall implement the IM of removal of all visible debris protruding from the SWMU area. Within 90 days after the effective date of this permit, the Permittee shall submit an Interim Measures Report describing how all visible debris protruding from the SWMU was removed, and how it was managed as a hazardous or nonhazardous waste.

b. RFI Phase III Release Characterization for Ground Water

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase III Release Characterization Work Plan to the Regional Administrator, within 450 days after the effective date of this permit, to determine the rate and extent of migration of hazardous waste or hazardous constituents and the concentrations of the hazardous waste or hazardous constituents in the ground water. The contents of this RFI Phase III Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase III Work Plan. Within 30 days of receipt of such comments, the Permittee must modify so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 45 days of the Regional Administrator's approval of the RFI Phase III Work Plan, the Permittee shall implement the RFI Phase III Work Plan according to the terms and schedule in the RFI Phase III Work Plan. The Regional Administrator will determine, based on the RFI Phase III Final Release Characterization Report, whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

c. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 240 days after the effective date of this permit, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modifications, as appropriate (see Condition V.F.31.).

e. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous wastes or constituents in that media.

7. McComish Gorge SWMU

a. Interim Measures (IMs)

The Permittee shall implement the IM of removal of all visible debris protruding for the SWMU. Within 90 days after the effective date of this permit, the Permittee shall submit an Interim Measures Report describing how all visible debris protruding from the SWMU was removed, and how it was managed as a hazardous or nonhazardous waste.

b. RFI Phase III Release Characterization for Ground Water

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase III Release Characterization Work Plan to the Regional Administrator, within 510 days after the effective date of this permit, to determine the rate and extent of migration of hazardous waste or hazardous constituents and the concentrations of the hazardous waste or hazardous constituents in the ground water. The contents of this RFI Phase III Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase III Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 45 days of the Regional Administrator's approval of the RFI Phase III Work Plan, the Permittee shall implement the RFI Phase III

Work Plan according to the terms and schedule in the RFI Phase III Work Plan. The Regional Administrator will determine, based on the RFI Phase III Final Release Characterization Work Plan, whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

c. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 270 days after the effective date of this permit, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of the RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Adminiastrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modifications, as appropriate (see Condition V.F.31.).

8. Mustard Gas Burial Ground SWMU

a. RFI Phase II Release Assessment for Ground Water

The Permittee shall submit a written RCRA Facility Investigation (RFI) Release Assessment Work Plan to the Regional Administrator, within 480 days after the effective date of this permit, to document the absence or presence of hazardous waste or hazardous constituents in the ground water. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 45 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future release do not occur.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 300 days after the effective date of this permit, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phase III, CMS and CMI studies, and Permit Modifications, as appropriate (see Condition V.F.31.).

d. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous wastes or constituents in that media.

9. Rockeye SWMU

a. RFI Phase III Release Characterization for Ground Water

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase III Release Characterization Work Plan to the Regional Administrator, within 150 days after the effective date of this permit, to determine the rate and extent of migration of hazardous waste or hazardous constituents and the concentrations of the hazardous wastes or hazardous constituents in the ground water. The contents of this RFI Phase III Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide conmments to the Permittee as to the corrections or modifications needed for the RFI Phase III Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 45 days of the Regional Administrator's approval of the RFI Phase III Work Plan, the Permittee shall implement the RFI Phase III Work Plan according to the terms and schedule in the RFI Phase III Work Plan. The Regional Administrator will determine, based on the RFI Phase III Final Release Characterization Report, whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 210 days after the effective date of this permit, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of the RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modifications, as appropriate (see Condition V.F.31.).

d. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II or Phase III Investigation Reports, that a surface water body, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous wastes or constituents in that media.

10. Old Storage Building 225 SWMU

a. Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 540 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

11. Load and Fill Area, Building 106 Pond SWMUs

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrater, within 570 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

12. Mine Fill A SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 600 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

13. Mine Fill B SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 630 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

14. Sanitary Landfill and Lithium Battery SWMUs

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 660 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. Upgrading Monitoring Programs/RFI Phase II Release Assessment

If the Regional Administrator determines, based on ground water, air, surface water, soil, and/or sediment monitoring programs, that any monitoring program needs modifications to demonstrate the absence or presence of hazardous waste or hazardous constituents released to the environment, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents released to the environment from the SWMU. Within 60 days of the determination by the Regional Administrator, the Permittee must submit the RFI Phase II Release Assessment Work Plan. The contents of this RFI Phase II Work Plan are outlined in Attachment III, or as modified by the Regional Administrator in the notification, if the monitoring program is adequate and only minor modifications are necessary (e.g., more 40 CFR Part 264 Appendix IX constituents). The Regional Administrator will approve, modify and approve, or disapprove, and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of comments, the Permittee must modify the plan, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedules in the RFI Phase II Work Plan. If the Regional Administrator determines, based on chemical data from the RFI phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be so notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phase III, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

15. Roads and Grounds Area SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 690 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

16. Cast High Explosives Fill/Incineration Complex SWMUs

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 720 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases II and III, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

17. PCB Capacitor Burial/Pole Yard SWMU

a. Interim Measures (IMs)

The Permittee shall implement the IM of SWMU source location, in order to define the exact location of the SWMU. Within 750 days after the effective date of the permit, the Permittee shall submit an IM Work Plan to the Regional Administrator. The IM Work Plan shall include the method of locating the source, quality assurance/quality control plan, a health and safety plan, and a data management plan. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the IM Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments. Within 30 days of the Regional Administrator's approval of the IM Work Plan, the Permittee shall implement the IM Work Plan according to the terms and schedule in the IM Work Plan.

b. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 750 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

c. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases II and III, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

18. Load and Fill Area Building SWMUs

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 780 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval.

Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

19. Pyrotechnic Test Area SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 810 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil and Surface Water Bodies

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil and surface water bodies. The contents of this RFI Phase II Work

Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

20. CAAA QA/QC Test Area SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 840 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

21. DRMO Storage Lot SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 870 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

22. Lead Azide SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 900 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

23. Battery Shop SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 930 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

24. Sludge Drying Bed SWMUs

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 960 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Soil

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the soil. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

25. Highway 58 Dump Site A SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 990 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

26. Highway 58 Dump Site B SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 1020 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

27. Illuminant Building 126 SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 1050 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

28. Maintenance Shop, Building 1820 SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 1080 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

29. PCP Dip Tank, Building 56 SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 1110 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

30. Land Farm SWMU

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 1140 days after the effective date of this permit, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measures (CMs) taken. The contents of the RFI Phase I Environmental Monitoring Report are outlined in Attachment III.

b. RFI Phase II Release Assessment for Ground Water

The Permittee shall submit a written RCRA Facility Investigation (RFI) Phase II Release Assessment Work Plan to the Regional Administrator, within 60 days of the Regional Administrator's approval of the Phase I Environmental Monitoring Report, to document the absence or presence of hazardous waste or hazardous constituents to the ground water. The contents of this RFI Phase II Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove and provide comments to the Permittee as to the corrections or modifications needed for the RFI Phase II Work Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedule in the

RFI Phase II Work Plan. If the Regional Administrator determines, based on the chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. Cross-media Investigations

If the Regional Administrator determines, based on the Final RFI Phase II Release Assessment or RFI Phase III Release Characterization (if necessary), that a ground water, or any other cross-media investigation is necessary, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents in that media.

d. Other Corrective Action Phases

The Permittee shall follow the Corrective Action steps for RFI Phases, CMS and CMI studies, and Permit Modification, as appropriate (see Condition V.F.31.).

31. Corrective Action Phases for SWMUs

a. RFI Phase I Environmental Monitoring Report

The Permittee shall submit a written RFI Phase I Environmental Monitoring Report to the Regional Administrator, within 120 days of identification of a new SWMU, to document the past and present monitoring requirements under Federal, State, and local authorities, any known releases of hazardous waste or hazardous constituents, and any Corrective Measure (CMs) taken. The content of the RFI Phase I Environmental Monitoring Report is outlined in Attachment III.

b. Upgrading Monitoring Programs/RFI Phase II Release Assessment

If the Regional Administrator determines, based on ground water, air, surface water, soil, and/or sediment monitoring programs, that any monitoring program needs modifications to demonstrate the absence or presence of hazardous waste or hazardous constituents released to the environment, the Permittee will be so notified and must submit an RFI Phase II Release Assessment to document the absence or presence of hazardous waste or hazardous constituents released to the environment from the SWMUs identified. Within 120 days of the determination by the Regional Administrator, the Permittee must submit the RFI Phase II Release Assessment Work Plan.

The contents of this RFI Phase II Work Plan are outlined in Attachment III, or as modified by the Regional Administrator in the notification, if the monitoring program is adequate and only minor modifications are necessary (e.g., monitoring more 40 CFR §264 Appendix IX constituents). The Regional Administrator will approve, modify and approve, or disapprove, and provide comments to the Permittee as to the corrections or modifications needed for RFI Phase II Work Plan. Within 30 days of receipt of comments, the Permittee must modify the plan, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase II Work Plan, the Permittee shall implement the RFI Phase II Work Plan according to the terms and schedules in the RFI Phase II Work Plan. If the Regional Administrator determines, based on chemical data from the RFI Phase II Release Assessment, that there has been no release of hazardous waste or hazardous constituents to the environment, the Permittee will be notified if a Corrective Action Monitoring Plan will be required, and the length of time it must continue, in order to assure that future releases do not occur.

c. RFI Phase III Release Characterization

If the Regional Adminstrator determines, based on the RFI Phase I Report or on chemical data from the RFI Phase II Release Assessment, that there has been a release of hazardous waste or hazardous constituents to the environment from the SWMUs, the Permittee will be so notified and must submit an RFI Phase III Release Characterization to determine the rate and extent of migration of hazardous waste or hazardous constituents and their concentrations in the ground water and/or soil. Within 120 days of the determination by the Regional Administrator, the Permittee shall submit an RFI Phase III Release Characterization Work Plan. The contents of the RFI Work Plan are outlined in Attachment III. The Regional Administrator will approve, modify and approve, or disapprove, and provide comments to the Permittee as to the Plan. Within 30 days of receipt of such comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new plan for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the RFI Phase III Work Plan, the Permittee shall implement the RFI Phase III Work Plan according to the terms and schedule in the RFI Phase III Work Plan. The Regional Administrator will determine, based on the RFI Phase III Final Release Characterization Report whether Corrective Measures (CMs) are necessary. If the Regional Administrator determines that CMs are not necessary, no further action will be required.

d. Corrective Measures Study (CMS)

If CMS are determined to be necessary, the Regional Administrator will notify the Permittee and will specify the target performance objectives that any corrective measure would be expected to meet. The contents for a Scope of Work for a Corrective Measures Study (SOW/CMS) are outlined in Attachment III. Within 120 days of the Regional Administrator's determination, the Permittee shall submit to the Regional Administrator a draft SOW/CMS. The Regional Administrator will approve, modify and approve, or disapprove, and provide comments to the Permittee as to the corrections or modification needed for the SOW/CMS. Within 30 days of receipt of comments, the Permittee must modify, so as to reflect the changes required in the Regional Administrator's comments, or submit a new SOW/CMS for the Regional Administrator's approval. Within 30 days of the Regional Administrator's approval of the SOW/CMS, the Permittee shall implement a Corrective Measures Study (CMS) according to the requirements and schedules contained in the SOW/CMS. The purpose of the CMS will be to develop and evaluate the corrective action alternative(s) and to outline one or more alternative Corrective Measure(s) which will satisfy the performance objectives specified by the Regional Administrator. Within 12 months after receipt of the SOW/CMS approval, the Permittee shall submit a Final CMS. The Regional Administrator will approve, modify and approve, or disapprove, and provide comments to the Permittee as to the corrections or modifications needed for the CMS. Within 30 days of receipt of such comments, the Permittee must modify the CMS, so as to reflect the changes required in the Regional Administrator's comments, or submit a new study for the Regional Administrator's approval of one or more of the Corrective Measure(s) which will be based on performance, reliability, implementability, safety, human health and environmental impact of the measure(s).

e. Permit Modification

Within 90 days after receipt of the Regional Administrator's approval of the CMS, this permit will be modified (per 40 CFR §124.5) to incorporate that Corrective Measure(s) selected by the Permittee, from among those alternative Corrective Measure(s) approved by the Regional Administrator. Within 90 days after public notice and modification of this permit, the Permittee shall begin the Corrective Measure(s) Implementation (CMI) according to the approved modification work plans.

G. CORRECTIVE ACTION SCHEDULE OF COMPLIANCE EXTENSIONS FOR FEDERAL FACILITIES

1. Requests for an Extension

Within 15 days of any anticipated need for a change in the corrective action compliance schedule, the Permittee shall submit a request for an extension to the Regional Administrator for approval.

a. Contents of a Request for an Extension

Any request for an extension by the Permittee shall be submitted in writing and shall specify the following:

(1) The corrective action requirement that is sought to be extended;

(2) The length of the extension sought;

(3) The good cause(s) for the extension; and

(4) Any related corrective action requirement that would be affected if the extension were granted.

b. What Constitutes Good Cause

Good cause exists for an extension when sought in regard to the following:

(1) An event of Force Majeure;

(2) A delay caused by the good faith invocation of dispute resolution or the initiation of judicial action;

(3) A delay caused, or which is likely to be caused, by the grant of an extension in regard to another corrective action requirement; and

(4) Any other event or series of events mutually agreed to by the Permittee and the U.S. EPA as constituting good cause.

c. Definition of Force Majeure

When the Permittee, as a Federal Facility, asserts the occurence of a Force Majuere as good cause for a compliance extension, the Permittee shall have the burden of proof to establish that a force majuere event has occured. For the purposes of the corrective action requirements of this permit for the facility (Naval Weapons Support Center (NWSC), located in Crane, Indiana), "Force Majeure" shall mean any event arising from causes beyond the control of the Permittee that cause a delay in, or prevents the performance of, any corrective action obligation under this permit, including but not limited to:

(1) Acts of God;

(2) Fire;

(3) War;

(4) Insurrection;

(5) Civil disturbance;

(6) Explosion;

(7) Unanticipated breakage or accident to machinery, equipment, or lines of pipe, despite reasonably diligent maintenance;

(8) Adverse weather conditions that could not be reasonably anticipated;

(9) Unusual delay in transportation;

(10) Restraint by court order or order of public authority;

(11) Inability to obtain, at reasonable cost, and after excercise of reasonable diligence, any necessary authorizations, approvals, permits, or licenses, due to action or inaction of any governmental agency or authority, other than the Permittee;

(12) Delays caused by compliance with applicable statutes or regulations governing contracting, procurement or acquisition procedures, despite the excercise of reasonable diligence; and

(13) Insufficient availability of appropriated funds, if the Permittee shall have made a timely request for such funds as a part of the budgetary process as set forth in this permit under Condition H.

A Force Majeure shall also include any strike or other labor dispute, whether or not within control of the Parties affected thereby. Force Majeure shall not solely include increased costs or expenses of Corrective Measures, whether or not anticipated at the time such Corrective Measures were initiated.

c. Disposition of the Request

(1) U.S. EPA Review

Upon receipt of a request for an extension for corrective action activities from the Permittee, as soon as possible, the U.S. EPA shall review the request and approve, modify and approve, or disapprove the request. The U.S. EPA shall notify the Permittee of the decision on the request for an extension (approval, modifications and approval, or denial), and the basis for the modifications or denial which may have occurred through a phone conversation. The verbal communication shall be verified to the Permittee in writing.

(2) Approval of the Request

If the request is approved, the Permittee shall extend the affected corrective action compliance schedule accordingly, and submit a revised copy of the compliance schedule to the Regional Administrator.

(3) Denial or Dispute of the Request

If the request for an extension is not approved, or the Permittee does not agree with the modifications, the Permittee may seek modification of this permit through 40 CFR §124.5, or the Permittee may seek and obtain a determination through any available existing dispute resolution process for federal facility corrective actions, that may be established by the Administrator of the U.S. EPA and the Office of the Secretary of the Navy.

H. FUNDING FOR CORRECTIVE ACTION ACTIVITIES

It is the expectation of the U.S. EPA and the Permittee that all obligations of the Permittee, for the facility NWSC (located in Crane, Indiana), arising under this permit will be fully funded. The Permittee agrees to seek sufficient funding through the Department of Defense (DoD) budgetary process to fulfill its obligations under this permit.

a. Congressional Annual Reports

The Permittee shall include in its annual report to Congress, pursuant to CERCLA §120(e)(5), (42 U.S.C. §9620(e)(5)), the specific cost estimates and budgetary proposals associated with the implementation of corrective action requirements for this permit. A copy of the Congressional annual report shall be maintained at the facility.

b. Obligation of Funds

Federal facilities are required by Section 6001 of RCRA, (42 U.S.C. §6961), to comply with all Federal and State requirements of RCRA. However, any requirement for the payment or obligation of funds, by the Permittee, established by the terms of this permit, shall be subject to the availability of appropriated funds, and no provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. Section 1341. In cases where payment or obligation of funds would constitute a violation of the Anti-Deficiency Act, the dates established requiring the payment or obligation of such funds shall be appropriately adjusted.

c. Authorized Funding

Funds authorized and appropriated annually by Congress under the "Environmental Restoration, Defense" appropriation in the DoD Appropriation Act, and allocated by the DoD to the Permittee, will be the source of funds for corrective action activities at the NWSC facility (located in Crane, Indiana) required by this permit, consistent with the Superfund Amendments and Reauthorization Act of 1986 (SARA) Section 211 (10 U.S.C. Chapter 160).

However, should the Environmental Restoration Defense appropriation be inadequate in any year to meet the total Department of the Navy CERCLA implementation requirements, the DoD has agreed to employ, and the Permittee shall follow, a standardized DoD prioritization process which allocates that year's appropriations in a manner which maximizes the protection of human health and the environment. A standardized DoD prioritization model shall be developed and utilized with the assistance of the U.S. EPA and the States.

I. CORRECTIVE ACTION PUBLIC RELATIONS

The Permittee shall establish a Technical Review Committee (TRC) for the purpose of affording local officials and citizens the opportunity to become informed on, and express their opinion about, the technical aspects of the RFI, CMS, and CMI Phases of corrective action. The Permittee shall notify the U.S. EPA and the Indiana Department of Environmental Management (IDEM), at least 2 weeks before, of the meetings/activities and afford them the opportunity to participate in the event. Regular meetings/activities shall occur at the facility, at least annually, or as necessary to inform the public of key decisions in the corrective action program for the facility. Minutes of the TRC meetings, and any documents distributed at the meetings, shall be maintained at the facility and distributed to the U.S. EPA, IDEM, and any interested party upon request.

This permit is based on the assumption that the information submitted in the permit application attached to the Permittee's letter, dated October 12, 1984, and in any subsequent amendments (hereinafter referred to as the application), and in the certification regarding potential releases from solid waste management units, dated June 13, 1985, is accurate. Any inaccuracies found in this information may be grounds for the termination, revocation and reissuance, or modification of this permit (see 40 CFR §270.41, §270.42 and §270.43) and potential enforcement action. The Permittee must inform U.S. EPA of any deviation from or changes in the information in the submitted information.

Effective Date:

The RCRA permit is effective when both this permit and the State permit are effective. This permit is effective as of thirty days after service of notice, unless a review is requested under 40 CFR §124.19 (unless no comments requested a change in the draft permit in which case the permit shall become effective immediately upon issuance), and shall remain in effect for 5 years, unless revoked and reissued, or terminated (40 CFR §270.41, §270.42, and §270.43), or continued in accordance with 40 CFR §270.51.

Issued this 20th day of Dec. 1989,

by Norman Niedergang.
for Basil G. Constantelos, Director
Waste Management Division

ATTACHMENT I

WASTE ANALYSIS PLAN
for
LAND DISPOSAL RESTRICTIONS

and the

LAND DISPOSAL PLAN

LAND DISPOSAL PLAN

A. RECORDKEEPING (Operating Record)

The Permittee shall characterize the waste as outlined in this Attachment. The Permittee must record the following information, as it becomes available, and maintain it in the operating record until closure of the facility:

1. Storage of Files

For on-site treatment, the Permittee shall maintain all records, from one part of the facility to another, in one central file system or separate file systems. The records may be computerized, but must be made into hard copies and certified by an authorized representative, upon request of the Regional Administrator.

2. Generator Recordkeeping

a. Wastes Generated That Do Not Meet the Treatment Standard

If the Permittee (generator) determines that he is managing a restricted waste under 40 CFR Part 268 and the waste does not meet the applicable treatment standards set forth in 40 CFR Part 268, Subpart D, or exceeds the applicable prohibition levels set forth in 40 CFR §268.32 or RCRA Section 3004(d), with each shipment of waste, or monthly for continuous waste streams (pipelines), the generator must notify the treatment or storage facility in writing of the appropriate treatment standards, set forth in 40 CFR Part 268, Subpart D, and any applicable prohibition levels set forth in 40 CFR §268.32 or RCRA Section 3004(d).

(1) The notice must include the following information:

(a) EPA Hazardous Waste Number;

(b) The corresponding treatment standards and all applicable prohibitions set forth in 40 CFR §268.32 or RCRA Section 3004(d);

(c) The manifest number associated with the shipment of waste, if applicable; and

(d) Waste analysis data, where available.

b. Wastes Generated That Can Be Disposed Without Further Treatment

If the Permittee (generator) determines that he is managing a restricted waste under 40 CFR Part 268, and determines that the waste can be land disposed without further treatment, with each shipment of waste, or monthly for continuous waste streams (pipelines), the Permittee must submit to the treatment, storage, or land disposal facility, a notice and a certification stating that the waste meets the applicable treatment standards, set forth in 40 CFR Part 268, Subpart D, and the applicable prohibitions set forth in 40 CFR §268.32 or RCRA Section 3004(d).

(1) The notice must include the following information:

(a) EPA Hazardous Waste Number;

(b) The corresponding treatment standards and all applicable prohibitions set forth in 40 CFR §268.32 or RCRA Section 3004(d);

(c) The manifest number associated with the shipment of waste, if applicable; and

(d) Waste analysis data, where available.

(2) The certification must be signed by an authorized representative and must 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. Wastes Subject to Extensions, Exemptions, or Variances

If the Permittee's (generator's) waste is 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, with each shipment of waste, or monthly for continuous waste streams (pipelines), the Permittee must submit a notice to the facility receiving the Permittee's waste, stating that the waste is not prohibited from the land disposal.

(1) The notice must include the following information:

(a) EPA Hazardous Waste Number;

(b) The corresponding treatment standards and all applicable prohibitions set forth in 40 CFR §268.32 or RCRA Section 3004(d);

(c) The manifest number associated with the shipment of waste;

(d) Waste analysis data, where available; and

(e) The date the waste is subject to the prohibitions.

d. <u>Waste Subject to the Prohibitions Under 40 CFR §268.33(f) (First Thirds)</u>

If the Permittee (generator) determines that he is managing a waste that is subject to the prohibitions under 40 CFR §268.33(f), and is not subject to the prohibitions set forth in 40 CFR §268.32, with each shipment of waste, the generator must notify the treatment, storage, or disposal facility, in writing, of any applicable prohibitions set forth in 40 CFR §268.33(f).

(1) The notice must include the following information:

(a) EPA Hazardous Waste Number;

(b) The applicable prohibitions set forth in 40 CFR §268.33(f);

(c) The manifest number associated with the shipment of waste; and

(d) Waste analysis data, where available.

e. <u>Determining Restrictions Based on Knowledge</u>

If the Permittee (generator) determines whether the waste is restricted based solely on his knowledge of the waste, all supporting data used to make this determination must be maintained on-site in the Permittee's files.

f. Determining Restrictions Based on Analysis

If the Permittee (generator) determines whether the waste is restricted based on testing this waste or an extract developed using the test method described in 40 CFR Part 268 Appendix I, all waste analysis data must be retained on-site in the Permittee's files.

g. Record Retention Period

The Permittee (generator) must retain on-site a copy of all notices, certifications, demonstrations, waste analysis data, and other documentation produced pursuant to 40 CFR §268.7 and §268.8, for at least 5 years from the date that the waste, which is the subject of such documentation, was last sent to on-site or off-site treatment, storage or disposal. The 5-year record retention period is automatically extended during the course of any unresolved enforcement action regarding the regulated activity or as requested by the Regional Administrator.

h. First Third Restrictions

(1) Prior to May 8, 1990

Wastes which are otherwise prohibited from land disposal under 40 CFR §268.33(f) may be disposed in a landfill or surface impoundment which is in compliance with the requirements of 40 CFR §268.5(h)(2), provided the requirements of 40 CFR §268.8 are met.

(a) Good Faith Effort

Prior to such disposal, the Permittee (generator) must make a good faith effort to locate and contract with treatment and recovery facilities practically available which provide the greatest environmental benefit.

(b) Demonstration and Certification

The Permittee (generator) must submit to the Regional Administrator a demonstration and certification that the requirements of 40 CFR §268.8(a)(1) (Condition A.2.h.(a), above) have been met. The demonstration must include a list of facilities and facility officials contacted, addresses, telephone numbers, and contact dates.

(i) No Practically Available Treatment

(A) If the Permittee (generator) determines that there is no practically available treatment for his waste, he must indicate so in his demonstration, and provide a written discussion of why he was not able to obtain treatment or recovery for that waste.

(B) Certification

The Permittee (generator) must also provide the following certification:

"I certify under penalty of law that the requirements of 40 CFR 268.8(a)(1) have been met and that disposal in a landfill or surface impoundment is the only practical alternative to treatment currently available. I believe that the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

(ii) Practically Available Treatment

(A) Demonstration and Contract

If the Permittee (generator) determines that there are practically available treatments for his waste, he must contract to use the practically available technology that yields the greatest environmental benefit, as indicated in his demonstration.

(B) Certification

The Permittee (generator) must provide the following certification:

"I certify under penalty of law that the requirements of 40 CFR 268.8(a)(1) have been met and that I have contracted to treat my waste (or will otherwise provide treatment) by the practically available technology which yields the greatest environmental benefit, as indicated in my demonstration. I believe that the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

(c) Shipping of Wastes

(i) No Practically Available Treatment

Where the Permittee (generator) has determined that there is no practically available treatment for his waste prior to disposal, he must do the following:

(A) Initial Shipment

With the initial shipment of waste, the Permittee (generator) must submit a copy of the demonstration and the certification required in 40 CFR §268.8(a)(2)(i) (Condition A.2.h.(1)(b), above) to the receiving facility.

(B) Subsequent Shipment

With each subsequent waste shipment, only the certification, required in 40 CFR §268.8(a)(2)(i), is required to be submitted provided that the conditions being certified remain unchanged.

(ii) Practically Available Treatment

Where the Permittee (generator) has determined that there is practically available treatment for his waste prior to disposal, he must do the following:

(A) Initial Shipment

With the initial shipment of waste, the Permittee (generator) must submit a copy of the demonstration and the certification required in 40 CFR §268.8(a)(2)(ii) (Condition A.2.h.(1)(b), above) to the receiving facility.

(B) Subsequent Shipment

With each subsequent waste shipment, only the certification, required in 40 CFR §268.8(a)(2)(ii), is required to be submitted provided that the conditions being certified remain unchanged.

(2) Regional Administrator Review

After receiving the demonstration and certification, required in 40 CFR §268.8(a)(2), the Regional Administrator may request any additional information which he deems necessary to evaluate the certification.

(a) Notification of Changes

The Permittee (generator) must immediately notify the Regional Administrator when he has knowledge of any change in the conditions which formed the basis of his certification submitted under 40 CFR §268.8.

(b) Invalidation of Certification

If, after review of the certification or subsequent notifications, the Regional Administrator determines that practically available treatment exists where the Permittee (generator) has certified otherwise, or that there exists some other method of practically available treatment yielding greater environmental benefit than that which the Permittee (generator) has certified, the Regional Administrator may invalidate the certification. If the Regional Administrator invalidates a certification, the Permittee (generator) must immediately:

(i) Cease further shipments of waste;

(ii) Inform all facilities that received the waste of such invalidation; and

(iii) Keep records of such communications on-site in his files.

3. Treatment Facility Recordkeeping

a. Wastes or Treatment Residues That Do Not Meet the Treatment Standards or Prohibitions

If the waste or treatment residues will be further managed at a different treatment or storage facility off-site, the Permittee (treater) must comply with the notice and certification requirements applicable to generators under 40 CFR §268.7.

b. Notification

(1) Treatment Residues Subject to Treatment Standards

For treatment residues which meet or do not meet the applicable standards, and are to be sent off-site, a notice must be sent with each waste shipment, to the land disposal facility (i.e., surface impoundment or landfill) which includes the following information:

(a) EPA Hazardous Waste Number;

(b) The corresponding treatment standards and all applicable prohibitions set forth in 40 CFR §268.32 or RCRA Section 3004(d);

(c) The manifest number associated with the shipment of waste, if applicable; and

(d) Waste analysis data, where available.

(2) Wastes Subject to the Prohibitions Under 40 CFR §268.33(f)

For wastes that are subject to the prohibitions under 40 CFR §268.33(f) and are not subject to the prohibitions set forth in 40 CFR §268.32, with each shipment of such waste, or monthly for continuous waste streams (pipelines), the Permittee (treater) must notify any subsequent treatment, storage, or disposal facility, in writing, of any applicable prohibitions set forth in 40 CFR §268.33(f). The notice must include the following information:

(a) EPA Hazardous Waste Number;

(b) The applicable prohibitions set forth in 40 CFR §268.33(f);

(c) The manifest number associated with the shipment of waste; and

(d) Waste analysis data, where available.

c. Certification

The Permittee (treater) must submit a certification, or maintain such certification on file in the case of on-site management with each shipment of waste or treatment residue of a restricted waste, to the land disposal facility that the waste or treatment residue has been treated in compliance with the applicable performance standards specified in 40 CFR Part 268, Subpart D, and the applicable prohibitions set forth in 40 CFR §268.32 or RCRA Section 3004(d).

d. Certification for Wastes with Treatment Standard Concentrations

For wastes with treatment standards expressed as concentrations in the waste extract or in the waste (40 CFR §268.41 or §268.43), or for wastes prohibited under 40 CFR §268.32 or RCRA Section 3004(d) which are not subject to any treatment standards under 40 CFR Part 268, Subpart D, the certification must be signed by an authorized representative and must state the following:

"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and that, based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the performance levels specified in 40 CFR Part 268, Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d) without dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

e. Certification for Wastes with Treatment Standard Technologies

For wastes with treatment standards expressed as technologies (40 CFR §268.42), the certification must be signed by an authorized representative and must state the following:

"I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.42. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

f. First Third Restriction

(1) Certification

The Permittee (treater) must certify that he has treated the waste in accordance with the generator's demonstration. The following certification is required:

"I certify under penalty of the law that I have personally examined and am familiar with the treatment technology and operation of treatment process used to support this certification and that, based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the performance levels specified in 40 CFR Part 268, Subpart D and all applicable prohibitions set forth in 40 CFR Part 268.32 or RCRA Section 3004(d) without dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

(2) Shipping of Waste

The Permittee (treater) must send a copy of the generator's demonstration (if applicable) and certification under 40 CFR §268.8 (a)(2), and certification under 40 CFR §268.8(c)(1) (if applicable) to the facility receiving the waste or treatment residues.

4. Storage Facility Recordkeeping

a. Wastes or Treatment Residues Further Managed Off-site

If the waste or treatment residue will be further managed at a different treatment or storage facility off-site, the Permittee (storer) must comply with the notice and certification requirements applicable to generators under 40 CFR §268.7.

b. First Third Restrictions

The Permittee (storer) receiving wastes subject to a valid certification must have copies of the generator's demonstration (if applicable) and certification required in 40 CFR §268.8 in his operating record.

(1) Shipping of Wastes

The Permittee (storer) must send a copy of the generator's demonstration (if applicable) and certification under 40 CFR §268.8(c)(1) (if applicable) to the facility receiving the waste or treatment residues.

B. TREATABILITY

1. Treatment Residues

Treatment residues from restricted wastes must continue to be treated until they meet the treatment standard.

2. Paint Filter Liquids Test

If a waste fails the Paint Filter Liquids Test for the purpose of the California Waste listing, the waste would also be considered a liquid waste.

C. PROHIBITIONS ON LAND DISPOSAL

1. Solvent Wastes

a. Effective November 8, 1986

The spent solvent wastes specified in 40 CFR §261.31 as EPA Hazardous Waste Numbers F001, F002, F003, F004, and F005 are prohibited under 40 CFR Part 268, Subpart C, from land disposal (except in an injection well) unless one or more of the following conditions apply:

(1) The generator of the solvent waste is a small quantity generator of 100-1000 kilograms of hazardous waste per month; or

(2) The solvent waste is generated from any response action taken under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) or any corrective action taken under the Resource Conservation and Recovery Act (RCRA), except where the waste is contaminated soil or debris;

(3) The initial generator's solvent waste is a solvent-water mixture, solvent-containing sludge or solid, or solvent-contaminated soil (non-CERCLA or RCRA corrective action) containing less than one percent (1%) total F001-F005 solvent constituents listed in 40 CFR §268.41 Table CCWE; or

(4) The solvent waste is a residue from treating a waste described in 40 CFR §268.30(a)(1), (a)(2), or (a)(3); or the solvent waste is a residue from treating a waste not described in 40 CFR §268.30(a)(1), (a)(2), or (a)(3) provided such residue belongs to a different treatability group than the waste as initially generated and wastes belonging to such a treatability group are described in 40 CFR §268.30(a)(3).

b. Effective November 8, 1990

The F001-F005 solvent wastes listed in 40 CFR §268.30(a)(1), (2), (3), and (4) (Condition C.1.a.(1), (2), (3), and (4) above) are prohibited from land disposal.

c. Effective November 8, 1990

The F001-F005 solvent wastes which are contaminated soil and debris resulting from a response action taken under Section 104 or 106 of CERCLA or a corrective action required under Subtitle C of RCRA and the residues from treating these wastes are prohibited from land disposal.

d. Between November 8, 1988 and November 8, 1990

The F001-F005 solvent wastes listed in 40 CFR §268.30(c) (Condition C.1.c. above) may be disposed of in a landfill or surface impoundment only if such unit is in compliance with the requirements specified in 40 CFR §268.5(h)(2).

e. The requirements of 40 CFR §268.30(a), (b), and (c) (Conditions C.1.a., b., c., and d., above) do not apply if:

(1) The wastes meet the standards of 40 CFR Part 268, Subpart D; or

(2) Persons have been granted an exemption from a prohibition, pursuant to a petition under 40 CFR §268.6, with respect to those wastes and units covered by the petition; or

(3) Persons have been granted an extension to the effective date of a prohibition, pursuant to 40 CFR §268.5, with respect to those wastes covered by the extension.

2. <u>Dioxin Containing Wastes</u>

a. <u>Effective November 8, 1988</u>

The dioxin-containing wastes specified in 40 CFR §261.31 as EPA Hazardous Waste Numbers F020, F021, F022, F023, F026, F027, and F028, are prohibited from land disposal unless the following condition applies:

(1) The F020-F023 and F026-F028 dioxin-containing wastes are contaminated soil and debris resulting from a response action taken under Section 104 or 106 of CERCLA or a corrective action taken under Subtitle C of RCRA.

b. <u>Effective November 8, 1990</u>

The F020-F023 and F026-F028 dioxin-containing wastes listed in 40 CFR §268.31(a)(1) are prohibited from land disposal.

c. <u>Between November 8, 1988 and November 8, 1990</u>

Wastes included in 40 CFR §268.31(a)(1) may be disposed in a landfill or surface impoundment only if such unit is in compliance with the requirements specified in 40 CFR §268.5(h)(2) and all other applicable requirements of 40 CFR Parts 264 and 265.

d. <u>The requirements of 40 CFR §268.31(a) and (b) (Condition C.2.a. and b. above) do not apply if:</u>

(1) The wastes meet the standards of 40 CFR Part 268, Subpart D; or

(2) Persons have been granted an exemption from a prohibition pursuant to a petition under 40 CFR §268.6, with respect to those wastes and units covered by the petition; or

(3) Persons have been granted an extension from the effective date of a prohibition pursuant to 40 CFR §268.5, with respect to those wastes covered by the extension.

3. California List Wastes

a. Effective July 8, 1987

The following hazardous wastes are prohibited from land disposal (except in injection wells):

(1) pH

Liquid hazardous wastes having a pH less than or equal to two (2.0);

(2) PCBs

Liquid hazardous wastes containing polychlorinated biphenyls (PCBs) at concentrations greater than or equal to 50 ppm;

(3) HOCs

(a) Liquid hazardous wastes that are primarily water and contain halogenated organic compounds (HOCs) in total concentration greater than or equal to 1,000 mg/l and less than 10,000 mg/l HOCs.

(b) HOCs are defined as any compounds having a carbo-halogen bond which are listed in 40 CFR Part 268, Appendix III.

(4) Metals

Liquid hazardous waste, including free liquids associated with any solid or sludge, containing the following metals (or elements) or compounds of these metals (or elements) at concentrations greater than or equal to those specified below:

(a) Arsenic and/or compounds (as As)......... 500 mg/l

(b) Cadmium and/or compounds (as Cd)......... 100 mg/l

(c) Chromium and/or compounds (as Cr VI)..... 500 mg/l

(d) Lead and/or compounds (as Pb)............ 500 mg/l

(e) Mercury and/or compounds (as Hg)......... 20 mg/l

(f) Nickel and/or compounds (as Ni).......... 134 mg/l

(g) Selenium and/or compounds (as Se)........ 100 mg/l

(h) Thalium and/or compounds (as Tl)......... 130 mg/l

(5) Cyanides

Liquid hazardous wastes, including free liquids associated with any solids or sludge, containing free cyanides at concentrations greater than or equal to 1,000 mg/l.

b. Effective November 8, 1988

The following hazardous wastes are prohibited from land disposal (subject to any regulations that may be promulgated with respect to disposal in injection wells):

(1) HOCs

(a) Liquid hazardous wastes that contain HOCs in total concentration greater than or equal to 1,000 mg/l and are not prohibited under 40 CFR §268.32(a)(3) (Condition C.3.a.(3)); and

(b) Nonliquid hazardous wastes containing HOCs in total concentration greater than or equal to 1,000 mg/kg and are not waste described in 40 CFR §268.32(d)

c. Between July 8, 1987 and November 8, 1988

The wastes included in 40 CFR §268.32(e)(1) and (2) (Condition C.3.b.(1)) may be disposed of in a landfill or surface impoundment only if such disposal is in compliance with the requirements specified in 40 CFR §268.5(h)(2) (Releases from Solid Waste Management Units, and Design and Operating Requirements).

d. The requirements of 40 CFR §268.32(a) and (e) (Conditions C.3.a and b.) do not apply until:

(1) July 8, 1989

Where the wastes are contaminated soil or debris not resulting from a response action taken under Section 104 or 106 of CERCLA, or a corrective action taken under Subtitle C of RCRA.

(2) Between July 8, 1987 and July 8, 1989

The waste may be disposed of in a landfill or surface impoundment only if such disposal is in compliance with the requirements specified in 40 CFR §268.5(h)(2).

(3) November 8, 1990

Where the wastes are contaminated soil or debris resulting from a response action taken under Section 104 or 106 or CERCLA of a corrective action taken under Subtitle C of RCRA.

(4) Between November 8, 1988 and November 8, 1990

The wastes may be disposed in a landfill or surface impoundment only is such unit is in compliance with the requirements specified in 40 CFR §268.5(h)(2).

e. The requirements of 40 CFR §268.32(a), (d), and (e) (Conditions C.3.a, b, and d.) do not apply if:

(1) Persons have been granted an exemption from a prohibition pursuant to a petition under 40 CFR §268.6, with respect to those wastes and units covered by the petition (except for liquid hazardous wastes containing polychlorinated biphenyls at concentrations greater than or equal to 50 ppm which are not eligible for such exemptions); or

(2) Persons have been granted an extension to the effective date of a prohibition pursuant to 40 CFR §268.5, with respect to those wastes covered by the extension; or

(3) The wastes meet the applicable standards specified in 40 CFR Part 268, Subpart D; or

(4) Where treatment standards are not specified, the wastes are in compliance with the applicable prohibitions set forth in 40 CFR Part 268.32 or RCRA Section 3004(d).

f. The prohibitions and effective dates specified in 40 CFR §268.32(a)(3), (d) and (e) (Conditions C.3.a., b., and d.) do not apply where the waste is subject to a 40 CFR Part 268, Subpart C, prohibition and effective date for a specified HOC (such as a hazardous waste chlorinated solvent, see e.g., 40 CFR §268.30(a)).

4. First Third Wastes

a. Effective August 8, 1988

The following hazardous wastes are prohibited from land disposal:

(1) F Series Wastes

EPA Hazardous Waste Number

(a) F006 (nonwastewater)

(2) K Series Waste

EPA Hazardous Waste Numbers

(a) K001;

(b) K004 (nonwastewater);

(c) K008 (nonwastewater);

(d) K015;

(e) K016;

(f) K018;

(g) K019;

(h) K020;

(i) K021 (nonwastewater);

(j) K022 (nonwastewater);

(k) K024;

(l) K025;

(m) K030;

(n) K036 (nonwastewater);

(o) K037;

(p) K044;

(q) K045;

(r) nonexplosive K046 (nonwastewater);

(s) K047;

(t) K060 (nonwastewater);

(u) K061 (nonwastewaters containing less than 15% zinc);

(v) K062;

(w) non $CaSO_4$ K069 (nonwastewaters);

(x) K083 (nonwastewaters);

(y) K086 (solvent washes);

(z) K087;

(aa) K099;

(bb) K100;

(cc) K101;

(dd) K102;

(ee) K103; and

(ff) K104.

b. <u>Effective August 8, 1988 and Continuing Until August 7, 1990</u>

K061 wastes containing 15% zinc or greater are prohibited from land disposal pursuant to the treatment standards specified in 40 CFR §268.41 applicable to K061 wastes containing less than 15% zinc.

c. <u>Effective August 8, 1990</u>

The wastes specified in 40 CFR §261.32 as EPA Hazardous Waste Numbers K048, K049, K050, K051, K052, K061 (containing 15% zinc or greater), and K071 are prohibited from land disposal.

d. Effective August 8, 1990

The wastes specified in 40 CFR §268.10 having a treatment standard in 40 CFR Part 268, Subpart D, based on incineration and which are contaminated soil and debris are prohibited from land disposal.

e. Between November 8, 1988 and August 8, 1990

Wastes included in 40 CFR §268.33(b) and (c) (Condition C.4.c. and d. above) may be disposed of in a landfill or surface impoundment only if such unit is in compliance with the requirements specified in 40 CFR §268.5(h)(2).

f. The requirements of 40 CFR §268.33(a), (b), (c), and (d) (Conditions C.4.a., b., c., d., and e., above) do not apply if:

(1) The wastes meet the applicable standards specified in 40 CFR Part 268, Subpart D; or

(2) Persons have been granted an exemption from a prohibition pursuant to a petition under 40 CFR §268.6, with respect to those wastes and units covered by the petition; or

(3) Persons have been granted an extension to the effective date of a prohibition pursuant to 40 CFR §268.5, with respect to those wastes covered by the extension.

g. Between August 8, 1988 and May 8, 1990

The wastes specified in 40 CFR §268.10 for which treatment standards under 40 CFR Part 268, Subpart D, are not applicable, including those wastes which are subject to the statutory prohibitions of RCRA Section 3004(d) or codified prohibitions under 40 CFR §268.32, but not including wastes subject to a treatment standard under 40 CFR §268.42, are prohibited from disposal in a landfill or surface impoundment unless the wastes are the subject of a valid demonstration and certification pursuant to 40 CFR §268.8.

h. Hazardous Wastes listed in 40 CFR §268.10 exceeding the Applicable Treatment Standards in 40 CFR §§268.41 and 268.43.

If the waste contains constituents in excess of the applicable 40 CFR Part 268, Subpart D, levels, based on the generator testing required in 40 CFR §268.33(g), the waste is prohibited from land disposal and all requirements of 40 CFR Part 268 are applicable, except as otherwise specified.

5. Second Third Wastes

a. Effective June 8, 1989

The Following hazardous wastes are prohibited from land disposal:

(1) F Series Wastes

EPA Hazardous Waste Number

(a) F010; and

(b) F024.

(2) K Series Wastes

EPA Hazardous Waste Number

(a) K005;

(b) K007;

(c) K009 (nonwastewaters);

(d) K010;

(e) K023;

(f) K027;

(g) K028;

(h) K029 (nonwastewaters);

(i) K036;

(j) K038;

(k) K039;

(l) K040;

(m) K043;

(n) K093;

(o) K094;

(p) K095 (nonwastewaters);

(q) K096 (nonwastewaters);

(r) K113;

(s) K114;

(t) K115; and

(u) K116.

(3) P Series Wastes

EPA Hazardous Waste Number

(a) P013;

(b) P021;

(c) P029;

(d) P030;

(e) P039;

(f) P040;

(g) P041;

(h) P043;

(i) P044;

(j) P062;

(k) P063;

(l) P071;

(m) P074;

(n) P085;

(o) P089;

(p) P094;

(q) P097;

(r) P098;

(s) P099;

(t) P104;

(u) P106;

(v) P109;

(w) P111; and

(x) P121.

(4) U Series Wastes

EPA Hazardous Waste Number

(a) U028;

(b) U058;

(c) U069;

(d) U087;

(e) U088;

(f) U102;

(g) U107;

(h) U221;

(i) U223; and

(j) U235.

b. Effective June 8, 1989

The following hazardous wastes specified in 40 CFR §261.32 are prohibited from land disposal, except when they are underground injected pursuant to 40 CFR §§148.14(f) and 148.15(d):

(1) K009 (wastewaters);

(2) K011 (nonwastewaters);

(3) K013 (nonwastewaters); and

(4) K014 (nonwastewaters).

c. Effective July 8, 1989

The following hazardous wastes specified in 40 CFR §261.31 are prohibited from land disposal:

(1) F006-cyanide (nonwastewaters);

(2) F008;

(3) F009;

(4) F011 (wastewaters); and

(5) F012 (wastewaters).

d. Effective July 8, 1989

The waste specified in 40 CFR §261.31 as EPA Hazardous Waste Number F007 is prohibited from land disposal, except when it is underground injected pursuant to 40 CFR §148.14(f).

e. Effective July 8, 1989 and continuing until December 8, 1989

EPA Hazardous Waste Numbers F011 (nonwastewaters) and F012 (nonwastewaters) are prohibited from land disposal pursuant to the treatment standards specified in 40 CFR §§268.41 and 268.43 applicable to F007, F008, and F009 nonwastewaters.

f. Effective December 8, 1989

EPA Hazardous Waste Numbers F011 (nonwastewaters) and F012 (nonwastewaters) are prohibited from land disposal pursuant to the treatment standards specified in 40 CFR §§268.41 and 268.43 applicable to F011 (nonwastewaters) and F012 (nonwastewaters).

g. Effective June 8, 1991

The wastes specified in 40 CFR §268.34 having a treatment standard in 40 CFR Part 268, Subpart D, based on incineration, and which are contaminated soil and debris, are prohibited from land disposal.

h. Between June 8, 1989 and June 8, 1991

For EPA Hazardous Waste Numbers F007, F009, F011, and F012 between June 8, 1989 and July 8, 1989: wastes included in 40 CFR §268.34(c) and (d) may be disposed in a landfill or surface impoundment, regardless whether such unit is a new, replacement, or lateral expansion unit, only if such unit is in compliance with the technical requirements specified in 40 CFR §268.5(h)(2).

i. The Requirements of 40 CFR §268.34(a), (b), and (c) (Condition C.5.a., b., c., d., and e. above) do not apply if:

Persons have been granted an extension to the effective date of a prohibition pursuant to 40 CFR §268.5, with respect to those wastes covered by the extension.

j. Between June 8, 1989 and May 8, 1990

The wastes specified in 40 CFR §268.11 for which treatment standards under 40 CFR Part 268, Subpart D, are not applicable, including California List wastes subject to the statuartory prohibitions of RCRA Section 3004(d) or codified prohibitions under 40 CFR §268.32, are prohibited from disposal in a landfill or surface impoundment unless the wastes are the subject of a valid demonstration and certification pursuant to 40 CFR §268.8.

k. Hazardous Wastes listed in 40 CFR §§268.10, 268.11, and 268.12 exceeding the Applicable Treatment Standards in 40 CFR §§268.41 and 268.43

If the waste contains constituents in excess of the applicable 40 CFR Part 268, Subpart D, levels, based on the generator testing required in 40 CFR §268.34(i), the waste is prohibited from land disposal and all requirements of 40 CFR Part 268 are applicable, except as otherwise specified.

6. Future Land Ban Regulations

The Permittee shall comply with all applicable future revisions or additions to 40 CFR Part 268.

D. TREATMENT STANDARDS

1. 40 CFR Part 268 Appendix I Test Method

A restricted waste identified in 40 CFR §268.41, may be land disposed only if an extract of the waste or the treatment residue of the waste developed using the test method in 40 CFR Part 268 Appendix I, does not exceed the values shown in Table CCWE of 40 CFR §268.41, for any hazardous constituent listed in Table CCWE for that waste.

2. Combined Waste Treatment Standard

When wastes with differing treatment standards for a constituent of concern are combined for the purposes of treatment, the treatment residues must meet the lowest treatment standard for the constituent of concern.

3. Treatment Standards Expressed as Specified Technologies

a. A restricted waste for which a treatment technology is specified under 40 CFR §268.42(a) may be land disposed after it is treated using that specified technology or an equivalent treatment method approved by the Regional Administrator under the procedures set forth in 40 CFR §268.42(b).

b. The following wastes must be treated using the identified technology or technologies, or an equivalent method approved by the Regional Administrator.

(1) PCBs

(a) Liquid hazardous wastes containing polychlorinated biphenyls (PCBs) at concentrations greater than or equal to 50 ppm but less than 500 ppm must be incinerated in accordance with the technical requirements of 40 CFR §761.70 or burned in high efficiency boilers in accordance with the technical requirements of 40 CFR §761.60.

(b) Liquid hazardous wastes containing polychlorinated biphenyls (PCBs) at concentrations greater than or equal to 500 ppm must be incinerated in accordance with the technical requirements of 40 CFR §761.70.

(c) Thermal treatment under 40 CFR §268.42 must also be in compliance with applicable regulations in 40 CFR Parts 264, 265, and 266.

(2) HOCs

(a) Nonliquid hazardous wastes containing halogenated organic compounds (HOCs) in total concentration greater than or equal to 1,000 mg/kg and liquid HOC-containing wastes that are prohibited under 40 CFR §268.32(e)(1) must be incinerated in accordance with the requirements of 40 CFR Part 264, Subpart O, or 40 CFR Part 265, Subpart O, or in boilers or industrial furnaces burning in accordance with applicable regulatory standards. These treatment standards do not apply where the waste is subject to a 40 CFR Part 268, Subpart C treatment standard for a specific HOC (such as a hazardous waste chlorinated solvent for which a treatment standard is established under 40 CFR §268.41(a)).

c. Alternative Treatment Technology

(1) The Permittee may submit an application to the Regional Administrator demonstrating that an alternative treatment method can achieve a measure of performance equivalent to that achievable by methods specified in 40 CFR 268.42(a). The Permittee must submit information demonstrating that his treatment method is in compliance with Federal, State and local requirements and is protective of human health and the environment. On the basis of such information and any other available information, the Regional Administrator may approve the use of the alternative treatment method if he finds that the alternative treatment method provides a measure of performance equivalent to that achieved by methods specified in 40 CFR §268.42(a).

(2) Any alternative treatment method approval from the Regional Administrator must be stated in writing and may contain such provisions and conditions as the Regional Administrator deems appropriate. Upon issuance, the approval becomes a part of this permit and the Permittee must comply with all limitations contained in such a determination.

4. Treatment Standards Expressed as Waste Concentrations

A restricted waste identified in 40 CFR §268.43 may be land disposed only if the constituent concentrations in the waste treatment residue of the waste do not exceed the value shown in Table CCW of 40 CFR §268.43 for any hazardous constituent listed in Table CCW for that waste.

E. PROHIBITIONS ON STORAGE

1. Except as provided in 40 CFR §268.50, the storage of hazardous wastes restricted from land disposal under 40 CFR Part 268, Subpart C, of RCRA Section 3004 is prohibited unless the following conditions are met:

   a. Generator Storage

      The Permittee stores such wastes in tanks or containers on-site solely for the purpose of the accumulation of such quantities of hazardous waste as necessary to facilitate proper recovery, treatment, or disposal and the Permittee complies with the requirements in 40 CFR §262.34.

   b. Treatment, Storage, or Disposal Facility Storage

      The Permittee stores such wastes in tanks or containers solely for the purpose of the accumulation of such quantities of hazardous waste as necessary to facilitate proper recovery, treatment, or disposal, and:

      (1) Container Labeling

         Each container is clearly marked to identify its contents and the date each period of accumulation begins; and

      (2) Tank Labeling

         Each tank is clearly marked with a description of its contents, the quantity of each hazardous waste received, and the date each period of accumulation begins, or such information for each tank is recorded and maintained in the operating record at the facility. Regardless of whether the tank itself is marked, the Permittee must comply with the operating record requirements specified in 40 CFR §264.73.

2. Storage for Up to One (1) Year

   The Permittee may store hazardous wastes restricted from land disposal under 40 CFR Part 268, Subpart C, or RCRA Section 3004, for up to 1 year, unless the U.S. EPA can demonstrate that such storage was not solely for the purpose of accumulation of such quantities of hazardous waste as are necessary to facilitate proper recovery, treatment, or disposal.

3. <u>Storage Greater than One (1) Year</u>

The Permittee may store hazardous waste restricted from land disposal under 40 CFR Part 268, Subpart C, or RCRA Section 3004, beyond 1 year; however, the Permittee bears the burden of proving that such storage was solely for the purpose of accumulation of such quantities of hazardous waste as necessary to facilitate proper recovery, treatment, or disposal.

4. <u>Applicability</u>

a. The prohibition of 40 CFR §268.50(a) (Condition E.1. above) does not apply to the wastes which are the subject of an approved petition under 40 CFR §268.6, a nationwide variance under in 40 CFR Part 268, Subpart C, an approved case-by-case extension under 40 CFR §268.5, or a valid certification under 40 CFR §268.8.

b. The prohibition in 40 CFR §268.50(a) (Condition E.1. above) does not apply to hazardous wastes that meet the treatment standards specified under 40 CFR §§268.41, 268.42, and 268.43 or the treatment standards specified under the variance in 40 CFR §268.44, or, where treatment standards have not been specified, or is in compliance with the applicable prohibitions specified in 40 CFR §268.32 or RCRA Section 3004.

5. <u>PCBs</u>

Liquid hazardous wastes containing polychlorinated biphenyls (PCBs) at concentrations greater than or equal to 50 ppm must be stored at a facility that meets the requirements of 40 CFR §271.65(b) and must be removed from storage and treated or disposed, as required by 40 CFR Part 268, within 1 year of the date when such wastes are first placed into storage. The provisions of 40 CFR §268.50(c) do not apply to such PCB wastes prohibited under 40 CFR §268.32.

6. <u>Accumulation</u>

Accumulation begins as soon as the first volume of waste is placed in the container or tank for storage.

F. PROHIBITIONS ON LIQUIDS IN LANDFILLS

1. In accordance with 40 CFR §264.314(b), the Permittee shall not place or dispose of liquid hazardous waste or hazardous waste containing free liquids (whether or not absorbents have been added) into a landfill.

2. In accordance with 40 CFR §264.314(e), the Permittee shall not place nonhazardous liquids into a hazardous waste landfill.

G. PROHIBITIONS ON EVAPORATION AS A MEANS OF TREATMENT

The Permittee shall not use evaporation of hazardous constituents as the primary means of treatment for purposes of obtaining an exemption under 40 CFR §268.4.

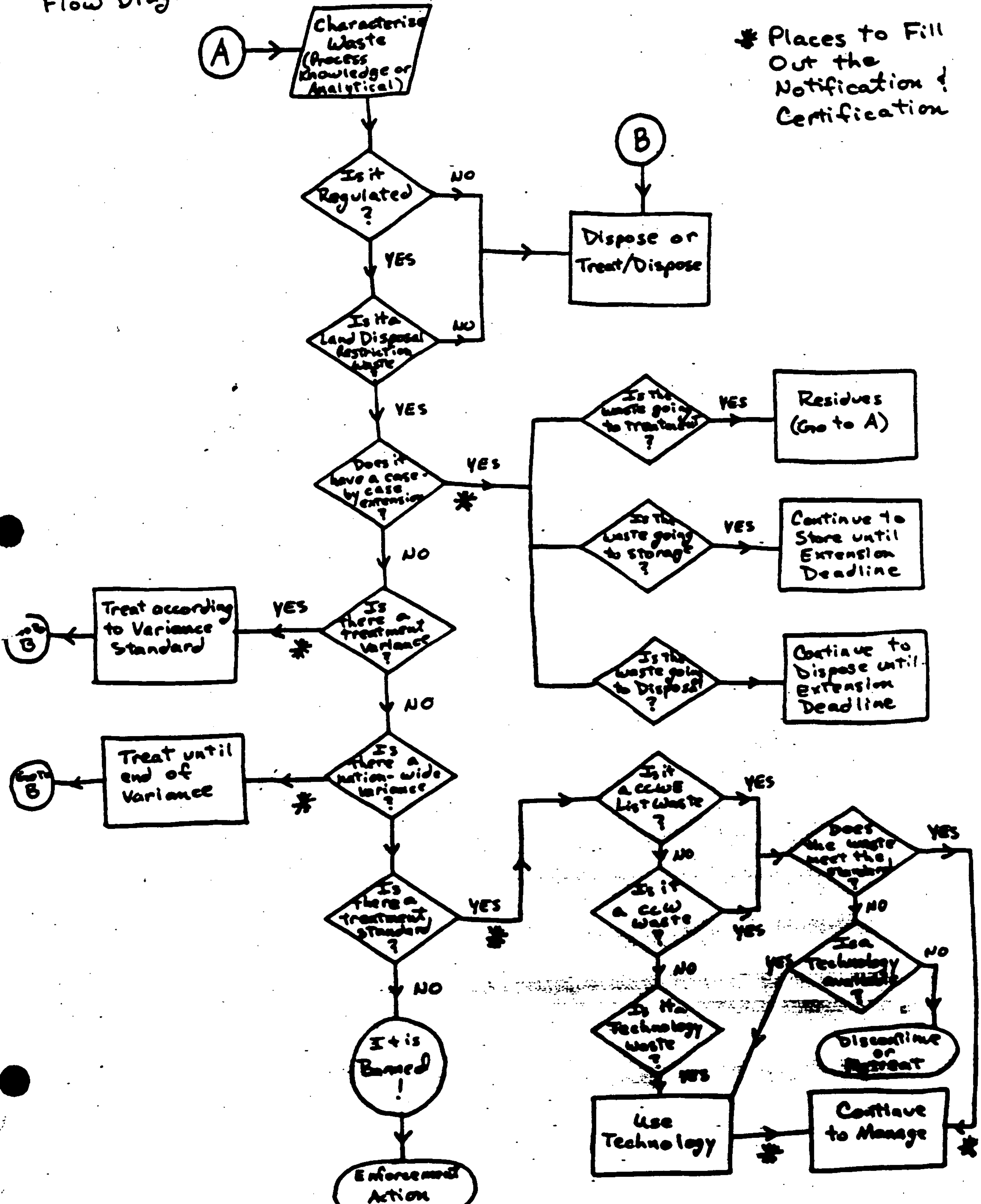
H. MIXTURES OF RESTRICTED OR PROHIBITED WASTES

1. Restricted wastes mixed with nonrestricted wastes become restricted wastes and must meet the appropriate treatment standards of 40 CFR Part 268, Subpart D, before land disposal.

2. Prohibited wastes mixed with restricted or nonrestricted wastes become prohibited wastes and must meet the land disposal requirements of 40 CFR Part 268 or RCRA Section 3004.

Land Disposal Plan Figure

Flow Diagram for Generators / Treatment Facilities



WASTE ANALYSIS PLAN
for
LAND DISPOSAL RESTRICTIONS

A. Waste Acceptance Procedures

1. Prior to unloading each load of waste:

a. The employee shall carefully examine the manifest or shipping document(s) to determine the source of the load of waste. The employee shall visually inspect the waste and, if necessary, analyze hazardous waste shipments at the facility, to make certain that they match the accompanying manifest or shipping document(s).

b. The employee shall further examine each manifest or shipping document(s) to determine if such waste is banned from land disposal. The employee shall determine if he/she has a copy of the notice and certification required by the owner/operator of a treatment facility under 40 CFR §268.7(b)(1) and (b)(2) and/or a copy of the notice and certification required by the generator under 40 CFR §268.7(a)(2), whichever is applicable.

B. Waste Analysis for Land Disposal Restrictions

Samples of each hazardous waste stream to be land disposed shall also be evaluated and analyzed to determine if they comply with the applicable requirements of the land disposal restrictions.

1. Frequency of Analysis

Testing shall be done on the following schedule, for all constituents listed in 40 CFR Part 268 under each of the hazardous waste codes for which the waste has been characterized, and a treatment level is established.

a. Treatment Residues

(1) Free Liquids Testing

Samples of each waste stream to be landfilled off-site that are potentially subject to land disposal restrictions shall be tested for free liquids at least monthly and as necessary after visual inspection. Samples shall be analyzed using the Paint Filter Liquids Test (EPA Method 9095).

(2) Land Disposal Restriction Compliance Testing

Samples of each hazardous waste stream to be land disposed shall also be evaluated and analyzed to determine if they comply with the requirements of the land disposal restrictions. Samples shall be representative pre-acceptance samples, from the treatment facility, taken before shipment to the off-site land disposal facility, and tested for all constituents listed in 40 CFR §268 under each of the hazardous waste codes for which the waste has been characterized, and a treatment level is established, following at least the minimum schedule identified below:

Waste Shipments Per Year	Testing Schedule Per Year
1 - <10 Shipments of Waste/Year	No Confirmation Testing (Treatment facility data must be adequate and reported)
>10 Shipments of Waste/Year	Semiannual Confirmation Tests/Year

b. Generated Wastes

(1) Free Liquids Testing

Samples of each waste stream to be landfilled off-site that are potentially subject to land disposal restrictions shall be tested for free liquids at least monthly and as necessary after visual inspection. Samples shall be analyzed using the Paint Filter Liquids Test (EPA Method 9095).

(2) Land Disposal Restriction Compliance Testing

Samples of each hazardous waste stream to be land disposed shall also be evaluated and analyzed to determine if they comply with the requirements of the land disposal restrictions. Samples shall be representative pre-acceptance samples, from the generator, taken before shipment to the off-site land disposal facility, and tested for all constituents listed in 40 CFR §268 under each of the hazardous waste codes for which the waste has been characterized, and a treatment level is established, following at least the minimum schedule identified below:

Waste Shipments Per Year	Testing Schedule Per Year
1 - <10 Shipments of Waste/Year	No Confirmation Testing (Generator data must be adequate and reported)
>10 Shipments of Waste/Year	Semiannual Confirmation Tests/Year

2. <u>General Waste Characterization (40 CFR §264.13(a)(3))</u>

Waste analysis must be repeated as necessary to ensure that it is accurate and up to date. At a minimum, the analysis must be repeated:

a. When the Permittee is notified, or has reason to believe, that the process or operation generating the hazardous waste has changed; and

b. For off-site facilities (receiving wastes for storage, treatment, or disposal from another site), when the results of the inspection required in 40 CFR §264.13(a)(4) (Condition A.1.) indicate that the hazardous waste received at the facility does not match the waste designated on the accompanying manifest or shipping paper.

3. <u>Generator's Waste Analysis</u>

a. <u>Dilution</u>

The Permittee (generator) shall not in any way dilute a restricted waste or the residual from treatment of a restricted waste as a substitute for adequate treatment to achieve compliance with 40 CFR Part 268, Subpart D, to circumvent the effective date of a prohibition in 40 CFR Part 268, Subpart C, to otherwise avoid a prohibition in 40 CFR Part 268, Subpart C, or to circumvent a land disposal prohibition imposed by RCRA Section 3004.

b. <u>Determining If the Waste Is a Liquid</u>

If it is necessary to determine whether or not a waste is a liquid under 40 CFR §268.32(a) and (e) and under RCRA Section 3004(d), the following test must be used: Method 9095 (Paint Filter Liquids Test) as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," EPA Publication No. SW-846.

c. Determining If the Waste Is Restricted

Except as specified in 40 CFR §268.32 or §268.43, the Permittee (generator) must test his/her waste, or test an extract developed using the test method described in 40 CFR Part 268, Appendix I, or use knowledge of the waste, to determine if the waste is restricted from land disposal under 40 CFR Part 268.

d. Determining the pH of the Waste

The initial generator of a liquid hazardous waste must test his/her waste (not an extract or filtrate) in accordance with the procedures specified in 40 CFR §268.22(a)(1), or use knowledge of the waste, to determine if the waste has a pH less than or equal to two (2.0).

e. Determining PCB Concentrations of the Waste

The initial generator of a liquid hazardous waste containing polychlorinated biphenyls (PCBs) must test his/her waste (not an extract or filtrate), or use knowledge of the waste, to determine whether the concentration levels in the waste equal or exceed the prohibition levels specified in 40 CFR §268.32.

f. Determining HOC Concentrations of the Waste

The initial generator of a liquid or nonliquid hazardous waste containing halogenated organic compounds (HOCs) must test his/her waste (not an extract or filtrate), or use knowledge of the waste, to determine whether the concentration levels in the waste equal or exceed the prohibition levels specified in 40 CFR §268.32.

g. Determining the Cyanide Concentration of the Waste

The Permittee (generator) of a hazardous waste containing cyanide shall perform a free cyanides test on the filtrate from the Paint Filter Liquids Test. The Cyanides Amenable to Chlorination Test Method 9010 in EPA Publication SW-846 for determining "free" cyanide shall be used.

h. Determining If a Waste Listed in 40 CFR §268.10 Exceeds the 40 CFR §§268.41 and 268.43 Treatment Standards

The initial generator must test a representative sample of the waste extract or the entire waste, depending on whether the treatment standards are expresssed as concentrations in the waste extract or the waste, to determine whether a hazardous waste listed in 40 CFR §268.10 exceeds the applicable treatment standards specified in 40 CFR §§268.41 and 268.43.

i. Determining if a Waste Listed in 40 CFR §§268.10, 268.11, and 268.12 Exceeds the 40 CFR §§268.41 and 268.43 Treatment Standards

The initial generator must test a representative sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentrations in the waste extract or the waste, or the generator may use knowledge of the waste, to determine whether a hazardous waste listed in 40 CFR §§268.10, 268.11, and 268.12 exceeds the applicable treatment standards specified in 40 CFR §§268.41 and 268.43.

2. Treatment Facility Waste Analysis

a. Dilution

The Permittee (treater) shall not in any way dilute a restricted waste or the residual from treatment of a restricted waste as a substitute for adequate treatment to achieve compliance with 40 CFR Part 268, Subpart D, to circumvent the effective date of a prohibition in 40 CFR Part 268, Subpart C, to otherwise avoid a prohibition in 40 CFR Part 268, Subpart C, or to circumvent a land disposal prohibition imposed by RCRA Section 3004.

b. Determining if the Waste is a Liquid

If it is necessary to determine whether or not a waste is a liquid under 40 CFR §268.32(a) and (e) or under RCRA Section 3004(d), the following test must be used: Method 9095 (Paint Filter Liquids Test) as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," EPA Publication No. SW-846.

c. Determining the pH of the Waste

The Permittee (treater) must test liquid hazardous waste (not an extract or filtrate) in accordance with the procedures specified in 40 CFR §268.22(a)(1), or use knowledge of the waste, to determine if the waste has a pH less than or equal to two (2.0).

d. Testing for Compliance with the Treatment Standard (Residues or Extract)

For wastes with treatment standards expressed as concentrations in the waste extract (40 CFR §268.41), the Permittee (treater) must test the treatment residues, or an extract of such residues developed using the test method described in 40 CFR Part 268 Appendix I, to determine whether the treatment residues or extract meet the applicable treatment standards. Testing will be performed according to the frequency specified in the facility waste analysis plan as required by 40 CFR §264.13.

e. Testing for Compliance with the Treatment Standard (Residues)

For wastes with treatment standards expressed as concentrations in the waste (40 CFR §268.43), the Permittee (treater) must test the treatment residues (not an extract of such residues) to determine whether the treatment residues meet the applicable treatment standards.

f. Testing for Compliance with the Applicable Prohibitions

For wastes that are prohibited under 40 CFR §268.32 or RCRA Section 3004(d) but not subject to any treatment standards under 40 CFR Part 268, Subpart D, the Permittee (treater) must test the treatment residues according to the generator testing requirements specified in 40 CFR §268.32 to assure that the treatment residues comply with the applicable prohibitions. Testing will be performed according to the frequency specified in the facility waste analysis plan, as required by 40 CFR §264.13.

g. Determining the Cyanide Concentration of the Waste

If any liquid treatment residue is suspected of containing cyanides, the Permittee (treater) shall perform a free cyanides test on the filtrate from the Paint Filter Liquids Test. The Cyanides Amenable Test Method 9010 in EPA Publication SW-846 shall be used.

C. WASTE CHARACTERISTICS

C-1. CHEMICAL AND PHYSICAL ANALYSES INCLUDING SAMPLING/ANALYSIS METHODS

Table C-1 lists test parameters used to provide adequate information for the proper management of waste mixtures stored inside Building 2993 as well as in the outside containment and graveled areas adjacent to Building 2993. The graveled area adjacent to Building 2993 (the outside non-liquids storage area) is designed to hold only wastes which do not contain free liquids. Ignitable, reactive, and incompatible wastes are separated as needed within each of the storage locations.

Ash from open burning operations will be managed as hazardous waste and transported by use of bulk containers (roll-off) to an off-site permitted disposal facility. Ash from OB operations will not be stored at NWSC, Crane for longer than 90 days. However, it will be necessary to perform waste analysis of the ash for proper management prior to transport to an off-site facility. The parameter to be analyzed may include but not be limited to the following: TCLP - Eptoxicity - Reactivity.

In the event that bulk containers of ash is not removed from the generation site to disposal site within 90 days of start of accumulation it would be necessary to move the containers to Building 2993 (CSF) out-side non-liquid storage area. During the less than ninety day storage period at the generation site the containers will be labeled according to the labeling plan described as Section D of this application which will comply with 329 IAC 3-9-5(a).

After open burning takes place, the ash residue is carefully inspected to insure the burn was complete. If the burn was complete then it is certified complete. If the burn was not complete it will be reburnt until complete. The ash is not containerized until after the area supervisor has certified the burn complete.

Table C-2 shows hazardous waste constituents that have been found to be present in containerized waste managed at the Central Storage Facility.

C-1a. Containerized Waste

There are three areas within the Central Storage Facility which serve as storage areas for hazardous wastes generated at NWSC Crane. Wastes are collected and brought into these areas where they are sampled and await treatment, storage, or disposal at a permitted facility elsewhere.

TABLE C-1
ANALYSIS PARAMETERS FOR WASTE MIXTURES
STORED AT NWSC, CRANE

Waste	Test Parameter
Acids and acidic wastes	pH TCLP EP Toxicity Metals
Bases, including caustic cleaners and decontaminants	pH TCLP EP Toxicity Metals
Oils, waste (some of which) are ignitable)	Flash point TCLP EP Toxicity Metals
Paint wastes with removers	Flash point TCLP Methylene Chloride EP Toxicity Metals
Pentachlorophenol Contaminated wastes	Dioxin Pentachlorophenol EP Toxicity Metals
Plastic formulation contaminated wastes	Cyanide Flash point Methylene chloride Trichlorofluoromethane EP Toxicity Metals
Plating wastes (for Cyanide) bearing, wastes see Cyanide	pH TCLP EP Toxicity Metals
Cyanide bearing wastes	pH Cyanide EP Toxicity Metals
Halogenated solvents	Methylene Chloride 1,1,2-Trichloroethylene(TCE); Trichloroethylene (TCE) EP Toxicity Metals

Metallic Salts and contaminated salts	pH TCLP Cyanide Reactivity EP Toxicity Metals
Non-halogenated solvents	Flash point Methyl ethyl ketone Methyl isobutyl ketone Toluene Xylene EP Toxicity Metals
Grit Blast Residue (Dust particles removed from air in abrasive sand/grit blast operations removing paint)	EP Toxicity Metals TCLP Cyanide
Ash from Open burning/ open detonation operations	EP Toxicity Metals TCLP Reactivity Cyanide

Table C-1(b)

TABLE C-2
HAZARDOUS WASTES STORED AT CSF (Building 2993)
(CONSTITUENTS/CHARACTERISTICS PREVIOUSLY DETERMINED)

Waste	Hazardous Constituent	Hazardous Waste No.	Hazard Code
Acids, Waste	Acetic acid Chromium Fluoboric acid Hydrochloric acid Hydrofluoric acid Lead Nitric acid Phosphoric acid Sodium acid sulfate Sulfuric acid	D002/D008	(C,T)
	Fluoracetic Acid	P058	
	DPN Phosphate	P041	
	Thalium Sulfate	P115	
Aerosols, Off-spec and defective cans (Propellants)	Butane Propane	D001	(I)
Bases, wastes * including caustic cleaners	Ammonium hydroxide Lead Sodium hydroxide	D002/D008	(C,T)
Caustic cleaning *	Chromium Lead Sodium hydroxide	D002/D007/ D008	(C,T)
Cyanide bearing wastes including some plating wastes	Potassium thiocyanate Sodium hydroxide	D002/D003/ F006/F007 F008	(C,R, T)
Decontaminating * agent (caustic)	Ethylene glycol Monoethyl ether Sodium hydroxide	D001/D002	(I,C)
Grit blast residue from operations (Dust particles removed from air in abrasive sand/grit blast operations removing paint)	Cadmium	D006	(T)
	Chromium	D007	(T)
	Lead	D008	(T)
	Barium	D005	

Ash from open burning/open detonation operations		D008	(T)
Halogenated solvents, spent, including degreasers and coolants	Dichloroethane Methylene chloride 1,1,1-Trichloroethane Trichloroethylene (TCE) 1,1,2-Trichloro-1,2,2-Trifluoroethane	F001/F002	(T)
Metallic salt contaminated wastes	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	D002/D004/ D005/D006/ D007/D008/ D009/D010/ D011	(C,T)
Non-halogenated solvents, spent and off-spec, including mineral spirits (petroleum distillates) paint thinner and Stoddard solvent	Acetone Ethanol Isopropanol Methanol Methyl ethyl ketone Methyl isobutyl ketone Naphtha Toluene Xylene	D001/F003/ F005/U154/U220/ U002	(I,T)
Oils, waste (some of which are ignitable)	Barium Chromium Lead	D001/D005/ D007/D008	(I,T)
Paint waste, including sludges thinners, strippers, primers & varnishes	Chromium Lead Methane-dichloro Non-halogenated solvents	F002/D001/ D007/F003/ D008/F005/ D006/U080	(I,T)
Pentachlorophenol contaminated wastes including oils, sludges, and water	Pentachlorophenol	F027	(T)
Plastic formulations: waste and off-spec	Ethanol Methylene chloride Trichlorofluoromethane Styrene monomer Urethane elastomer Toluene diisocyanate Halogenated solvents	D001/D002/ D003/F002	(I,R,T)

Table C-2(b)

Plating & coating wastes & sludges including caustic cleaning solution wastes (excluding cyanide bearing waste):	Boric acid Cadmium Chromic acid Chromium Hydrofluoric acid Lead Nitric acid Phosphoric acid Selenium Sodium hydroxide For Cyanide bearing (see Cyanide wastes)	F006/D002 D006/D007 D008/D010	(C,T)
Salts, contaminated: Ammonium nitrate Ceric ammonium nitrate Sodium , carbonate sodium nitrate/Sodium sulfide	Cadmium Chromium Lead	D006/ D007/D008	(T)
Urethane contaminated wastes	Ethyl carbonate Methylene chloride	U238/F002	(T)
Vanadium pentoxide/ titanium tetrachloride mix	Vanadium pentoxide	D002/P120	(C,T)
Yellow "D" (Ammonium Picrate) contaminated water, very dilute solution	Reactive	D003	(R)
Wastewater trmt: sludge from manufacturing, formulation & loading of lead-based initiating compounds	Lead Formaldehyde Trichoroethylene Copper cyanides	K046 U122 U228 P029	(T)
	Spent carbon from treatment of wastewater explosives Cyanides Toluene diisocyanate Halogenated solvents	K045 P030 U223 F001	(R,T)

Note: Waste constituents, numbers, and hazard codes shown for a group of chemicals do not necessarily apply to every waste in the grouping. (Ex. N all waste acids contain lead)

• Waste streams from different operations

TABLE C-3
CHEMICAL/PHYSICAL ANALYTICAL PROCEDURES FOR CSF WASTES

TEST PARAMETER	METHOD REFERENCES	SIZE AND TYPE OF CONTAINERS	PRESERVATIVES
Arsenic	7060/7061	1 Liter Plastic	5 ml HNO_3/liter and Iced (pH2)
Barium	7080/7081	"	"
Cadmium	7130/7131	"	"
Chromium	7190/7191	"	"
Lead	7420/7421	"	"
Mercury	7470/7471	"	"
Selenium	7740/7741	"	"
Methylene Chloride	8010	8oz Wide Mouth with Teflon Liner	none
Trichloroflouromethane	8010		"
1,1,2 - Trichloroethane	8010		"
Trichloroethylene (TCE)	8010	"	"
Methyl ethyl ketone	8015	"	"
Methyl isobutyl ketone	8015	"	"
Toulene	8020	"	"
Xylene	8020	"	"
Pentachlorophenol	8040	1 Liter Glass	2 ml 50% H_2SO_4 liter
Flash Point	1010		
pH	9040		
* TCLP			
Cyanide	9010	1 Liter Plastic	1 ml 50% NOAH/ Liter and Iced
EP Toxicity	1310	1 Liter Compatible to Sample	None

* See Exhibit C-4 at end of this section

Note: For parameters not listed here we will refer to 329 IAC 3-6-7, Chemical Analysis test method. This is shown in <u>Exhibit C-3.</u>

Building 2993 and the outside liquid storage area are designed for the storage of liquid wastes and wastes containing free standing liquids.

The graveled area adjacent to Building 2993 (outside non-liquid storage area) is designed to hold only wastes which do not contain free liquids. Ignitable, reactive, and incompatible wastes are separated as needed within each of the storage locations. Table C-2 lists the hazardous constituents that have been previously determined to be present in the wastes managed at the Central Storage Facility.

C-2. Waste Analysis Plan

C-2a. Parameters and Rationale

There are several approaches on steps to be considered in the characterization of a waste material as either hazardous on non-hazardous listed as follows:

1. if the waste generating activity is known, the material may be examined against the criteria for that activity, which may result in an assignment of an "F" or "K" series code number.
2. If the chemical product name is known, the material may be assigned a "P" series code number.
3. if a specific compound is known to be present in the chemical product or it may be detected in some concentration considered to be significant, the material may be assigned a "U" series code number.

Waste of totally unknown characteristics (managed by NWSC Crane) will be stored and managed by NWSC Crane sampled and analyzed before being placed in Storage at the CSF. During the time that analysis is being done for characterization the container will be segregated and held in an earthen covered storage magazine (B-1487) for less than 90 days. Consideration will be given to condition of container and need for containment or recontainerization.

This situation will only exist after an intensive effort is made to investigate and determine the origin of the material. The pH and ignitability can be determined on station reasonably quick.

This type of material will require all parameters for characterization of hazardous waste be performed to include ignitability, corrosivity, reactivity, EP toxicity and toxic characteristic leaching procedure. Methods to be used to perform this analysis are described in the Waste Analysis Plan that follows.

NWSC Crane will not seek land disposal for any liquid hazardous waste. Our Hazardous Waste contract requires that all liquid land ban waste be treated prior to disposal. Test for toxic characteristic leaching procedure will be ran on all solid waste before landfill disposal is used.

Table C-1 list parameters to be analyzed for in the waste to be managed at the Central Storage Facility.

C-2b. Test Methods: 329 IAC 3-41-4(b)(2)

Table C-3 titled Chemical/Physical Analytical Procedures for CSF Wastes, lists test parameters, method references, sample container type, volume and preservatives. These methods are taken from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW 846, Third Edition. Any laboratory that will be performing analysis for NWSC Crane will be required to use these methods.

Enclosed at the end of Section C, titled Exhibit C-5, is the Quality Assurance/Quality Control Plan for the laboratory that is currently performing the analytical work for our existing hazardous waste disposal contract.

Under Department of Defense contracting requirements, the contract is advertised for bid yearly.

Exhibit C-6 at the end of Section C is copies of the pages of the contract bid packet that states the minimum requirements for the performance of the analytical portions.

Exhibit C-7 at the end of Section C is the test procedure used for friction impact sensitivity.

C-2c. Sampling Methods: 329 IAC 3-41-4(b)(3) and 3-6-5

Sampling strategies that will be used to obtain representative samples from containerized waste managed at the CSF will be a combination of simple random and stratified random sampling.

Waste streams that will remain consistent will be sampled using simple random sampling. For example, from a group of ten drums of hydrochloric acid waste from plating shop operations we would take two samples from random containers. Both samples would be sent to the laboratory for pH and E. P. Toxicity Metals, the results would be compared and profiled for disposal if the results of the analysis is close to the same, as would be expected since they were generated from the same process. Should the results be very different this would cause us to resample and question the laboratory methods used.

Waste streams that are not expected to remain consistent are sampled more often and usually per each container. An example here would be waste generated in our local research laboratories, they may generate Nitric Acid contaminated with heavy metals (Silver/Lead) but the concentrations of the metals may vary.

Compositing of waste from different processes will not be done.

Sample containers and preservation methods are described on Table C-3 as well as the amount needed as specified by EPA Publication SW 846, 3rd Edition.

Wide mouth glass or plastic bottles with adequate wall thickness are normally used for samples. They are thoroughly washed with detergent, rinsed with tap water and distilled water, and solvent rinsed to remove contaminants prior to use. Normally glass is used, unless strong alkali or hydrofluoric acid is involved. Plastic (linear polyethylene) is then used for those purposed. Covers are lined with foil or teflon and are screw type. Photosensitive wastes are containerized in colored or opaque bottles. Adequately sized containers are used to satisfy the analytical requirements and to facilitate the logistics of transferring the waste to the container.

Types of samplers and decontamination/clearing method are shown as follows in paragraph a. through g.

a. A PVC (polyvinyl chloride) Coliwasa is used for the sampling of most wastes in containers or tanks except those that contain the solvents with ketones, nitrobenzene, dimthylformamide, mesityl oxide and tetrahydrofuran. The sampler is cleaned by rinsing with appropriate solvent, and washing with soapy water and rinsing with tap water and distilled water.

b. A Glass Coliwasa is used for sampling most other containerized liquids, except very strong alkali and hydrofluoric acid wastes. The sampler is decontaminated as under (a).

c. Glass tubes (thief samplers) consisting of tubes 1/2 inch in diameter by 4 feet are used frequently for core sampling liquids and sludges which do not contain concentrated alkali or hydrofluoric acid. The tubes are discarded after use.

d. Plastic or glass scoops are used to sample homogeneous solid waste. Each scoop has a lid and also serves as the sample container.

e. A Metal soil auger is used for sampling soils at depths of 4 inches to 3 feet. A trowel is used to sample contaminated surface soils up to 4 inches.

f. Waste pile sampler, made of PVC pipe (about five feet long by one inch in diameter with a slot, running the length of the pipe about 4 1/2 feet, is used for sampling the waste ash pile at the Burning Grounds.

g. A Sediment sampler for sampling pond and creek bottoms consists of a weighted metal body with a spring loaded closure and a rope for recovery.

All samples are properly labeled with information concerning the type of waste, related operation, sampler's name, date of sampling and proper identification numbers (building and container ID number).

All information concerning sample number, collector, collector's signature, date and time of collection, waste types, signatures of persons in chain of possession and relative dates is recorded on a chain of custody form. This form is displayed at the end of this Section as Exhibit C-1.

The general procedures for sampling containers are as follows;

1. All personnel will know and understand the sampling procedures.

2. All personnel will have proper protective equipment and clothing.

3. Move all containers to be sampled onto a level surface in a well-ventilated working area, out of the sunlight.

4. Prepare the cleaning and rinsing solutions prior to the commencement of the sampling operations.

5. Select and prepare sampling device.

OPENING THE CONTAINER

Slowly open the container of material to be sampled to release any pressure which might built up inside during storage. Bleeding the pressure in this manner eliminates the possibility of losing material through opening and also reduces the danger of a pressure surge.

When the pressure has been bled, the container will be fully opened and ready for sampling.

SAMPLING PROCEDURE FOR LIQUID WASTES

Drummed liquids and wet sludges will be sampled using a Colivasa or glass tube. These devices collect portions of wastes from all depths of standing material in the drum, thus assuring a representative sample.

Colivasa
1. A plastic or glass Colivasa tube is inserted into the container with the stopper fully open.
2. When the Colivasa has bottomed out in the container, personnel will pull the center rod up causing the stopper to close and trap the waste in the tube. This allows the collection of all layers that may exist in the container and determination can be made of the percentage of each layer.
3. The sampling tube with the extracted sample is carefully removed from the container, making sure that all drippage goes back into the container. The tube is placed inside a quart sampling jar and the liquid is released by pressing down on the rod and releasing the stopper.

Glass Tube
1. The glass sampling tube is inserted into the container. This allows the waste material to flow freely into the tube which enables a sample to be representative of any layers or levels in the container.
2. When the tube is at the bottom of the container, the sampler's thumb is then placed securely over the top end of the tube. thus entrapping the waste material in place by natural vacuum.

SAMPLING PROCEDURES FOR DRY (NON-LIQUID) WASTES

Powders or granular wastes will be withdrawn from the container with a thief sampler or trowel.

Dry sludges or soils will be withdrawn with an auger or trier sampler or soil probe.

Thief
Insert closed thief into waste material. Rotate inner tube to open thief. Wiggle the unit to encourage material to flow into thief. Close thief and withdraw. Place sampler thief in a horizontal position with the slots facing upward. Remove inner tube from thief and transfer sample to a container.

Trier
Insert trier into waste material 0 to 45 degrees from horizontal. Rotate trier to cut a core of the waste. Remove trier with concave side up and transfer sample to container.

Auger
Bore a hole through the middle of an aluminum pie pan large enough to allow the blade of the auger to pass through. The pan will be used to catch the sample brought to the surface by the auger.

Place pan against the sampling point. Auger through the hole in the pan until the desired sampling depth is reached. Back off the auger and transfer the sample in the pan and material adhering to the auger to a container. Spoon out the rest of the loosened sample with a sample trier.

Sample Preservation

Once a sample has been collected, steps must be taken to preserve the chemical and physical integrity of the sample assuring transport and storage prior to analysis. The type of sample preservation required will vary according to the sample type and the parameter to be measured. Preservation and storage requirements described in EPA manual SW-846, test methods for Evaluating Solid Waste, Physical/Chemical Methods, 3rd Edition, will be followed.

Closing Sample Container

The sample container will be closed and sealed. The waste container will be marked with sample identification number and date. Sample bottle will be marked with sample date parameters, sample identification number (same as on waste container). This information will be entered on the sample log sheet (Exhibit C-2) and chain of custody (Exhibit C-1). Any additional information (i.e.) Material Safety Data Sheet and generating processes will be noted.

Chain of Custody will begin with the contractor that currently holds our hazardous waste disposal contract. They will transport samples to the laboratory immediately after sampling.

C-2d. Frequency of Analyses: 329 IAC 3-41-4(b)(3) and (4)

Waste streams that are consistent, are sampled and analyzed for disposal profiling at least yearly to insure that they are consistant with disposal profiles.

All other one time waste streams or waste streams that are expected to change will be analyzed before disposal or anytime the processes change.

Resampling and profiling on consistant waste streams are often done at the disposal site.

NWSC Crane is reviewing its current procedures for sampling and frequency analysis. Changes will be made in this section to better comply with 329 IAC 3-41-4(b)(3) and (4).

C-2e. Additional Requirements for Waste Generated Off-site

Hazardous Waste is stored at the ~~[illegible]~~ for less than 90 days or, as necessary, placed in the Central Storage Facility for

~~holding until the DRMO Chemical Disposal Contractor collects the wastes for treatment or disposal off-Center at an EPA/state-approved facility.~~

Also at times, requests are made that the Explosive Ordnance Detachment (EOD) at NWSC Crane pick up sensitive items (explosive wastes, unstable chemicals, etc.) from Indiana University, Indiana State Police or other Federal facilities, etc., for detonation at our Demolition Range. Any such pickups will be coordinated with IDEM and handled on a case by case basis. These items cannot be handled in any other safe manner.

These requests are followed up with a written request and list of items for pickup. These lists are reviewed by Environmental Protection Branch (Code 0924) prior to pickup by EOD to determine quantity and to be sure items are properly identified.

The aforementioned list along with the completed manifest are used by EOD to verify items that are to be picked up. Each item on the list has to be properly labeled prior to pickup. Any item that doesn't show up on the list or quantity varies from amount shown on the list or manifest will be rejected. The sensitive/explosive items picked up by the EOD Group are usually of known composition. These items are usually so sensitive in nature, they can't safely be handled for sampling or analysis.

These wastes are transported with a completed Hazardous Waste Manifest and disposed of shortly after arrival at NWSC Crane. While awaiting disposal, EOD items are stored in a magazine (less than 10 days.) When material/sensitive items are received on-Center it is treated/disposed of immediately or placed in a magazine. These wastes are then transfered to Demolition Area where they are either detonated or open burned. Code 0924 is notified when material is picked up, arrived on-site and disposal completed.

C-2f. Additional requirements for Ignitable, Reactive or Incompatible Wastes

Ignitable, reactive and incompatible waste will be packaged separately and clearly identified.

NWSC Crane samples are primarily transported in small volume by our hazardous waste contractor to the laboratory in a private automobile.

If NWSC Crane ships samples by commercial carrier, the following procedure from EPA Publication SW-846 would be followed.

Shipping of Samples

Any material that is identified in the DOT Hazardous Material Table (49 CFR 172.101) must be transported as prescribed in the table. All other hazardous waste samples must be transported as follows:

1. Collect sample in a 16-ounce or smaller glass or polyethylene container with nonmetallic teflon-lined screw cap. Allow sufficient air space (approximately 10% by volume) so container is not liquid full at 54° C (130° F). If collecting a solid material, the container plus contents should not exceed 1 pound net weight. If sampling for volatile organic analysis, fill VOA container to septum but place the VOA container inside a 16-ounce or smaller container so the required air space may be provided. Large quantities, up to 3.785 liters (1 gallon), may be collected if the sample's flash point is 23° C (75° F) or higher. In this case, the flash point must be marked on the outside container (e.g., carton, cooler), and shipping papers should state that "Flash point is 73° F or higher."

2. Seal sample and place in a 4-mil-thick polyethylene bag, one sample per bag.

3. Place sealed bag inside a metal can with noncombustible, absorbent cushioning material (e.g., vermiculite or earth) to prevent breakage, one bag per can. Pressure-close the can and use clips, tape or other positive means to hold the lid securely.

4. Mark the can with:

   Name and address of originator
   "Flammable Liquid N.O.S. UN 1993"
   (or "Flammable Solid N.O.S. UN 1325")

   NOTE: UN numbers are now required in proper shipping names.

5. Place one or more metal cans in a strong outside container such as a picnic cooler or fiberboard box. Preservatives are not used for hazardous waste site samples.

6. Prepare for shipping:

   "Flammable Liquid, N.O.S. UN 1993" or "Flammable Solid, N.O.S. UN 1325"; "Cargo Aircraft Only" (if more than 1 quart net per outside package); "Limited Quantity" or "Ltd. Qty."; "Laboratory Samples"; "Net Weight__" or "Net Volume __" (of hazardous contents) should be indicated on shipping papers and on outside of outside shipping container. "This Side Up" or "This End Up" should also be on container. Sign shipper certification.

7. Stand by for possible carrier requests to open outside containers for inspection or modify packaging. It is wise to contact carrier before packing to ascertain local packaging requirements and not to leave area before the carrier vehicle (aircraft, truck, etc.) is on its way.

CHAIN OF CUSTODY RECORD

CONTAINER LISTING

SAMPLING DATE	CONTAINER ID #	BUILDING #	OPERATION	ANALYTICAL PARAMETERS

	SIGNATURE	DATE/TIME	ORGANIZATION
SAMPLE COLLECTOR			
SAMPLE PREPARER			
LABORATORY CUSTODIAN			

METHOD OF SHIPMENT:

COMMENTS:

EXHIBIT C-1

HWSC SAMPLE#	GENERATOR	MSDS Y/N	LAB	SAMPLE DATE	COMPOSITION	EPA CODE	UN #	DOT SHIPPING NAME	HAZARD CLASS

EXHIBIT C-2

329 IAC 3-6-7 Chemical analysis test methods

Authority: IC 13-7-7; IC 13-7-8.5
Affected: IC 13-7-8.5; 40 CFR 261-Appendix III

Sec. 7. Tables 1, 2, and 3 specify the appropriate analytical procedures, described in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," incorporated by reference, see 329 IAC 3-1-6 which shall be used to determine whether a sample contains a given 329 IAC 3-6-8 or 329 IAC 3-6-9 toxic constituent.

Table 1 identifies each 329 IAC 3-6-8 or 329 IAC 3-6-9 organic constituent along with the approved measurement method. Table 2 identifies the corresponding methods for inorganic species. Table 3 summarizes the contents of SW-846 and supplies specific section and method numbers for sampling and analysis methods.

Prior to final sampling and analysis method selection, the analyst should consult the specific section or method described in SW-846 for additional guidance on which of the approved methods should be employed for a specific sample analysis situation.

TABLE 1 — ANALYTICAL METHODS FOR ORGANIC CHEMICALS CONTAINED IN SW-846

Compound	First edition method(s)	Second edition method(s)
Acetonitrile	8.03, 8.24	8030, 8240
Acrolein	8.03, 8.24	8030, 8240
Acrylamide	8.01, 8.24	8015, 8240
Acrylonitrile	8.03, 8.24	8030, 8240
2-Amino-1-methylbenzene (o-Toluidine)	*	8250
4-Amino-1-methylbenzene (p-Toluidine)	*	8250
Aniline	*	8250
Benzene	8.02, 8.24	8020, 8240
Benz(a)anthracene	8.10, 8.25	8100, 8250, 8310
Benzo(a)pyrene	8.10, 8.25	8100, 8250, 8310
Benzotrichloride	8.12, 8.25	8120, 8250
Benzyl chloride	8.01, 8.12, 8.24, 8.25	8120, 8250
Benzo(b)fluoanthene	8.10, 8.25	8100, 8250, 8310
Bis(2-chloroethoxymethane)	8.01, 8.24	8010, 8240
Bis(2-chloroethyl)ether	8.01, 8.24	8010, 8240
Bis(2-chloroisopropyl)ether	8.01, 8.24	8010, 8240
Carbon disulfide	8.01, 8.24	8015, 8240
Carbon tetrachloride	8.01, 8.24	8010, 8240
Chlordane	8.08, 8.25	8080, 8250
Chlorinated biphenyls	8.08, 8.25	8.08, 8250
Chlorinated dibenzo-p-dioxins		8280
Chlorinated dibenzofurans		8280
Chloroacetaldehyde	8.01, 8.24	8010, 8240
Chlorobenzene	8.01, 8.02, 8.24	[illegible], 8240
Chloroform	8.01, 8.24	8010, 8240
Chloromethane	8.01, 8.24	8010, 8240
2-Chlorophenol	8.04, 8.25	8040, 8250
Chrysene	8.10, 8.25	8100, 8250, 8310

EXIBIT C-3

Compound	First edition method(s)	Second edition method(s)
	8.10, 8.25	8100, 8250
Creosote[4]	8.04, 8.25	8040, 8250
Cresol(s)	8.04, 8.25	8040, 8250
Cresylic Acid(s)	8.01, 8.02,	8010, 8120
Dichlorobenzene(s)	8.12, 8.25	8250
	8.01, 8.24	8010, 8240
Dichloroethane(s)	8.01, 8.24	8010, 8240
Dichloromethane	8.40, 8.25	8150, 8250
Dichlorophenoxyacetic acid	8.12, 8.25	8120, 8250
Dichloropropanol	8.04, 8.25	8040, 8250
2,4-Dimethylphenol	8.09, 8.25	8090, 8250
Dinitrobenzene	8.04, 8.25	8040, 8250
4,6-Dinitro-o-cresol	8.09, 8.25	8090, 8250
2,4-Dinitrotoluene	*	8060 or 8250
2,6-Dinitrotoluene	8.08, 8.25	8080, 8250
Endrin		8030, 8240
2-Ethoxyethanol	8.01, 8.02,	8015, 8240
Ethyl ether	8.24	
		8010, 8240
Ethylene dibromide	8.01, 8.24	8015, 8240
Formaldehyde	8.06, 8.25	8250
Formic acid	8.06, 8.25	8080, 8250
Heptachlor	8.12, 8.25	8120, 8250
Hexachlorobenzene	8.12, 8.25	8120, 8250
Hexachlorobutadiene	8.12, 8.25	8010, 8240
Hexachloroethane	8.12, 8.25	8120, 8250
Hexachlorocyclopentadiene	8.08, 8.25	8080, 8250
Lindane	8.06, 8.25	8250
Maleic anhydride	8.01, 8.24	8010, 8240
Methanol	8.32	8250
Methomyl	8.01, 8.02,	8015, 8240
Methyl ethyl ketone	8.24	
	8.01, 8.02,	8015, 8240
Methyl isobutyl ketone	8.24	
	8.10, 8.25	8100, 8250
Naphthalene	8.06, 8.09,	8090, 8250
Napthoquinone	8.25	
	8.09, 8.25	8090, 8250
Nitrobenzene	8.04, 8.25	8040, 8240
4-Nitrophenol	8030, 8240	
2-Nitropropane		
Paraldehyde	8.01, 8.24	8015, 8240
(trimer of acetaldehyde)	8.04, 8.25	8040, 8250
Pentachlorophenol	8.04, 8.25	8040, 8250
Phenol	8.22	8140
Phorate	8.06, 8.09,	8140
Phosphorodithioic acid esters	8.22	
	8.06, 8.09,	8090, 8250
Phthalic anhydride	8.25	
	8.06, 8.09,	8090, 8250
2-Picoline	8.25	

Compound	First edition method(s)	Second edition method(s)
Pyridine	8.06, 8.09, 8.25	8090, 8250
Tetrachlorobenzene(s)	8.12, 8.25	8120, 8250
Tetrachloroethane(s)	8.01, 8.24	8010, 8240
Tetrachloroethene	8.01, 8.24	8010, 8240
Tetrachlorophenol	8.04, 8.24	8040, 8250
Toluene	8.02, 8.24	8020, 8240
2,4-Toluenediamine	*	8250
2,6-Toluenediamine	*	8250
3-4-Toluenediamine	*	8250
Toluenediamine	8.25	8250
Toluene diisocyanate(s)	8.06, 8.25	8250
Toxaphene	8.08, 8.25	8080, 8250
Trichloroethane	8.01, 8.24	8010, 8240
Trichloroethene(s)	8.01, 8.24	8010, 8240
Trichlorofluoromethane	8.01, 8.24	8010, 8240
Trichlorophenol(s)	8.04, 8.25	8040, 8250
2,4,5-Trichlorophenoxy propionic acid	8.40, 8.24	8150, 8250
Trichloropropane	8.01, 8.24	8010, 8240
Vinyl chloride	8.01, 8.24	8010, 8240
Vinylidene chloride	8.01, 8.24	8010, 8240
Xylene	8.02, 8.24	8020, 8240

[4]Analyze for phenanthrene and carbazole; if these are present in a ratio between 1.4:1 and 5:1, creosote should be considered present.

*No number given-column "First edition method(s)" to be removed as per October 23, 1985, Federal Register. (column "Second edition method(s)" to be re-titled "Method Numbers").

TABLE 2—ANALYSIS METHODS FOR INORGANIC CHEMICALS CONTAINED IN SW-846

Compound	First edition method(s)	Second edition method(s)
Antimony	8.50	7040, 7041
Arsenic	8.51	7060, 7061
Barium	8.52	7080, 7081
Cadmium	8.53	7090, 7091
Chromium	8.54	7190, 7191
Chromium: Hexavalent	8.545, 8.546, 8.547	7195, 7196, 7197
Lead	8.56	7420, 7421
Mercury	8.57	7470, 7471
Nickel	8.58	7520, 7521
Selenium	8.59	7740, 7741
Silver	8.60	7760, 7761
Cyanides	8.55	9010
Total Organic Halogen	8.66	9020
Sulfides	8.67	9030

TABLE 3—SAMPLING AND ANALYSIS METHODS CONTAINED IN SW-846

Title	First Edition Section No.	First Edition Method No.	Second Edition Section No.	Second Edition Method No.
Sampling of Solid Wastes	1.0		1.0	
Development of Appropriate Sampling Plans	1.0		1.1	
Regulatory and Scientific Objectives	1.0-2		1.1.1	
Fundamental Statistical Concepts	1.0-3		1.1.2	
Basic Statistical Strategies	1.0-7		1.1.3	
Simple Random Sampling			1.1.3.1	
Stratified Random Sampling			1.1.3.2	
Systematic Random Sampling			1.1.3.3	
Special Considerations	1.0-7			
Composite Sampling			1.1.4.1	
Subsampling			1.1.4.2	
Cost and Loss Functions			1.1.4.3	
Implementation of Sampling Plan	1.0-7		1.2	
Selection of Sampling Equipment			1.2.1	
Composite Liquid Waste Sampler	3.2.1		1.2.1.1	
Weighted Bottle	3.2.2		1.2.1.2	
Dipper	3.2.3		1.2.1.3	
Thief	3.2.4		1.2.1.4	
Trier	3.2.5		1.2.1.5	
Auger	3.2.6		1.2.1.6	
Scoop and Shovel	3.2.7		1.2.1.7	
Selection of Sample Containers	3.3		1.2.2	
Processing and Storage of Samples	3.3		1.2.3	
Documentation of Chain of Custody	2.0		1.3	
Sample Labels	2.0-1		1.3.1	
Sample Seals	2.0-3		1.3.2	
Field Log Book	2.0-5		1.3.3	
Chain-of-Custody Record	2.0-6		1.3.4	
Sample Analysis Request Sheet	2.0-9		1.3.5	
Sample Delivery to Laboratory	2.0-10		1.3.6	
Shipping of Samples	2.0-10		1.3.7	
Receipt and Logging of Sample	2.0-12		1.3.8	
Assignment of Sample for Analysis	2.0-13		1.3.9	
Sampling Methodology	3.0		1.4	
Containers	3.2-2		1.4.1	
Tanks	3.2-2		1.4.2	
Waste Piles	3.2-2		1.4.3	
Landfills and Lagoons	3.2-2		1.4.4	
Waste Evaluation Procedures			2.0	
Characteristics of Hazardous Waste			2.1	
Ignitability	4.0		2.1.1	
Pensky-Martens Closed-Cup Method	4.1		2.1.1	1010
Setaflash Closed-Cup Method	4.1		2.1.1	1020
Corrosivity	5.0		2.1.2	
Corrosivity Toward Steel	5.3		2.1.2	1110
Reactivity	6.0		2.1.3	
Extraction Procedure Toxicity	7.0		2.1.4	
Extraction Procedure Toxicity Test	7.1, 7.2, 7.5			

Title	First Edition Section No.	First Edition Method No.	Second Edition Section No.	Second Edition Method No.
Method and Structural Integrity Test	7.4		2.1.4	1310
Sample Workup Techniques			4.0	
Inorganic Techniques	8.49		4.1	
Acid Digestion for Flame AAS			4.1	3010
Acid Digestion for Furnace AAS			4.1	3020
Acid Digestion of Oil, Grease, or Wax	8.49-9		4.1	3030
Dissolution Procedure for Oil, Grease, or Wax	8.49-8			
Alkaline Digestion	8.0	8.458	4.1	3060
Organic Techniques	8.0		4.2	
Separatory Funnel Liquid-Liquid Extraction	9.0	9.1	4.2	3510
Continuous Liquid-Liquid Extraction	9.0	9.01	4.2	3520
Acid-Base Cleanup Extraction	8.0	8.84	4.2	3530
Soxhlet Extraction	8.0	8.86	4.2	3540
Sonication Extraction	8.0	8.85	4.2	3550
Sample Introduction Techniques			5.0	
Headspace	8.0	8.82	5.0	5020
Purge-and-Trap	8.0	8.83	5.0	5030
Inorganic Analytical Methods	8.0		7.0	
Antimony, Flame AAS	8.0	8.50	7.0	7470
Antimony, Furnace AAS	8.0	8.50	7.0	7471
Arsenic, Flame AAS	8.0	8.51	7.0	7060
Arsenic, Furnace AAS	8.0	8.51	7.0	7061
Barium, Flame AAS	8.0	8.52	7.0	7080
Barium, Furnace AAS	8.0	8.52	7.0	7081
Cadmium, Flame AAS	8.0	8.53	7.0	7130
Cadmium, Furnace AAS	8.0	8.53	7.0	7131
Chromium, Flame AAS	8.0	8.54	7.0	7090
Chromium, Furnace AAS	8.0	8.54	7.0	7191
Chromium, Hexavalent, Coprecipitation	8.0	8.545	7.0	7195
Chromium, Hexavalent, Colorimetric	8.0	8.546	7.0	7196
Chromium, Hexavalent, Chelation	8.0	8.547	7.0	7197
Lead, Flame AAS	8.0	8.56	7.0	7420
Lead, Furnace AAS	8.0	8.56	7.0	7421
Mercury, Cold Vapor, Liquid	8.0	8.57	7.0	7470
Mercury, Cold Vapor, Solid	8.0	8.57	7.0	7471
Nickel, Flame AAS	8.0	8.58	7.0	7520
Nickel, Furnace AAS	8.0	8.58	7.0	7521
Selenium, Flame AAS	8.0	8.59	7.0	7740
Selenium, Gaseous Hydride AAS	8.0	8.59	7.0	7741
Silver, Flame AAS	8.0	8.60	7.0	7760
Silver, Furnace AAS	8.0	8.60	7.0	7761
Organic Analytical Methods	8.0		8.0	
Gas Chromatographic Methods	8.0		8.1	
Halogenated Volatile Organics	8.0	8.01	8.1	8010
Nonhalogenated Volatile Organics	8.0	8.01	8.1	8015
Aromatic Volatile Organics	8.0	8.02	8.1	8020

Title	First Edition Section No.	First Edition Method No.	Second Edition Section No.	Second Edition Method No.
Acrolein, Acrylonitrile, Acetonitrile	8.0	8.03	8.1	8030
Phenols	8.0	8.04	8.1	8040
Phthalate Esters	8.0	8.06	8.1	8060
Organochlorine Pesticides and PCBs	8.0	8.08	8.1	8080
Nitroaromatics and Cyclic Ketones	8.0	8.09	8.1	8090
Polynuclear Aromatic Hydrocarbons	8.0	8.10	8.1	8100
Chlorinated Hydrocarbons	8.0	8.12	8.1	8120
Organophosphorus Pesticides	8.0	8.22	8.1	8140
Chlorinated Herbicides	8.0	8.40	8.1	8150
Gas Chromatographic/Mass Spectroscopy Methods (GC/MS)	8.0		8.2	
GC/MS Volatiles	8.0	8.24	8.2	8240
GC/MS Semi-Volatiles, Packed Column	8.0	8.25	8.2	8250
GC/MS Semi-Volatiles, Capillary	8.0	8.27	8.2	8270
Analysis of Chlorinated Dioxins and Dibenzofurans			8.2	8280
High Performance Liquid Chromatographic Methods (HLPC)	8.0		8.3	
Polynuclear Aromatic Hydrocarbons	8.0	8.10	8.3	8310
Miscellaneous Analytical Methods	8.0		9.0	
Cyanide; Total and Amenable to Chlorination	8.0	8.55	9.0	9010
Total Organic Halogen (TOX)	8.0	8.66	9.0	9020
Sulfides	8.0	8.67	9.0	9030
pH Measurement	5.0	5.2	9.0	9040
Quality Control/Quality Assurance	10.0		10.1	
Introduction	10.0		10.1	
Program Design	10.0		10.2	
Sampling	10.0		10.3	
Analysis	10.0		10.4	
Data Handling	10.0		10.5	

(Solid Waste Management Board; 329 IAC 3-6-7; filed May 31, 1988, 2:42 pm)

Appendix I to Part 268 — Toxicity Characteristic Leaching Procedure (TCLP)

1.0 SCOPE AND APPLICATION

1.1 The TCLP is designed to determine the mobility of both organic and inorganic contaminants present in liquid, solid, and multiphasic wastes.

1.2 If a total analysis of the waste demonstrates that individual contaminants are not present in the waste, or that they are present but at such low concentrations that the appropriate regulatory thresholds could not possibly be exceeded, the TCLP need not be run.

2.0 SUMMARY OF METHOD (See Figure 1)

2.1 For liquid wastes (i.e., those containing insignificant solid material), the waste, after filtration through a 0.6- to 0.8-um glass fiber filter, is defined as the TCLP extract.

2.2 For wastes comprised of solids or for wastes containing significant amounts of solid material, the particle-size of the waste is reduced (if necessary), the liquid phase, if any, is separated from the solid phase and stored for later analysis. The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase. The extraction fluid employed is a function of the alkalinity of the solid phase of the waste. A special extractor vessel is used when testing for volatiles (See Table 1). Following extraction, the liquid extract is separated from the solid phase by 0.6- to 0.8-um glass fiber filter filtration.

2.3 If compatible (i.e., multiple phases will not form on combination), the initial liquid phase of the waste is added to the liquid extract, and these liquids are analyzed together. If incompatible, the liquids are analyzed separately and the results are mathematically combined to yield a volume-weighted average concentration.

3.0 INTERFERENCES

3.1 Potential interferences that may be encountered during analysis are discussed in the individual analytical methods.

4.0 APPARATUS AND MATERIALS

4.1 <u>Agitation apparatus</u>: An acceptable agitation apparatus is one which is capable of rotating the extraction vessel in an end-over-end fashion (See Figure 2) at 30 ± 2 rpm. Suitable devices known to EPA are identified in Table 2.

4.2 <u>Extraction Vessel</u>

4.2.1 Zero-Headspace Extraction Vessel (ZHE). This device is for use only when the waste is being tested for the mobility of volatile constituents (see Table 1). The ZHE is an extraction vessel that allows for liquid/solid separation within the device, and which effectively precludes headspace (as depicted in Figure 3). This type of vessel allows for initial liquid/solid separation, extraction, and final extract filtration without having to open the vessel (see Step 4.3.1). These vessels shall have an internal volume of 500 to 600 mL and be equipped to accommodate a 90-mm filter. Suitable ZHE devices known to EPA are identified in Table 3. These devices contain viton O-rings which should be replaced frequently.

For the ZHE to be acceptable for use, the piston within the ZHE should be able to be moved with approximately 15 psi or less. If it takes more pressure to move the piston, the O-rings in the device should be replaced. If this does not solve the problem, the ZHE is unacceptable for TCLP analyses and the manufacturer should be contacted.

The ZHE should be checked after every extraction. If the device contains a built-in pressure gauge, pressurize the device to 50 psi, allow it to stand unattended for 1 hour, and recheck the pressure. If the device does not have a built-in pressure gauge, pressurize the device to 50 psi, submerge it in water, and check for the presence of air bubbles escaping from any of the fittings. If pressure is lost, check all fittings and inspect and replace O-rings, if necessary. Retest the device. If leakage problems cannot be solved, the manufacturer should be contacted.

xtraction fluid:

6.1 Extraction fluid #1: This fluid is made by adding 5.7 mL glacial HOAc to 500 mL of the appropriate water (see Step 5.1), adding 64.3 mL of N NaOH, and diluting to a volume of 1 liter. When correctly prepared, the pH of this fluid will be 4.93 ± 0.05.

2 Extraction fluid #2: This fluid is made by diluting 5.7 mL glacial HOAc with ASTM Type II water (see Step 5.1) to a volume of 1 liter. When correctly prepared, the pH of this fluid will be 2.88 ± 0.05.

> Note.—It is suggested that these extraction fluids be monitored frequently for impurities. The pH should be checked prior to use to ensure that these fluids are made up accurately.

5.7 Analytical standards shall be prepared according to the appropriate analytical method.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples shall be collected using an appropriate sampling plan.

6.2 At least two separate representative samples of a waste should be collected. If volatile organics are of concern, a third sample should be collected. The first sample is used in several preliminary TCLP evaluations (e.g., to determine the percent solids of the waste; to determine if the waste contains insignificant solids (i.e., the waste is its own extract after filtration); to determine if the solid portion of the waste requires particle-size reduction; and to determine which of the two extraction fluids are to be used for the non-volatile TCLP extraction of the waste). These preliminary evaluations are identified in Section 7.0. The second and, if required, third samples are extracted using the TCLP non-volatile procedure (Section 8.0) and volatile procedure (Section 9.0), respectively.

6.3 Preservatives shall not be added to samples.

6.4 Samples can be refrigerated unless refrigeration results in irreversible physical change to the waste (e.g., precipitation).

6.5 When the waste is to be evaluated for volatile contaminants, care should be taken to minimize the loss of volatiles. Samples shall be taken and stored in a manner to prevent the loss of volatile contaminants. If possible, it is recommended that any necessary particle-size reduction should be conducted as the sample is being taken (See Step 8.5).

6.6 TCLP extracts should be prepared for analysis and analyzed as soon as possible following extraction. If they need to be stored, even for a short period of time, storage shall be at 4°C, and samples for volatiles analysis shall not be allowed to come into contact with the atmosphere (i.e., no headspace). See Section 10.0 (QA requirements) for acceptable sample and extract holding times.

7.0 PRELIMINARY TCLP EVALUATIONS

The preliminary TCLP evaluations are performed on a minimum 100 gram representative sample of waste that will not actually undergo TCLP extraction (designated as the first sample in Step 6.2). These evaluations include preliminary determination of the percent solids of the waste; determination of whether the waste contains insignificant solids, and is therefore, its own extract after filtration; determination of whether the solid portion of the waste requires particle-size reduction; and determination of which of the two extraction fluids are to be used for the non-volatile TCLP extraction of the waste.

7.1 Preliminary determination of percent solids: Percent solids is defined as that fraction of a waste sample (as a percentage of the total sample) from which no liquid may be forced out by an applied pressure, as described below.

7.1.1 If the waste will obviously yield no free liquid when subjected to pressure filtration (i.e., is 100% solids) proceed to Step 7.4.

7.1.2 If the sample is liquid or multiphasic, liquid/solid separation to make a preliminary determination of percent solids is required. This involves the filtration device described in Step 4.3.2 and is outlined in Steps 7.1.3 through 7.1.9.

7.1.3 Pre-weigh the filter and the container that will receive the filtrate.

7.1.4 Assemble the filter holder and filter following the manufacturer's instructions. Place the filter on the support screen and secure.

7.1.5 Weigh out a representative subsample of the waste (100 gram minimum) and record the weight.

7.1.6 Allow slurries to stand to permit the solid phase to settle. Wastes that settle slowly may be centrifuged prior to filtration. Centrifugation is to be used only as an aid to filtration. If used, the liquid should be decanted and filtered followed by filtration of the solid portion of the waste through the same filtration system.

7.1.7 Quantitatively transfer the waste sample to the filter holder (liquid and solid phases). If filtration of the waste at 4°C reduces the amount of expressed liquid over what would be expressed at room temperature then allow the sample to warm up to room temperature in the device before filtering.

> Note.—If waste material (>1% of original sample weight) has obviously adhered to the container used to transfer the sample to the filtration apparatus, determine the weight of this residue and subtract it from the sample weight determined in Step 7.1.5 to determine the weight of the waste sample that will be filtered.

Gradually apply vacuum or gentle pressure of 1–10 psi, until air or pressurizing gas moves through the filter. If this point is not reached under 10 psi, and if no additional liquid has passed through the filter in any 2-minute interval, slowly increase the pressure in 10-psi increments to a maximum of 50 psi. After each incremental increase of 10-psi, if the pressurizing gas has not moved through the filter, and if no additional liquid has passed through the filter in any 2-minute interval, proceed to the next 10-psi increment. When the pressurizing gas begins to move through the filter, or when liquid flow has ceased at 50 psi (i.e., filtration does not result in any additional filtrate within any 2-minute period), filtration is stopped.

> Note.—Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.1.8 The material in the filter holder is defined as the solid phase of the waste, and the filtrate is defined as the liquid phase.

> Note.—Some wastes, such as oily wastes and some paint wastes, will obviously contain some material that appears to be a liquid. But even after applying vacuum or pressure filtration, as outlined in Step

If the sample is liquid or multiphasic, liquid/solid separation is required. This involves the filtration device described in Step 4.3.2 and is out-
lined in Steps 8.3 to 8.8.

Pre-weigh the container that will receive the filtrate.

Place the filter on the support screen and secure. Acid wash the
. Assemble the filter holder and filter following the manufacturer's instructions.
filter if evaluating the mobility of metals (See Step 4.4).

Note.—Acid washed filters may be used for all non- volatile extractions even when metals are not of
concern.

8.5 Weigh out a representative subsample of the waste (100 gram minimum) and record the weight. If the waste was shown to contain <0.5% dry
solids (Step 7.2), the waste, after filtration is defined as the TCLP extract. Therefore, enough of the sample should be filtered so that the amount
of filtered liquid will support all of the analyses required of the TCLP extract. For wastes containing $\geq 0.5\%$ dry solids (Steps 7.1 or 7.2), use the
percent solids information obtained in Step 7.1 to determine the optimum sample size (100 gram minimum) for filtration. Enough solids shouldbe
generated after filtration to support the analyses to be performed on the TCLP extract.

8.6 Allow slurries to stand to permit the solid phase to settle. Wastes that settle slowly may be centrifuged prior to filtration. Centrifugation is to
be used only as an aid to filtration. If used, the liquid should be decanted and filtered followed by filtration of the solid portion of the waste
through the same filtration system.

8.7 Quantitatively transfer the waste sample (liquid and solid phases) to the filter holder (see Step 4.3.2). If filtration of the waste at 4°C reduces
the amount of expressed liquid over what would be expressed at room temperature, then allow the sample to warm up to room temperature in the
device before filtering.

Note.—If waste material (>1% of the original sample weight) has obviously adhered to the container
used to transfer the sample to the filtration apparatus, determine the weight of this residue and subtract
it from the sample weight determined in Step 8.5, to determine the weight of the waste sample that will
be filtered.

Gradually apply vacuum or gentle pressure of 1–10 psi, until air or pressurizing gas moves through the filter. If this point is not reached under 10
psi, and if no additional liquid has passed through the filter in any 2-minute interval, slowly increase the pressure in 10-psi increments to maximum
of 50 psi. After each incremental increase of 10 psi, if the pressurizing gas has not moved through the filter, and if no additional liquid has passed
through the filter in any 2-minute interval, proceed to the next 10-psi increment. When the pressurizing gas begins to move through the filter, or
when the liquid flow has ceased at 50 psi (i.e., filtration does not result in any additional filtrate within a 2- minute period), filtration is stopped.

Note.—Instantaneous application of high pressure can degrade the glass fiber filter and may cause
premature plugging.

8 The material in the filter holder is defined as the solid phase of the waste, and the filtrate is defined as the liquid phase. Weigh the filtrate. The
liquid phase may now be either analyzed (see Step 8.13) or stored at 4°C until time of analysis.

Note.—Some wastes, such as oily wastes and some paint wastes, will obviously contain some material
that appears to be a liquid. But even after applying vacuum or pressure filtration, as outlined in Step 8.7,
this material may not filter. If this is the case, the material within the filtration device is defined as a
solid and is carried through the extraction as a solid. The original filter is not to be replaced with a fresh
filter under any circumstances. Only one filter is used.

8.9 If the waste contains <0.5% dry solids (see Step 7.2), proceed to Step 8.13. If the waste contains $\geq 0.5\%$ dry solids (see Step 7.1 or 7.2), and if
particle-size reduction of the solid was needed in Step 7.3, proceed to Step 8.10. If particle-size reduction was not required in Step 7.3, quantitative-
ly transfer the solid material into the extractor vessel, including the filter used to separate the initial liquid from the solid phase. Proceed to Step
8.11.

8.10 The solid portion of the waste is prepared for extraction by crushing, cutting, or grinding the waste to a surface area or particle-size as
described in Step 7.3. When the surface area or particle-size has been appropriately altered, quantitatively transfer the solid material into the ex-
tractor vessel, including the filter used to separate the initial liquid from the solid phase.

Note.—Sieving of the waste through a sieve that is not Teflon coated should not be done to avoid pos-
sible contamination of the sample. Surface area requirements are meant for filamentous (e.g., paper,
cloth) and similar waste materials. Actual measurement of surface area is not recommended.

8.11 Determine the amount of extraction fluid to add to the extractor vessel as follows:

$$\text{Weight of extraction fluid} = \frac{20 \times \%\ \text{solids (Step 7.1)} \times \text{weight of waste filtered (Step 8.5 or 8.7)}}{100}$$

Slowly add this amount of appropriate extraction fluid (See Step 7.4) to the extractor vessel. Close the extractor bottle tightly (it is recommended
that Teflon tape be used to ensure a tight seal), secure in rotary extractor device, and rotate at 30 ± 2 rpm for 18 ± 2 hours. Ambient tempera-
ture (i.e., temperature of room in which extraction is to take place) shall be maintained at 22 ± 3°C during the extraction period.

Note.—As agitation continues, pressure may build up within the extractor bottle for some types of
wastes (e.g., limed or calcium carbonate containing waste may evolve gases such as carbon dioxide). To
relieve excess pressure, the extractor bottle may be periodically opened (e.g., after 15 minutes, 30
minutes, and 1 hour) and vented into a hood.

8.12 Following the 18 ± 2 hour extraction, the material in the extractor vessel is separated into its component liquid and solid phases by filtering
through a new glass fiber filter, as outlined in Step 8.7. For final filtration of the TCLP extract, the glass fiber filter may be changed, if necessary,
to facilitate filtration. Filter(s) shall be acid-washed (see Step 4.4) if evaluating the mobility of metals.

9.4.2 For wastes containing > 5% solids (See Step 7.1), the amount of waste to charge into the ZHE is determined as follows:

$$\text{Weight of waste to charge ZHE} = \frac{25}{\text{\% solids (Step 7.1)}} \times 100$$

Weigh out a representative subsample of the waste of the appropriate size and record the weight.

9.5 If particle-size reduction of the solid portion of the waste was required in Step 7.3, proceed to Step 9.6. If particle-size reduction was not required in Step 7.3, proceed to Step 9.7.

9.6 The waste is prepared for extraction by crushing, cutting, or grinding the solid portion of the waste to a surface area or particle-size as described in Step 7.3. Wastes and appropriate reduction equipment should be refrigerated, if possible, to 4°C prior to particle-size reduction. The means used to effect particle-size reduction must not generate heat in and of itself. If reduction of the solid phase of the waste is necessary, exposure of the waste to the atmosphere should be avoided to the extent possible.

> Note.—Sieving of the waste is not recommended due to the possibility that volatiles may be lost. The use of an appropriately graduated ruler is recommended as an acceptable alternative. Surface area requirements are meant for filamentous (e.g., paper, cloth) and similar waste materials. Actual measurement of surface area is not recommended.

When the surface area or particle-size has been appropriately altered, proceed to Step 9.7.

9.7 Waste slurries need not be allowed to stand to permit the solid phase to settle. Wastes that settle slowly shall not be centrifuged prior to filtration.

9.8 Quantitatively transfer the entire sample (liquid and solid phases) quickly to the ZHE. Secure the filter and support screens into the top flange of the device and secure the top flange to the ZHE body in accordance with the manufacturer's instructions. Tighten all ZHE fittings and place the device in the vertical position (gas inlet/outlet flange on the bottom). Do not attach the extraction collection device to the top plate.

> Note.—If waste material (> 1% of original sample weight) has obviously adhered to the container used to transfer the sample to the ZHE, determine the weight of this residue and subtract it from the sample weight determined in Step 9.4, to determine the weight of the waste sample that will be filtered.

Attach a gas line to the gas inlet/outlet valve (bottom flange) and, with the liquid inlet/outlet valve (top flange) open, begin applying gentle pres-
[illegible]re of 1–10 psi (or more if necessary) to force all headspace (into a hood) slowly out of the ZHE device. At the first appearance of liquid from
[illegible] liquid inlet/outlet valve, quickly close the valve and discontinue pressure. If filtration of the waste at 4°C reduces the amount of expressed liq-
[illegible]d over what would be expressed at room temperature, then allow the sample to warm up to room temperature in the device before filtering. If
the waste is 100% solid (See Step 7.1), slowly increase the pressure to a maximum of 50 psi to force most of the headspace out of the device and
[illegible]oceed to Step 9.12.

[illegible].9 Attach the evacuated pre-weighed filtrate collection container to the liquid inlet/outlet valve and open the valve. Begin applying gently pressure
of 1–10 psi to force the liquid phase into the filtrate collection container. If no additional liquid has passed through the filter in any 2-minute inter-
val slowly increase the pressure in 10-psi increments to a maximum of 50 psi. After each incremental increase of 10 psi, if no additional liquid has
passed through the filter in any 2-minute interval, proceed to the next 10-psi increment. When liquid flow has ceased such that continued pressure
filtration at 50 psi does not result in any additional filtrate within any 2-minute period, filtration is stopped. Close the liquid inlet/outlet valve, dis-
continue pressure to the piston, and disconnect the filtrate collection container.

> Note.—Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

9.10 The material in the ZHE is defined as the solid phase of the waste and the filtrate is defined as the liquid phase.

> Note.—Some wastes, such as oily wastes and some paint wastes, will obviously contain some material that appears to be a liquid. But even after applying pressure filtration, this material will not filter. If this is the case, the material within the filtration device is defined as a solid and is carried through the TCLP extraction as a solid.

If the original waste contained <0.5% dry solids (See Step 7.2), this filtrate is defined as the TCLP extract and is analyzed directly. Proceed to Step 9.15.

9.11 The liquid phase may now be either analyzed immediately (see Steps 9.13 through 9.15) or stored at 4°C under minimal headspace conditions
until time of analysis. The weight of extraction fluid #1 to add to the ZHE is determined as follows:

$$\text{Weight of extraction fluid} = \frac{20 \times \text{\% solids (Step 7.1)} \times \text{weight of waste filtered (Step 9.4 or 9.8)}}{100}$$

9.12 The following steps detail how to add the appropriate amount of extraction fluid to the solid material within the ZHE and agitation of the
ZHE vessel. Extraction fluid #1 is used in all cases (see Step 5.6). [illegible] liquid inlet/outlet valve. The line used shall
9.12.1 With the ZHE in the vertical position, attach a line from the extraction fluid reservoir [illegible] in the line. Release gas pressure on the ZHE piston
[illegible]ntain fresh extraction fluid and should be preflushed with fluid to eliminate any air pockets [illegible] extraction fluid (by pumping or similar means) into the
[illegible] the gas inlet/outlet valve), open the liquid inlet/outlet valve, and begin transferring [illegible] fluid has been introduced into the device.
ZHE. Continue pumping extraction fluid into the ZHE until the appropriate amount of [illegible] disconnect the extraction fluid line. Check the
[illegible].12.2 After the extraction fluid has been added, immediately close the liquid inlet/outlet valve and [illegible] fashion 2 or 3 times. Reposition the
ZHE to ensure that all valves are in their closed positions. Physically rotate the device in an end-over-end [illegible] and slowly open the liquid
ZHE in the vertical position with the liquid inlet/outlet valve on top. Put 5–10 psi behind the piston (if necessary) [illegible] of extraction fluid. This bleeding
inlet/outlet valve to bleed out any headspace (into a hood) that may have been introduced due to the addition

TABLE 2—SUITABLE ROTARY AGITATION APPARATUS[1]

Company	Location	Model
Associated Design and Manufacturing Company	Alexandria, VA, (703) 549-5999	4-vessel device, 6-vessel device
Lars Lande Manufacturing	Whitmore Lake, MI, (313) 449-4116	10-vessel device, 5-vessel device
IRA Machine Shop and Laboratory	Santurce, PR, (809) 752-4004	16-vessel device
EPRI Extractor	—	6-vessel device[2]
REXNORD	Milwaukee, WI, (414) 643-2850	6-vessel device
Analytical Testing and Consulting Services, Inc.	Warrington, PA, (215) 343-4490	4-vessel device

[1] Any device that rotates the extraction vessel in an end-over-end fashion at 30 ± 2 rpm is acceptable.

[2] Although this device is suitable, it is not commercially made. It may also require retrofitting to accommodate ZHE devices.

TABLE 3—SUITABLE ZERO-HEADSPACE EXTRACTOR VESSELS

Company	Location	Model No
Associated Design & Manufacturing Co	Alexandria, VA, (703) 549-5999	3740-ZHB, Gas Pressure Device
Millipore Corp.	Bedford, MA, (800) 225-3384	SD1 P581 C5, Gas Pressure Device
Analytical Testing and Consulting Services, Inc.	Warrington, PA, (215) 343-4490	C102, Mechanical Pressure Device

TABLE 4—SUITABLE FILTER HOLDERS[1]

Company	Location	Model	Size
Nuclepore Corp	Pleasanton, CA, (800) 882-7711	425910	142 mm.
		410400	47 mm.
Micro Filtration Systems	Dublin, CA, (415) 828-6010	302400	142 mm.
Millipore Corp.	Bedford, MA, (800) 225-3384	YT30142HW	142 mm.
		XX1004700	47 mm.

[1] Any device capable of separating the liquid from the solid phase of the waste is suitable, providing that it is chemically compatible with the waste and the constituents to be analyzed. Plastic devices (not listed above) may be used when only inorganic contaminants are of concern. The 142-mm size filter holder is recommended.

TABLE 5—SUITABLE FILTER MEDIA

Company	Location	Model	Pore size[1]
Whatman Laboratory Products, Inc.	Clifton, NJ, (201) 773-5800	GFF	0.7

[1] Nominal pore size.

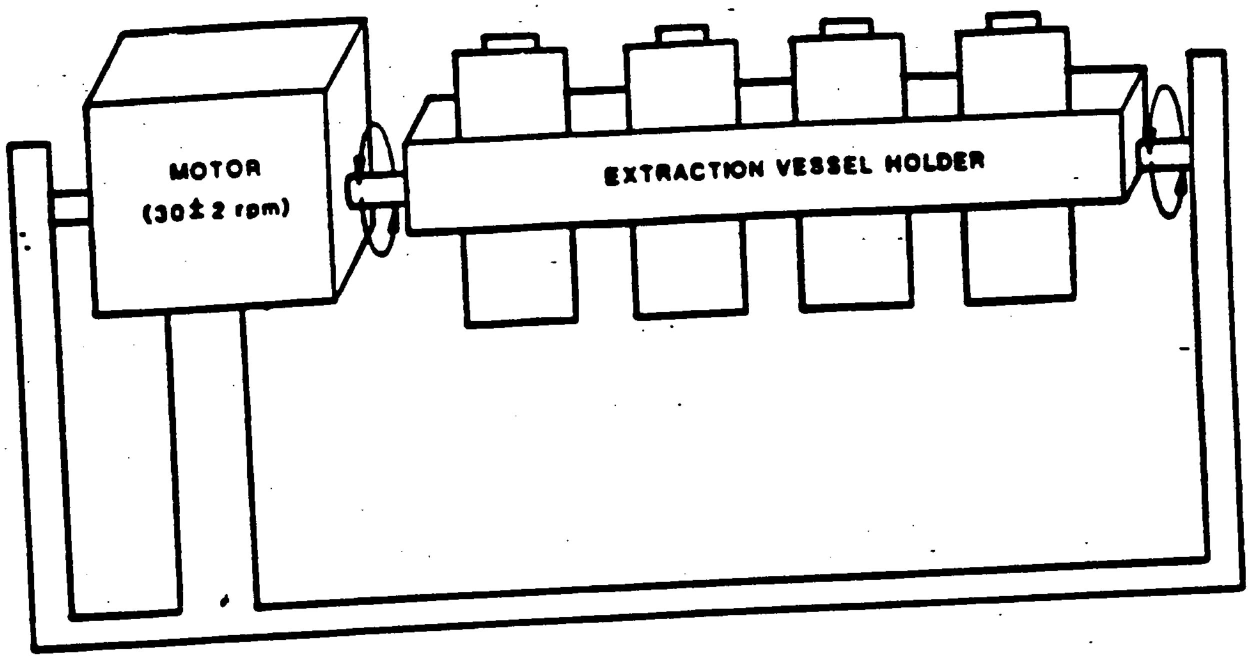


FIGURE 2: ROTARY AGITATION

Metro Service Laboratories, Inc.

Metro Service Laboratories, Inc. is a multi-disciplined analytical laboratory consisting of six major divisions. These divisions are Environmental Chemistry, Food Technology, Industrial Hygiene, Fuel Chemistry, Asbestos Control, and Forensic Chemistry. The divisions are in constant contact with each other and most personel have served in multiple divisions. This gives a wide range of experience and expertise not available in laboratories with a more narrow range of analytical work.

The constant interaction between divisions gives MSL information and capabilities not found in smaller labs. Such as the fuel lab helps support the environmental lab with waste oil samples and the environmental lab helps support the industrial hygiene and forensic branches with data and techniques required for their specialties.

MSL's staff is comprised of personel with degrees in chemistry, physics, biology, and microbiology. Most technical personel have at least a bachelor's degree in one of the above areas.

MSL utilizes modern equipment and stringent quality assurance programs. MSL participates in most government sponsered or recognized Quality Assurance programs including DMR QC, PAT, and RTI programs. Techniques includes Atomic Absorption, Infra-Red, Various Chromatographies, Microscopy, Calorimetry, Wet Chemistry, Physical, and other spectrographic methods.

Chemical Analysts and Consultr

835 EAST BURNETT AVENUE
LOUISVILLE, KENTUCKY 40208
PHONE (502) 635-6463

Environmental Chemistry Division

Key Personel:

Gerald Webb: Technical Director

BA, Chemistry, University of Louisville

Mr. Webb has fifteen years experience in instrumental, wet, and biological methods of analysis on a wide range of materials including water, air, gases, wastes, metals, refractories, soils, polymers, and coatings.

Shelton Poole: Division Manager

BS, Chemistry, University of Louisville

Mr. Poole has five years experience in the analysis of water, wastes, and air using EPA approved methodologies. He has had special training in instrumental analysis.

Richard King: Chromatographer

BS, Chemistry, Rose Hulman Institute of Technology
BS, Physics, Rose Hulman Institute of Technology

Mr. King has four years experience primarily in the area of organic analysis. He specializes in gas chromatography.

Kerry Humphrey: Wet Chemistry Analysist

BS, Biology, Indiana University

Mr. Humphrey has performed as a specialist in wet chemical analysis for two years.

Susan Shackelford: Director Microbiology

BS, Microbiology, University of Kentucky

Ms. Shackelford has nearly twenty years in the analysis of various matrices for a variety of micro-organisms.

Instrumentation and Methodology

Intruments include a PE Model 603 AA, a PE Model 3030 AA dedicated to graphite furnace, PE Model Sigma 300 GC, Hewlett Packard Model 5730 GC, IR, Visible Spectrometers, and a host of supporting equipment. The gas chromatographs are equiped with integrators and the detectors required to perform SW-846 and EPA Water Methods. GC/MS is available if required.

All water and waste analysis are conducted according to SW-846, EPA "Methods for Chemical Analysis of Water and Wastes", or Standard Methods for the Examination of Water and Wastewater". Method numbers and references are supplied on the analytical report. If required, some A.S.T.M. procedures are used.

The internal quality assurance program is based upon the EPA document 600/4-79-019 " Handbook for Analytical Quality Control in Water and Wastewater Laboratories". Quality control information is available to all authorized inspection personel upon reasonable notice. MSL reserves the right to limit access to QC data of a proprietary nature to our clients without court order.

QUALITY ASSURANCE

SECTION 1.1
Glassware:

All glassware used for analytical procedures shall be borosilicate glass unless the procedure specifies other materials.

Volumetric glassware shall conform to Federal Class A specifications. Volumes will be adjusted at the calibration temperature.

Glassware that is damaged, or cannot be cleaned to original clarity shall be disposed of.

All glassware shall be cleaned before use. The Cleaning procedures used shall be as follows:

METALS	Detergent, Nitric Acid, Reagent Water
ORGANICS	Detergent,Chromic Acid, Reagent Water, Appropriate Solvent
ANIONS*	Detergent, Appropriate Acid, Reagent Water

* Do NOT use phosphorus containing detergents to clean glassware intended for use in phosphate analysis.

SECTION 1.2
GENERAL EQUIPMENT

Analytical Balances shall be serviced biannually. Accuracy shall be tested monthly by comparison with Class S weights. General Balances shall be tested monthly and serviced when weight deviations exceed manufacturer's specifications.

Analytical Instruments shall be calibrated daily. All calibrations shall immediately precede the analysis. Calibrations shall be checked at least every ten samples. If recalibration is required the proceeding ten samples shall be reanalyzed. Instrument response shall be compared to response values previously obtained. If a discrepancy occurs between the previous and current response, then the cause of the discrepancy must be isolated and corrected prior to the analysis of samples.

Gas supplies for instrumentation must meet or exceed the manufacturer's specifications for the application being performed.

All consumable parts shall be replaced with supplies that equal or exceed the manufacturer's specifications. Instrument performance must be verified after replacing consumable parts.

SECTION 1.3

REAGENTS:

All reagents will be of specified purity. If no purity is specified, then reagents will be of ACS Analytical Reagent grade or better. Reagents used for primary standardizations will be of Primary Standard grade or obtained directly from NBS, EPA, or one of their contractors. Secondary standards shall be standardized against primary standards whenever possible.

Working standards shall be purchased from reputable suppliers when available. These commercial standards are to be checked for accuracy when received.

All reagents and standards shall be dated upon receipt and disposed of when the expiration date is reached.

Stock standards of stable materials shall be remade monthly and verified whenever used. The resulting working standards shall be made daily. Stock standards of less stable materials shall be made in accordance with the applicable procedure.

SECTION 2.1

DATA HANDLING

2.1.1 Significant Figures

Reported analytical values should contain only significant figures. A value is made up of significant figures when it contains all digits known to be true and one last digit in doubt. For example, if a value is reported as 18.8 mg/l the 18 must be firm while the 0.8 is somewhat uncertain, but presumably better than one of the values 0.7 or 0.9 would be. The use of the standard reporting values established (See Appendix) will provide the proper number of significant figures for a particular analysis. These values have been determined to be readily obtainable for the methods specified. Methods not included in the appendix must have the significant figures that apply determined by QC data. For additional information on significant figures see <u>Handbook for Analytical Quality Control in Water and Wastewater Laboratories</u> EPA-600/4-79-019.

2.1.2 Rounding Off Numbers

If the figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. If the figure following those to be retained is greater than 5, the figure is dropped, and the last retained figure is raised by 1. If the figure following those to be retained is 5, and if there are no figures other than zeros beyond the five, the figure 5 is dropped, and the number rounded to the even number.

SECTION 3.1
ANALYTICAL PERFORMANCE

Shewhart control charts, based upon percent recovery of spiked samples, will be used as accuracy control. Cusum charts, based upon the range of duplicates, will be used as precision control. Charts will be maintained at the bench and daily OC operations compared to the charts to maintain accuracy. Should any spike or duplicate be outside the control limits, or if seven successive results are on one side of the mean, then the analysis will be considered out of control. The problem must then be determined and corrected. All samples tested during or preceeding the control violation must be retested.

Analytical runs shall consist of at least the following:

1.) One water and reagent blank

2.) One midpoint standard.

3.) One spike to determine recovery

4.) One set of duplicates

SECTION 3.2
INTRALABORATORY QC

Reference samples shall be supplied to analysts at least quarterly. These reference samples should be supplied by EPA, NBS, or other agencies whose reputation is beyond reproach. These samples shall be prepared by the supervisor and submitted as regular samples. All analysis shall be performed with NO advance knowledge of the true values. Deviations or inaccuracies shall be immediately reported to the quality control supervisor.

It is the policy of this laboratory to accept all intralaboratory QC programs that are requested of it or are widely available. These QC samples, if suppied or requested by clients, will be performed AT NO CHARGE to the client. If multiple samples of blind QC samples are received, then all samples are to be tested and the data used to verify internal accuracy and precision data.

APPENDIX

Method	MDL
7060	0.001 mg/l
7080	1. mg/l
7130	0.01 mg/l
7131	0.001 mg/l
7190	0.01 mg/l
7196	0.01 mg/l
7197	0.01 mg/l
7210	0.01 mg/l
7420	0.1 mg/l
7421	0.001 mg/l
7470	0.0002 mg/l
7520	0.05 mg/l
7740	0.005 mg/l
7760	0.01 mg/l
7950	0.01 mg/l
8010	0.001 mg/l
8015	0.001 mg/l*
8020	0.001 mg/l*
8040	0.004 mg/l
8060	0.001 mg/l
8080	0.001 mg/l
8250	0.01 mg/l
9010	1. ppm
9030	1. ppm

* Some parameters may differ.

d. Procedure Requirements for Analyses. All analytical instrumentation and procedures used to fulfill analytical requirements shall be in agreement with the Environmental Protection Agency (EPA) and State of Indiana guidelines.

(1) Qualifications of Personnel: The following are the minimum personnel qualifications required of the analytical laboratory performing the requested services:

As a minimum requirement, personnel performing analyses must be experienced in atomic absorption spectrophotometry and GC-mass spectroscopy in order to perform analyses in accordance with EPA regulations, 40 CFR 261, Appendices 2 and 3.

Qualifications of laboratory personnel will be evaluated during preaward survey (Reference Paragraph M.1, Section M).

(2) Laboratory Facilities and Equipment: In addition to meeting all EPA, State, and OSHA requirements, the laboratory facilities must have sufficient space to adequately store and process all samples.

Prior to award of contract, the Contractor shall provide NAVWPNSUPPCEN with a list of all laboratory equipment, instrumentation, and its capabilities. All laboratory instrumentation and equipment must be clean and readily available.

Instrumentation must be calibrated and maintained to meet the technical requiremnts outlined in:

"Test Methods for the Evaluation of Solid Waste, Physical/ Chemical Methods," SW-846, U.S. EPA

American Society for Testing and Materials (ASTM) guidelines

"Methods for Chemical Analysis of Water and Wastewater," EPA

"Standard Methods for Examination of Water and Wastewater," American Public Health Association

Internal Quality Control requirements are addressed in Section E of this contract.

(3) Inspection: The Contractor's laboratory facilities (as applicable) shall be available for inspection by the Government representative to insure quality of analytical performance and resulting data and to ascertain that the facilities are in compliance with contract specifications.

(4) Within 15 days after award of contract, the Contractor shall provide NWSC Crane with copies or references of all procedures to be used concerning Crane's analytical requests. The Contracting Officer shall be notified in writing of all changes in analytical procedures as they occur during the term of the contract.

e. Required Analyses: The Contractor shall have precise and accurate analyses performed on the hazardous waste samples collected to determine the quantitative values (within the limits prescribed in the tables below) of wastes outlined in 40 CFR 261.31 to 261.33; and/or analyses to determine if waste is listed in 40 CFR 261.21 to 40 CFR 261.24; and or analyses as recommended by the Center's Environmental Coordinator; and to assign appropriate hazardous waste numbers based on the results of the analyses. All required analyses on all other parameters must be performed in accordance with State and/or EPA approved guidelines contained in:

(1) "Test Methods for the Evaluation of Solid Waste, Physical/ Chemical Methods," SW-846, U.S. EPA

(2) "The Standard Methods of Water and Wastewater," American Public Health Association

TABLE I - PCB ANALYSIS

Description	Minimum Limits of Detectability (mg/l)
PCB	1.0

TABLE II - HAZARDOUS WASTE CHARACTERISTICS ANALYSIS

Description	Minimum Detectable Limit
Ignitability	Limits of EPA Test
Corrosivity	Limits of EPA Test
Reactivity	Limits of EPA Test
EP Toxicity	See Table III

TABLE III - E.P. TOXICITY TESTS

Description	Minimum Detectability Limits mg/l
Arsenic	0.5
Barium	10.0
Cadmium	0.1
Chromium (Total)	0.5
Chromium (Hexavalent)	0.5
Lead	0.5
Mercury	0.02
Selenium	0.1
Silver	.5
Endrin	0.02
Lindane	.4
Methoxychlor	10.0
Toxaphene	0.5
2,4-D	0.5
2,4,5-TP Silvex	10.0

(3) Analytical procedures must include the ability to perform the Toxic Characteristic Leaching Procedure (TCLP) when necessary to comply with land disposal restrictions.

C.6 SAMPLING AND ANALYSIS

Contractor shall be required to obtain samples from designated waste streams and hazardous waste storage areas at NAVWPNSUPPCEN Crane and to perform analyses and report the results of those analyses. Payment will be made under Sub-Bid item 0001AA on an "each" basis. Price includes obtaining the sample, analyses, and reporting of results and other incidental related work.

a. Number of samples and performance dates will be Government-determined. Contractor shall respond to request for sampling and analytical services not later than 15 days after receipt of Delivery Order. Contractor shall be prepared to receive first Delivery Order not later than 15 days after award of contract. Sampling dates are unscheduled but have historically occurred monthly.

b. Contractor shall provide all labor, materials, supplies, and equipment; including sample bottles, preservatives, and transportation costs necessary to accomplish sampling and analytical services.

c. Procedure Requirements for Sampling

(1) Contractor shall notify Officer in Charge, or his designated representative, five days prior to the time (date) of arrival on Center for sample collection.

(2) Prior to award of contract, the Contractor shall submit written documentation outlining the specific procedures to be used in collecting samples. The procedures shall be in agreement with:

"Samples and Sampling Procedures for Hazardous Waste Streams," January 1980, EPA-600-2-80-018

American Society for Testing and Materials (ASTM) Guidelines

Naval Weapons Support Center (NAVWPNSUPPCEN) Instruction - Hazardous Waste Sampling and Analysis - July 1985

(3) Contractor shall be responsible for arrangements and cost of the transportation of samples from NAVWPNSUPPCEN Crane to the laboratory.

(4) A Chain of Custody form (Attachment J-C2) shall accompany all sample shipments. This form is Government-provided for Contractor completion. A copy shall accompany analytical results submitted to Government.

Weapons Quality Engineering Center
Naval Weapons Support Center
Crane, Indiana 47522

WQEC/C TP3025-SS9011
TEST PROCEDURE
for
IMPACT SENSITIVITY

(Replaces WQEC TP 3403-42)

Issue date: 4-15-83
Expiration Date: 4-15-85

WQEC TEST PROCEDURE ROUTING SHEET

PREPARED BY: H. Farley

TEST SCHED. DATE: ______

TEST PROCEDURE NO. 3025-TP-SS-9011

DATE STARTED: ______

ITEM NAME: IMPACT SENSITIVITY

		DATE IN	DATE OUT	INITIALS
PREPARED BY:	H. Farley	3-31-83	3-31-83	[illegible]
REVIEWED BY:	J. Torphy D. Ellison	3-31-83 3-31-83	4-1-83 4-1-83	[illegible]
APPROVED - PREP. BR. MGR.	R. Klausmeier	4-7-83	4-7-83	K
SAFETY WQEC DIV.	D. Sherfick	7 APR 83	—	[illegible]
WQEC DIV. MGR.	R. F. Karcher		4/8/83	[illegible]
WQEC SAFETY	D. Sherfick	—	7 APR 83	[illegible]
WQEC DIRECTOR	C. Thompson	4/14/83	4/14/83	[illegible]
SAFETY DEPT. 0411	E. Hildebrand	4/14/83	4/14/83	[illegible]
SAFETY DEPT. 04C2	E. McLaren ~~J. Fitch~~	4/15/83	4/15/83	[illegible]
ENVIRONMENTAL PROG. MGR. 0924	C. Andrews	4/15/83	4/18/83	[illegible]

☐ Proofing Approval (Do not sign approval sheet)

☒ Final Approval (Sign approval sheet)

☐ Recertification (Sign approval sheet)

REMARKS:

	NAME	SIGNATURE	DATE
PREPARED BY	H. Farley	H. Farley	3-31-83
REVIEWED BY	J. Torphy D. Ellison	J. Torphy D. Ellison	4-1-83 4-1-83
APPROVED - PREP. BR. MGR.	R. Klausmeier	R E Klausmeier	4-7-83
SAFETY WQEC DIV.	D. Sherfick	D. E. Sherfick	7 APR 83
WQEC DIV. MGR.	R. F. Karcher	R F Karcher	8 April 83
WQEC SAFETY	D. Sherfick	D. E. Sherfick	7 APR 83
WQEC DIRECTOR	C. Thompson	Charles E. Thompson	4/14/83
SAFETY DEPT. 0411	E. Hildebrand	Eugene A. Hildebrand	4/19/83
SAFETY DEPT. 04C2	~~J. Fitch~~ E. McQueen	Eric O. McQueen	4/15/83
ENVIRONMENTAL PROG. MGR. 0924	C. Andrews	James Haswicker	4/12/83

RECORD OF CHANGE/REVISION

Change/ Revision	Page or Sheet	Para.	Date	Signature	Reason for Change Revision Auth.

TEST PROCEDURE CERTIFICATE

This document has been station proofed by subjecting a sufficient number of various materials to each of the tests described herein and has found to accurately define and describe all equipment, conditions, and procedures.

VERIFIED BY: R.E. Klausmeier

DATE: 4-7-83

Naval Weapons Support Center
Weapons Quality Engineering Center
Crane, Indiana

HAZARD BRIEFING

NOTE: The test supervisor shall review this briefing with all personnel performing this impact test to assure that there are no misunderstandings by any operator of what is required and involved.

1. The open explosive or pyrotechnic weighs 35 mg ± 2 mg per sample.

2. Accidental igniting of the explosive or pyrotechnic by electrostatic discharge friction or impact could cause fire or detonation and severe personnel injury. There have not been any such incidents in this test to date. Personnel shall always handle the open explosives and pyrotechnics with extreme care and caution.

3. This procedure outlines the hazards and the necessary controls at each step. The operator must heed these controls during the test.

4. The test supervisor shall review any impact incident/accident which may have occurred previously. The test supervisor shall review the evacuation plan for building/area for which the tests will be conducted. This review will be passed on to each operator.

5. The test operator shall review this procedure, including the Hazard Analysis Section and Safety Summary before proceeding with this test. If the operator does not have a clear understanding of all aspects of safety and hazards involved, then he/she shall inform the test supervisor before starting any operations.

WQEC HAZARD ANALYSIS (SHEET 1)
9.D-NWSCC (SP 7/75)

WQEC HAZARD ANALYSIS	TEST PROC.: 3025-TP-SS-9011		REVISION:	REV. DATE:
	BRANCH: Explosive Sciences	PREP. BY: H. Farley	CODE: 3025	DATE: 1-83

HAZARDOUS ITEM/ INTERFACE/PROCEDURE/ETC.	TRIGGERING EVENT	ACCIDENT CONSEQUENCES	ACC. PROB.	HAZ. CAT.	CORRECTIVE ACTIONS AND/OR CONTROLS
Preparation of explosive, pyrotechnic and propellant samples for testing	Impact and/or electrostatic charge igniting explosive, pyrotechnic, propellant or igniter composition	1. Fire 2. Detonation 3. Personnel injury 4. Possible disability 5. Minor equipment damage	low	III	1. Require personnel to wear safety shoes (conductive safety shoes on conductive floor or grounded metal plate). 2. Use qualified experienced personnel. 3. Employ suitable grounding. 4. Use spark proof tools 5. Use suitable shieldin and barricades. 6. Keep operator inside cell during actual operations. 7. Perform operations ir authorized area. 8. Keep explosive and personnel limits to a minimum.

WQEC HAZARD ANALYSIS (SHEET 2)
9:D-NWSCC (SP 7/75)

WQEC HAZARD ANALYSIS	TEST PROC.: 3025-TP-SS-9011	BRANCH: 3025	REVISION:		PAGE: 2
HAZARDOUS ITEM/ INTERFACE/PROCEDURE/ETC.	TRIGGERING EVENT	ACCIDENT CONSEQUENCES	ACC. PROB.	HAZ. CAT.	CORRECTIVE ACTIONS AND/OR CONTROLS
Testing explosive, pyrotechnic, igniter composition and propellant.	Impact or electro-static charge igniting material to be tested	1. Fire 2. Personnel injury 3. Detonation 4. Minor equipment damage	low	III	1. Use qualified experienced personnel. 2. Require personnel to wear safety shoes. 3. Employ suitable shielding around test equipment. 4. Employ suitable grounding. 5. Perform all tests in authorized area. 6. Keep personnel and explosive limits to a minimum.

Sheet 5

OPERATIONAL EXPLOSIVE LIMIT

ITEM	CLASS	EXPLOSIVES AND PYROTECHNICS WT SAMPLE
Granular Explosive	1.1	35 ± 2 mg
Granular Pyrotechnics	1.3	

TEST SEQUENCE	LOCATION	PERSONNEL LIMITS	EXP LIMITS
Sample Preparation	Bldg 142-TC 2-10	2	.25 lbs.

1.0 GENERAL INFORMATION AND INSTRUCTIONS

1.1 This procedure describes a general description for the impact sensitivity test on various materials and ammunition.

1.2 The purpose of this test procedure is to insure that each activity will perform tests in the same manner to obtain comparable data.

1.3 Test data shall be recorded, defects and discrepancies shall be fully investigated and documented.

2.0 REFERENCE DOCUMENTS

2.1 Military Standards

2.1.1 MIL-STD-1234 (Pyrotechnics: Sampling, Inspection, and Testing)

2.1.2 MIL-STD-650 (Explosive: Sampling, Inspection, and Testing)

2.2 Publications

2.2.1 US/IMPACT/02 Feb 1966 (Manual of Sensitivity Tests)

2.2.2 AMC Pamphlet AMCP 706-177, Properties of Explosives of Military Interest

2.2.3 TM 9-1300-214, Military Explosives

2.2.4 Manual OD 5823, Sensitivity Test of Primers and Detonators

2.2.5 Manual OD 44811, Safety and Performance for Qualification of Explosives

2.3 Drawings

2.3.1 LD 70518 (NOL Impact Sensitivity Apparatus)

2.3.2 QEL 1962 (Impact Sensitivity Apparatus)

3.0 SAFETY PRECAUTIONS

3.1 Employ suitable ground for workbenches, test equipment, fixtures, and ground plates for personnel to protect operations from electrostatic charges.

3.2 Employees shall wear safety glasses with side shields, conductive sole shoes, cotton socks, and flameproof lab coats.

3.3 Observe posted building and area explosive limits at all times.

3.4 All tools used in operations involving explosives and pyrotechnics shall be nonsparking.

3.5 Shielding shall be provided around test equipment to protect operator and adjacent operations from fragments.

3.6 Scrap material and residue shall be placed in a grounded container until disposal.

3.7 During grinding of material, use test cell to protect operator and adjacent surroundings.

3.8 Primary explosives should be handled in the smallest quantities required to complete the test. Special precautions should be taken to prevent dropping or spilling primary explosives.

3.9 When testing material, the operator shall wear ear protection.

3.10 When testing compositions containing red phosphorus, a solution of copper sulfate should be placed adjacent to the apparatus.

4.0 EQUIPMENT AND FACILITIES

4.1 NOL Impact Sensitivity Apparatus, DWG 70518 or equivalent with "Type 12" tools; or NWSC Impact Sensitivity Apparatus, DWG QEL 1962.

4.2 Flint sandpaper - grade 5/0 (carborundum type F EX fine C135R is acceptable).

4.3 Analytical Balance

4.4 Safety Shield

4.5 Small Volumetric Scoop

4.6 Table or Bench

4.7 Authorized Test Area

4.8 Ear Protective Equipment

5.0 PREPARATORY PROCEDURES

5.1 <u>Equipment Preparation</u>

5.1.1 Cut sandpaper (see paragraph 4.2) in 1-inch squares.

5.1.2 Set zero point of impact apparatus with sandpaper between striker and anvil.

5.1.3 Check the faces of the striker and anvil for roughened surfaces. Surface must be replaced or polished if roughened.

5.1.4 Place proper weight in apparatus, 2 kg weight is normally used.

5.2 Sample Preparation

5.2.1 Test sample should be of fine granular material so that 35 mg ± 2 mg sample can be weighed easily.

5.2.2 Grinding of solid material is performed in a test cell, and may be done in a mortar and pestle or in a Wiley mill or equivalent.

5.2.3 Other granular material, such as smokeless powder and black powder, can be tested "as received" without further preparation.

5.2.4 The first few samples are weighed on an analytical balance. The remainder are volumetrically measured by use of a small scoop, which when used by an experienced operator, measures the quantity of sample within the desired tolerance.

5.2.5 Each 35 mg test sample shall be placed in the center of the 1-inch square sandpaper for testing.

5.2.6 Each 35 mg test sample shall be placed without spreading on the 1-inch square of sandpaper.

6.0 TEST SEQUENCE

6.1 Staircase Method

6.1.1 If apparatus is manually operated, raise the drop weight up to the holding fixture and place the release pin into position. PRECAUTION: Make sure weight is held in position by the release pin.

6.1.2 Elevate the drop weight to a preselected height. (This height should result in a "fire" of the sample.)

6.1.3 Place a 35 mg test sample on sandpaper in the center of the anvil. Do not spread the sample.

6.1.5 Lower the striker gently so that it rests on the top of the test sample.

NOTE: When testing very sensitive materials, do not drop or turn the striker on the sample.

6.1.6 With operator behind suitable shield, manually pull the release pin.

6.1.7 Manually slide the drop weight up to the holding fixture and place the release pin into position. WARNING: Make sure weight is held in position by the release pin.

6.1.8 Record the test results as a "fire" or "no fire" as indicated by the presence of fire, smoke, or noise.

NOTE: While testing lead azide, when a "no fire" occurs, raise the weight to a height, that when dropped, will fire the sample (this step eliminates the disposition problems of the sample).

6.1.9 Remove all residue or un-fired samples, and discard in accordance with paragraph 3.6.

NOTE: Paragraph 3.10 applies when testing red phosphorus.

6.1.10 After each test, carefully clean the face of the striker and anvil with fine abrasive paper.

6.1.11 A fresh test sample must be used for each drop test.

6.1.12 After the first "fire" is obtained, lower the drop height in 0.1 Log Unit increments, until a "no fire" is obtained.

6.1.13 Starting with the first "no fire" height obtained in paragraph 6.1.12, raise the drop weight 0.1 Log Unit for the next test.

6.1.14 If a "fire" is obtained at this level, lower the drop weight 0.1 Log Unit for the next test.

6.1.15 If a "no fire" is obtained at this level, raise the drop weight 0.1 log unit for the next test.

6.1.16 Continue to test the sample at a height 0.1 Log Unit higher or lower than the previous test, depending on whether or not it fired (staircase method).

6.1.17 Testing continues until a minimum total of 25 "fires" and "no fires" are obtained on a particular material.

6.1.18 The mean and standard deviation can be calculated from the above data. Also, various percentages of probability "fires" may be calculated. (Calculation method in Appendix A.)

6.2 Maximum No Fire Height Method

6.2.1 Follow procedure as described in paragraphs 6.1.1 through 6.1.11.

6.2.2 After the first "fire" is obtained, lower the drop weight in 0.1 Log Unit increments until a "no fire" is obtained.

6.2.3 Continue drop testing at this height until a sample "fires" or ten "no fires" are recorded.

6.2.4 If the sample fires before ten consecutive "no fires" are obtained at the same height, lower the drop height in 0.1 Log Unit increments until ten successive "no fire" results are obtained at the same height.

6.2.5 If a height of 100 cm is reached and the sample does not fire, test to get ten successive "no fire" at ~~100~~ 110 cm.

6.2.6 Stop test when ten "no fires" occur at the maximum height.

6.2.7 Report the results as a maximum "no fire" height.

APPENDIX A

Starting with the first reversal in either "fire" or "no fire", tally the number of "fires" or "no fires" at each height and insert them in the following table. (A minimum of (25) twenty-five drops shall be made.)

I HEIGHT IN CM, IN, LOG	II ADJUSTED HEIGHT	III NO. (FIRES) OR (NO FIRES)	IV (ADJUSTED HEIGHT) X (NO. FIRES) OR FIRES	V ADJUSTED HEIGHT SQUARED	VI ADJUSTED HEIGHT SQUARED X (NO FIRES, OR FIRES)
	0				
	1				
	2				
	3				
	4				

The formula for 50% fire height is:

$$\bar{h} = h_1 + D\left(\frac{A}{N} - .5\right) \text{ when "fires" are used, or}$$

$$\bar{h} = h_1 + D\left(\frac{A}{N} + .5\right) \text{ when "no fires" are used.}$$

$\bar{h}$ = 50% fire height
D = height interval
N = total of column III
A = total of column IV
B = total of column VI
h_1 = lowest height at which a test occurred

Report 50% fire height to the nearest cm.

The formula for standard deviation is:

$$s = D\left(.06 + 1.6\ \frac{(NB-A^2)}{N^2}\right)$$

D = height interval
N = total of column III
A = total of column IV
B = total of column VI

WQEC TEST PROCEDURE ROUTING SHEET

PREPARED BY: J. Torphy

TEST PROCEDURE NO. 3025-TP-SS-3015

ITEM NAME: FRICTION SENSITIVITY by the AUTO-FRICTION METHOD

TEST SCHED. DATE: ____________

DATE STARTED: ____________

		DATE IN	DATE OUT	INITIALS
PREPARED BY:	J. Torphy	2-4-83	2-4-83	JT
REVIEWED BY:	D. Ellison	2-4-83	2-14-83	DLE
APPROVED - PREP. BR. MGR.	R. Klausmeier	2-14	2-14	K
SAFETY WQEC DIV.	D. Sherfick	[illegible] Feb 83	—	[illegible]
WQEC DIV. MGR.	R. F. Karcher	—	16 Feb 83	[illegible]
WQEC SAFETY	D. Sherfick	—	16 Feb 83	[illegible]
WQEC DIRECTOR	C. Thompson	2/18/83	2/18/83	CJT
SAFETY DEPT. 0411	E. Hildebrand		2/22/83	[illegible]
SAFETY DEPT. 04C2	J. Fitch	2/23/83	2/24/83	JF
ENVIRONMENTAL PROG. MGR. 0924	C. Andrews	3/2/83	3/2/83	CA

☐	Proofing Approval	(Do not sign approval sheet)
☒ X	Final Approval	(Sign approval sheet)
☐	Recertification	(Sign approval sheet)

REMARKS:

Weapons Quality Engineering Center
Naval Weapons Support Center
Crane, Indiana 47522

3025-TP-SS-9015

TEST PROCEDURE for FRICTION SENSITIVITY BY THE ROTO-FRICTION METHOD

(Replaces WQEC TP 3403-50)

Issue date: 3-2-83
Expiration date: 3-1-85

TABLE OF CONTENTS

	NAME	SIGNATURE	DATE
PREPARED BY	J. Torphy	J. Torphy	2-4-83
REVIEWED BY	D. Ellison	Donald D Ellison	2-14-83
APPROVED - PREP. BR. MGR.	R. Klausmeier	RE Klausmeier	2-14-83
SAFETY WQEC DIV.	D. Sherfick	[illegible]	16 FEB 83
WQEC DIV. MGR.	R. F. Karcher	R F Karcher	16 FEB 83
WQEC SAFETY	D. Sherfick	[illegible]	16 FEB 83
WQEC DIRECTOR	C. Thompson	Charles A. Thompson	2/18/83
SAFETY DEPT. 0411	E. Hildebrand	[illegible]	2/22/83
SAFETY DEPT. 04C2	J. Fitch	[illegible]	2/21/83
ENVIRONMENTAL PROG. MGR. 0924	C. Andrews	[illegible] Andrews	3/2/83

RECORD OF CHANGE/REVISION

Change/ Revision	Page or Sheet	Para.	Date	Signature	Reason for Change/ Revision Auth.

3025-TP-SS-9015
6718G/169G
Sheet 2

TEST PROCEDURE CERTIFICATE

This document has been station proofed by subjecting a sufficient number of various materials to each of the tests described herein and has been found to accurately define and describe all equipment, conditions, and procedures.

VERIFIED BY: R E Klausmeier

DATE: 2/15/83

Naval Weapons Support Center
Weapons Quality Engineering Center
Crane, Indiana

A. HAZARD BRIEFING

NOTE: The test supervisor shall review this briefing with all personnel performing this friction test to assure that there are no misunderstandings by any operator of what is required and involved.

1. The open explosives or pyrotechnics weigh 100 grams or less.

2. Accidental igniting of the explosive or pyrotechnics by electrostatic charge, friction, or impact could cause fire or detonation and severe personnel injury. There have not been any such incidents in this test to date. Personnel shall always handle open explosives and pyrotechnics with extreme care and caution, keeping in mind a direction where he/she can move to avoid harm.

3. This procedure outlines the hazards and necessary controls at each step. The operator must heed these controls during the test.

4. The test supervisor shall review any friction test incident/accident which may have occurred previously. The test supervisor shall review the evacuation plan for the building/area for which the tests will be conducted. This review will be passed on to each operator.

5. The test operator shall review this procedure including the Hazard Analysis Section and Safety Summary before proceeding with this test. If the operator does not have a clear understanding of all aspects of safety and hazards involved, then he/she shall inform the test supervisor before starting any operations.

WQEC HAZARD ANALYSIS (SHEET 1)
9ND-NWSCC (SP 7/75)

WQEC HAZARD ANALYSIS	TEST PROC.: 3025-TP-SS-9015		REVISION:			REV. DATE:
	BRANCH: Explosive Sciences	PREP. BY: J. Torphy		CODE: 3025		DATE: 1.-3

HAZARDOUS ITEM/ INTERFACE/PROCEDURE/ETC.	TRIGGERING EVENT	ACCIDENT CONSEQUENCES	ACC. PROB.	HAZ. CAT.	CORRECTIVE ACTIONS AND/OR CONTROLS
Testing explosive, pyrotechnic, igniter composition, and propellant	Impactor Electrostatic Charge Igniting Sample	1. Fire 2. Detonation 3. Personnel injury 4. Minor equipment damage	low	III	1. Use qualified experienced personnel. 2. Require personnel to wear safety glasses, conductive safety shoes. and flameproof lab coat: 3. Perform testing in authorized areas. 4. Keep sample and personnel limits to a minimum. 5. A solution of copper sulfate should be place adjacent to the apparat when testing compositic containing red phospho 6. Employ suitable grounding. 7. Use suitable shieldi around test equipment.

OPERATIONAL EXPLOSIVE LIMIT

ITEM	CLASS	EXPLOSIVE AND PYROTECHNIC WT. SAMPLE
Granular Explosives	1.1	Maximum 37 mg
Granular Pyrotechnics	1.3	Maximum 37 mg

TEST SEQUENCE	LOCATION	PERSONNEL LIMITS	EXP. LIMITS
Sample Preparation	Bldg. 142-TC-2.5		.25 lb

1.0 GENERAL INFORMATION AND INSTRUCTIONS

1.1 This procedure describes a general description for determining the friction sensitivity of pyrotechnics, explosives, propellant, and other high energy compositions.

1.2 The purpose of this test procedure is to ensure that each activity will perform tests in the same manner to obtain comparable data.

1.3 Test data shall be recorded, defects and discrepancies shall be fully investigated and documented.

2.0 REFERENCE DOCUMENTS

2.1 Military Standards

2.1.1 MIL-STD-1234 (Pyrotechnics: Sampling, Inspection, and Testing)

2.1.2 TM-9-1300-214 (Military Explosives)

2.1.3 MIL-STD-650 (Explosive, Sampling, Inspection, and Testing)

2.1.4 Manual OD-44811 Safety and Performance for Qualification of Explosives

2.2 Publications

2.2.1 RDTR No. 60 (The Invention of a New Type of Friction Sensitivity Apparatus)

2.2.2 AMC Pamphlet AMCP 706-177, Properties of Explosives of Military Interest

2.3 Drawings

2.3.1 RDT 2822-2637 Torque Indicator for Friction Sensitivity Test (Modified)

2.3.2 RDT 2883 Sample Holder

2.3.3 RDT 2884 Friction Rod

2.3.4 QEL DWG 2294 Modified Drill Press

3.0 SAFETY PRECAUTIONS

3.1 The primary consideration in handling explosives is safety; therefore, the output of personnel shall never be evaluated on a competitive basis.

3.2 Improper handling of explosives can result not only in malfunctioning, but can cause accidents which result in injury or loss of life.

3.3 Any repeated work will lead to carelessness; therefore, constant vigilance and close supervision shall be maintained to prevent accidents.

3.4 No one employee shall be permitted to work in a location where assistance from another cannot be given immediately.

3.5 Employ suitable grounding for workbenches, test equipment, fixtures, sample containers, and personnel to protect operations from electrostatic charges.

3.6 Personnel shall wear safety glasses with side shields, conductive safety shoes, cotton socks, and flameproof laboratory coats.

3.7 All tools used in operations involving explosives and pyrotechnics shall be nonsparking.

3.8 Posted building and work area explosive and personnel limits shall not be exceeded.

3.9 Shielding shall be provided around test equipment to protect operator and adjacent operations from fragments.

3.10 Personnel shall not adjust speed of spindle while the apparatus is connected to power source.

3.11 Scrap material and residue shall be placed in powder tank and kept until disposal.

3.12 When testing compositions containing red phosphorus, a solution of copper sulfate should be adjacent to the apparatus.

4.0 EQUIPMENT AND FACILITIES

4.1 Aluminum Cam Torque Converter, DWG RDT 2822-2837 (See Appendix A)

4.2 Alundum Sample Holder, DWG RDT 2883

4.3 Friction Rod, DWG RDT 2884

4.4 Bench drill press modified according to OEL DWG 2294, used as driving force for the friction rod

4.5 Calibrated weights (12.16 oz., 8.26 oz., 4.24 oz., including cord are examples of typical weights used) that can be attached to the cam

4.6 Safety shield

4.7 Small volumetric scoop

4.8 Table or bench

4.9 Authorized test area

4.10 Calibrated weights that can be placed on spindle arm (25 pounds total)

4.11 Stroboscope

4.12 Stop watch

5.0 PREPARATORY PROCEDURES

5.1 Equipment Preparation

5.1.1 Place friction sensitivity apparatus in authorized test area (see photographs in Appendices B and C).

5.1.2 Place drive belt on the small diameter pulley on the electrical motor and on the large pulley on the spindle.

5.1.3 Connect power cord to power source.

5.1.4 Measure spindle speed and calibrate with stroboscope.

5.1.5 Place all large weights on spindle arm (11 lbs. on each side).

5.1.6 Attach a large deflection weight (12.15 oz.) onto the cord connected to the cam torque converter.

5.1.7 Place a friction rod in the apparatus.

5.1.8 Sample holder blocks shall have all holes clear of any residue.

5.2 Sample Preparation

5.2.1 Test sample should be of fine granular material so that 30 mg. ± 2 mg. can be weighed easily.

5.2.2 The first few samples are weighed on an analytical balance. The remainder are volumetrically measured by use of a small scoop which, when used by an experienced operator, measures the quantity of sample within the desired tolerance.

6.0 TEST PROCEDURE

6.1 Place approximately 35 milligrams of sample into sample block.

6.2 Raise spindle and place sample block into holder of cam torque converter.

6.3 Place safety shield in position.

6.4 Lower spindle onto sample, allowing the full weight of the spindle to rest on sample.

6.5 Raise the spindle from sample and hold.

6.6 Turn power switch to "on" position.

6.7 Pick up stop watch.

6.8 Slowly lower the spindle onto the sample. Start the stop watch when the friction rod touches the sample.

6.9 When the sample fires (flash, spark or audible sound) stop the watch, raise spindle, and turn off power switch.

WARNING: When sample fires, INSTANTLY raise spindle from sample to prevent damage to equipment.

6.10 The position (number of degrees) of the cam torque converter is read at the time the sample fires or the test terminated.

6.11 When sample does not fire, stop the test after 60 seconds, observing the number of degrees the cam torque converter indicates at the end of 60 seconds.

6.12 If the time of fire is too short to be measured accurately, the RPM shall be reduced (a desirable time range is 2 to 10 seconds).

6.13 The torque reading in degrees should be between 5° and 355°. The torque reading in this range may be obtained by adjusting the RPM, the torque weight, or a combination of both.

6.14 Record the time of fire to the nearest tenth of a second.

6.15 Record the number of degrees the cam torque indicated.

6.16 Record the RPM of the spindle.

6.17 Record the cam torque weight.

6.18 Remove the sample holder block and clean all residue from hole in sample block.

6.19 Repeat steps 6.1 through 6.18 for each test determination.

6.20 A minimum of five tests shall be made on each sample using the same friction rod and hole in sample holder.

6.21 Calculate each test determination for the samples following the procedure outlined in paragraph 7.0.

6.22 Average the calculated test results for each sample and report as fire/no fire in foot pounds.

7.0 CALCULATIONS

7.1 The energy required to decompose the sample is calculated in foot pounds by use of the following formula.

$$E \text{ (ft. lb.)} = \frac{\pi W t T}{30}$$

w = the angular velocity in RPM of the rotating friction rod

t = time or rotation in seconds

T = Torque on the rod in foot pounds

Since the torque data is obtained in ounce-inches, the product of these two values is converted to ft. lbs. by dividing by 192.

7.2 A typical calculation is given from the data as collected below:

Torque Load (oz)	Deflection Degrees	RPM	Time to Fire (sec)	Load on Friction Rod (lb)
4.27	318	2400	2.2	22

$$E = \frac{\pi\ 2400 \left(\frac{(2.46153^* \times 4.27)}{192}\right) \times 2.2}{30} = 30.3 \text{ ft. lb.}$$

NOTE: This figure represents the torque arm length in inches. Table I is provided which translates the degrees of deflection into a torque arm length in inches for 0° to 365° in 5° intervals.

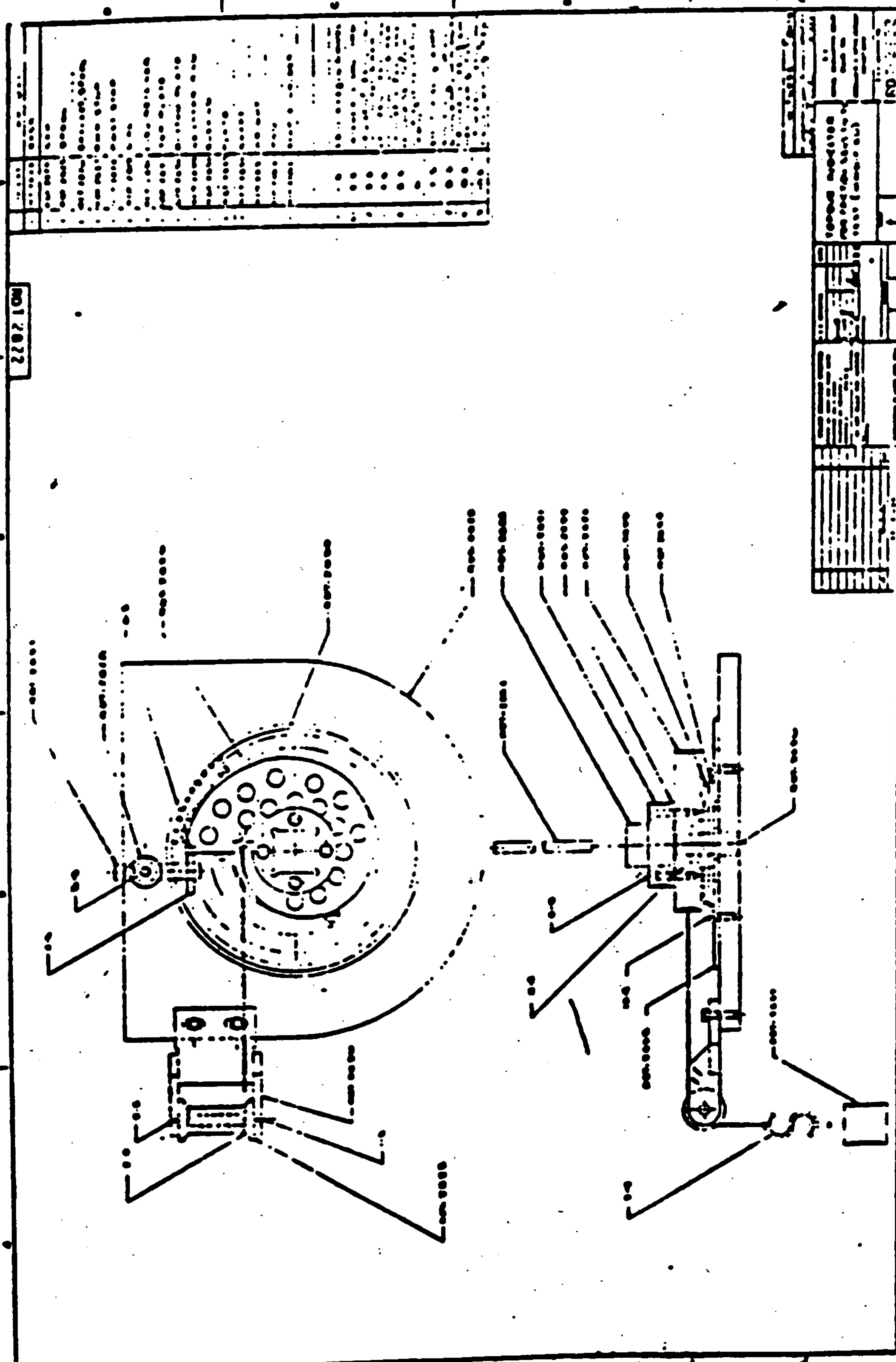
TABLE I

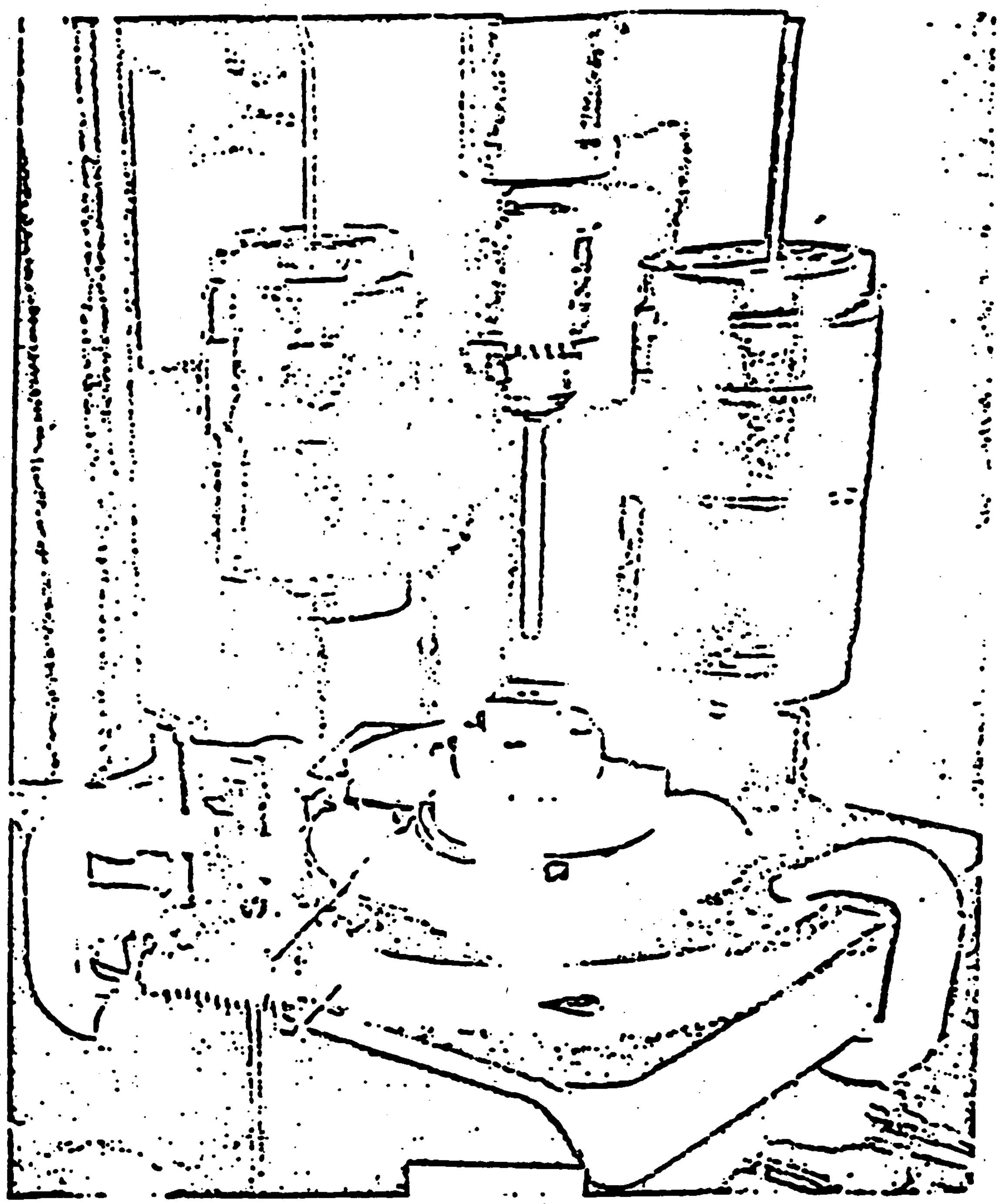
Rotation in Degrees	Torque Arm Length in Inches
0	1.25000
5	1.26905
10	1.28810
15	1.30715
20	1.32620
25	1.34525
30	1.36430
35	1.38335
40	1.40240
45	1.42145
50	1.44050
55	1.45955
60	1.47860
65	1.49765
70	1.51670
75	1.53575
80	1.55480
85	1.57385
90	1.59290
95	1.61195
100	1.63100
105	1.65005
110	1.66910
115	1.68815
120	1.70720
125	1.72625
130	1.74530
135	1.76435
140	1.78340
145	1.80245
150	1.82150
155	1.84055
160	1.85960
165	1.87865
170	1.89770
175	1.91675
180	1.93580
185	1.95485
190	1.97390
195	1.99295
200	2.01200
205	2.03105
210	2.05010
215	2.06915
220	2.08820

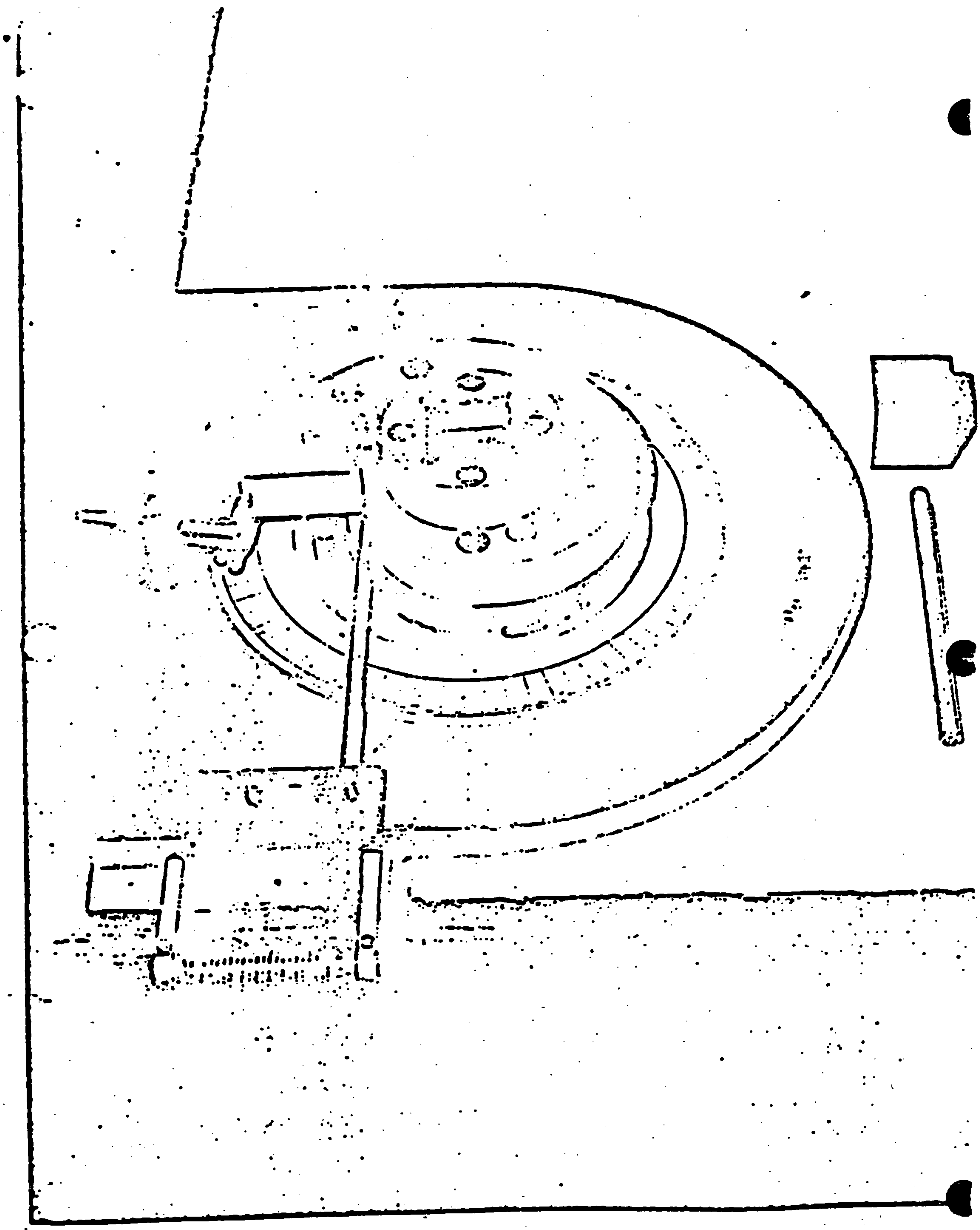
TABLE I (Cont'd)

Rotation in Degrees	Torque Arm Length in Inches
225	2.10725
230	2.12630
235	2.14535
240	2.16440
245	2.18345
250	2.20250
255	2.22155
260	2.24060
265	2.25865
270	2.27970
275	2.29875
280	2.31780
285	2.33685
290	2.35590
295	2.37495
300	2.49300
305	2.41205
310	2.43110
315	2.45015
320	2.46920
325	2.58825
330	2.50730
335	2.52635
340	2.54540
345	2.56445
350	2.58350
355	2.60255
360	2.62160

Each degree rotation represents .00381" increase in the torque arm. The torque arm length in distance is equal to the degrees of rotation X .00381 inch plus 1.25 inches.







ATTACHMENT II

DIOXIN MANAGEMENT PLAN

B.1.1 Central Storage Facility (CSF) - Building 2993

Hazardous wastes generated at various locations on NWSC Crane are temporarily stored at satellite accumulation locations (storage time not exceeding 90 days), then transported to the Central Storage Facility (CSF).

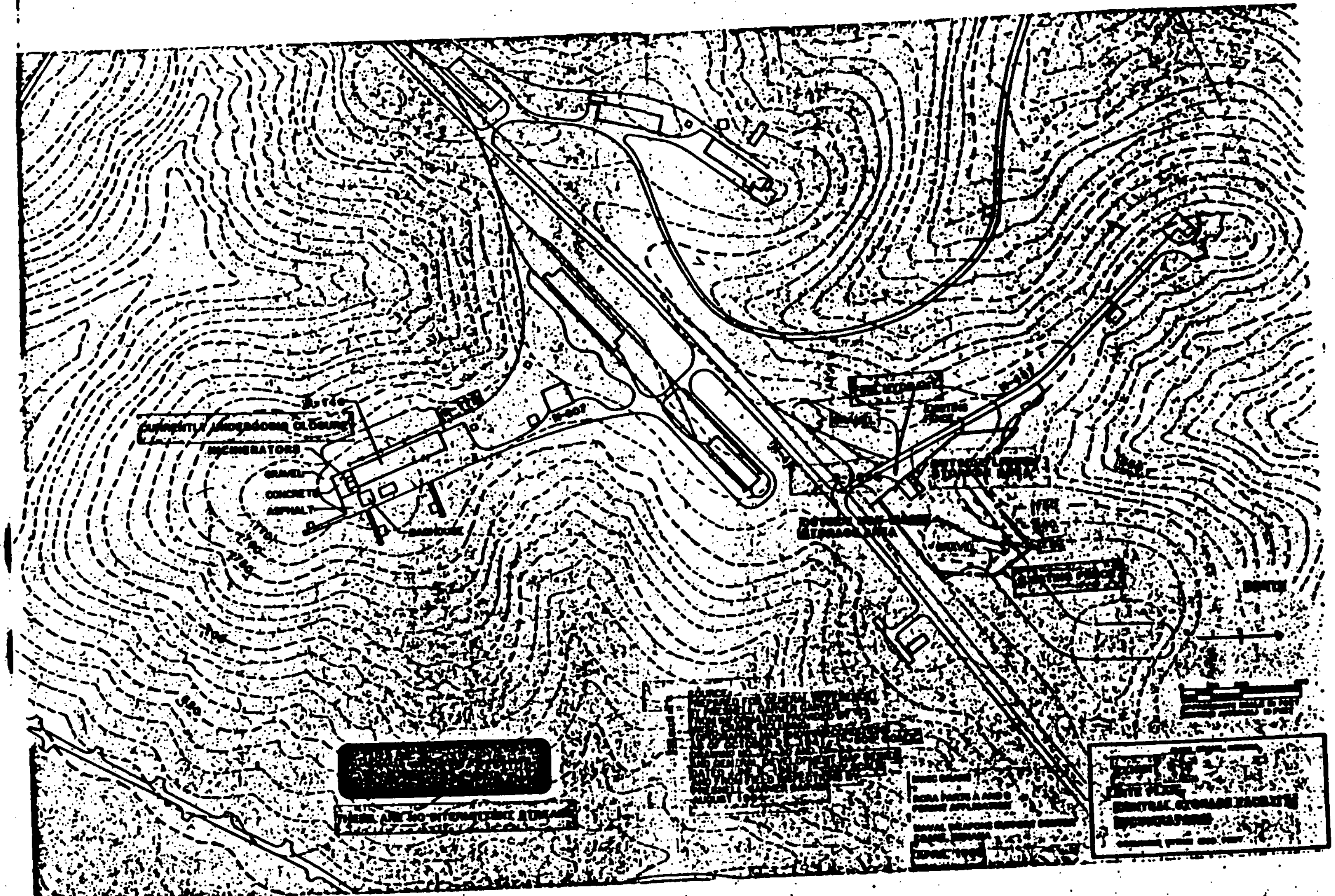
The CSF is the single destination for hazardous wastes to be stored at the NWCS Crane (for periods which may exceed 90 days) prior to being removed to an approved off-site RCRA permitted facility.

At the CSF, hazardous wastes are stored either inside Building 2993 (Storage Building); or the outside liquid storage area; or the outside non-liquid storage area. Exhibit B-2 shows these three storage areas.

The CSF is completely enclosed at present by a six foot high chain link security fence. As shown on Exhibit B-2. Building 2993 and the adjoining outside liquid storage area are shown on Exhibit B-2 and Exhibit B-3 in both plan view and cross-section. Building 2993 is a metal sided structure, approximately 40' wide x 72' - 6" long. The building floor is a concrete slab sloped toward sumps as shown in Exhibit B-3. The inside perimeter is completely enclosed by a 6 inch high concrete curb. As indicated on Exhibit B-3, concrete curbs and sumps have been constructed to separate waste storage areas and to prevent mixing of incompatible wastes. Explosive proof lighting and equipment, insulated walls and ceiling, a ventilation system, safety showers, eyewash, fire alarm system, explosion proof telephone for emergency use, and heating system in a segregated room have been provided.

The outside liquid storage area is also shown in Exhibit B-3 and is indicated on the drawing as "concrete storage slab." The slab is divided into five compartments with 6 inch high concrete curbs integrated with slab (no construction joint) to prevent leakage. See D-1a(3)(C) of this Permit Application for discussion of storage capacity.

The outside non-liquid storage area is also shown in Exhibit B-2. The location has been designated to be of sufficient area to contain all anticipated wastes to be received and so situated as to be no closer than 50 feet from the boundary of the CSF area. Location of the sanitary sewer in relationship to B-2993 is shown in Exhibit B-7.



INCINERATORS
GRAVEL
CONCRETE
ASPHALT

D. PROCESS INFORMATION

D-1. CONTAINERS

D-1a. Containers with Free Liquids

D-1a(1). Description of Containers: 329 IAC 3-23-7, 3-48-2, and 3-48-3

The floors and sumps of the containment systems will collect and hold liquids from leaks or spills until such liquids can be removed. Due to the anticipated daily entry of operating personnel, it is highly unlikely that a leak or spill would go undetected for more than a very short period of time. However, containers will be elevated above the level of any accumulated liquids because all containers will be on pallets.

As shown in Exhibit B-3, each particular section within Building 2993 has its own sump (containment system) for collecting and holding liquid spills and/or decontamination liquids until such liquids are removed. The sumps are not inter-connected and there are no drains or other outlets.

Each liquid waste storage area has an alphabetical letter assignment for storage record keeping. This listing is displayed on Exhibit B-3 page 2 of 7.

The alphabetical designators and the various liquid waste storage containment system capacities versus maximum storage volume for each section are listed in Table D-1.

Table D-1 shows what waste is currently being stored in each area. NWSC Crane will change the items stored in each area as generation, production or reduction rates change. If this is done, the area will be inspected and only waste compatible with each other will be relocated together.

Currently areas A-B-C contain flammables, solvents and E.P. Toxic liquids. Areas D and E are used for acids. Section F is designated for oxidizers, with G and H being for caustics. Lab wastes are stored in Section P. More shelving is being placed in this area as well as Section E and F for better segregation of lab waste material.

TABLE D-1
CONTAINMENT SYSTEM CAPACITY vs. MAXIMUM STORAGE VOLUME

Area (Inside)	Containment (in gallons) System Capacity	Maximum Storage Volume (in gallons)	Percent Containment of Max. Vol.
A-B-C	1,205	9,900	12%
D	504	3,300	15%
E	571	3,960	14%
F	364	1,980	18%
G	1,008	7,920	12%
H	485	3,080	15%
P	655	4,620	14%
Outside			
J-K-L-M (4 sections at:)	584 each	3,960 each	14% each
I	911	5,940	15%

The maximum storage volume was derived from a "worst case" situation as follows: four, 55-gallon drums (full) on 4' x 4' pallets; arranged to use the maximum possible floor space per area; drums and pallets stacked two tiers high.

It can be seen in Table D-1 that all the various containment system capacities exceed the "10 percent of maximum storage volume" minimum as required by 40 CFR 264.175(b) (3). Implicit in this is that the maximum storage volume is controlled by floor and aisle space requirements and not containment system capacity. The areas can be re-assigned according to need.

The outside non-liquid waste storage area is used to store hazardous waste containers that contain no free liquids and do not require secondary containment.

Exhibit D-13 at the end of this section is a diagram of the fenced area of the CSF. The area inside the dotted lines is equal to 41,500 square feet. Non-liquid waste will be managed on the limestone base within this area. NWSC Crane will not exceed the equivalent to 106,920 gallons of hazardous waste (non-liquid) in this area.

Examples of non-liquid hazardous wastes would be dry paint residues from cleaning paint booths, filters from paint booths as well as E. P. Toxic Solids and metal hydroxide sludges.

Hazardous wastes containing free liquids are stored in various containers listed as follows:

- 5-gallon, 30-gallon, and 55-gallon steel drums; DOT Spec. 17-E
- 30-gallon and 55-gallon steel drums; DOT Spec. 17-C
- 30-gallon polyethylene drums; DOT Spec. 34, Exemption No. E-6787
- 55-gallon polyethylene drums; DOT Exemption No. E-6787
- Glass jugs (Ref. 49CFR178.1 through 178.19)

Various laboratory packs and containers in original packaging All containers will be compatible with the wastes they are intended to contain.

Reconditioned containers are used to containerize hazardous waste. Currently a sole source purchase is being made from the Indianapolis Drum Service. The Indianapolis Drum Service performs drum recycling to standards set forth in DOT 173.28. This includes an approved rinsing/cleaning process as well as pressure tests to required standard. A copy of their written procedures is available in the Code 0924 office at Naval Weapons Support Center, Crane, Indiana.

Each container is then visually inspected by Code 0924 hazardous waste handlers before being delivered to satellite accumulation sites.

D-1a(2). Container Management Practices: 329 IAC 3-84-4

Containers holding hazardous waste with free liquids are stored only in Building 2993 and/or the adjoining liquid waste storage area. A floor plan of Building 2993 is shown on Exhibit B-3.

Containers will be stored in a manner that does not allow any possibility of puncture by contact with other containers. Pallets that do not permit contact between adjacent drum rims will be used if drums are stacked. Other containers will be separated vertically if stacked by some similar divider. Wastes in glass bottles, jars, or jugs will be placed in plastic or metal trays to minimize the possibility of breakage or spills. Glass containers will not be stacked unless placed into DOT specification overpack cartons. Supervisors/operators of accumulation sites are instructed to keep containers closed and open only during the time that waste is being added to the containers. Weekly inspections of generation sites provides a check system for this.

NWSC Crane and Crane Army Ammunition Activity (CAAA) is in the process of placing hazardous waste management containers (as shown in Exhibit D-11) at each generation site. These containers will protect containers from precipitation as well as providing secondary containment should a leak develop in the drum. Drums inside these containers will be managed on a less than ninety day storage/generation program.

Shelves used in Building 2993 for temporary storage of small containers, less than five gallons, are made of steel and measure 3 feet W x 2 feet D x 7 feet H per section. There is currently three sections in use in the lab waste area and two sections used in the acid storage area inside Building 2993. Each shelf is adjustable and held in place by 1/4 inch bolts, eight each per shelf. All wastes are placed in plastic or fiberglass tubs for compatible lab waste segregation. The shelves are adjusted according to the height of items placed in the tubs with at least four inches of clearance above the tallest item in the tub. More shelves may be constructed or removed at a later date.

Containers at the CSF are inspected routinely to insure that caps/lids are kept closed and open only when transferring waste. There is maintained limited access to the CSF.

Personnel responsible for handling hazardous waste containers will be trained with respect to proper handling so as to prevent container breakage or rupture.

Safety is constantly stressed to the hazardous waste handlers. All handlers are trained in Hazardous Material Safety and Material Handling Equipment Safety. When using drum handling devices, operators are advised to use a two person system that allows one person on the ground to insure that the device has been properly secured to the drum before lifting. The drum is kept as close to the ground as possible to lessen the distance and shock to the container should the drum release from the handling device.

Pallets that are used are carefully inspected for nails if they are wood and welds are inspected if they are metal. Any pallet found to not be sound in structure will be discarded unless safe repairs can be made.

NWSC Crane will provide for a minimum aisle space of 2 1/2 - 3 feet to allow the unobstructed movement of personnel, fire protection equipment, forklift, spill control equipment, and decontamination equipment to any part of the storage area as required by 40 CFR 264.35.

Containers holding free liquids will be stored on wooden or metal pallets (as compatible) which are intended to be moved using a forklift or similar equipment. The pallets support four, 55-gallon drums each and larger numbers of the smaller containers. Containers, if stacked, will be stacked a maximum of two high. Approximately two and one-half feet to three feet of aisle space will be maintained for personnel passage, inspection and fire protection operations; and an eight-foot wide operating aisle for container movement.

Drums are not normally transported on pallets, but when this is done, a ratchet type four inch nylon strap is placed around the girth of the drums to prevent movement on the pallet. Another strap of the same size is placed across the top of the drums and secured to the bed of the truck, this prevents shifting of the pallet.

Drums are normally placed on the floor of the truck and moved all the way to the front of the bed. A nylon ratchet strap is then fastened to the front stakes of the bed approximately two feet above the floor and around the girth of the rear drums and ratchet snugged up. This prevents side to side or front back movement of drums in transport. Careful driving skills are then used.

Containers will be unloaded from their delivery vehicle bed using a hydraulic tailgate. Containers can be moved into their storage positions by a forklift with a drum cradle or by a hand dolly as necessary. Delivery vehicle wheels will be chocked during unloading pallets.

At times, drums will be placed on pallets by use of the drum cradle and forklift and positioned by hand. This may be done on the smooth surface asphalt pad outside the CSF and then moved into proper storage by use of forklift or battery powered transporter (palletjack).

The procedure for labeling hazardous waste during generation and before shipment to offsite disposal facility is as follows:

Exhibit D found in this permit, contains examples of four hazardous waste labels used at NWSC Crane. They are paged as Exhibit D-1 through Exhibit D-4. Exhibit D-1 and Exhibit D-2 are labels used by our satellite generators. Exhibit D-5 is the instruction for completing hazardous waste labels that are used by generators. Exhibit D-2 is used for containers of 5 gallon or smaller. Exhibit D-1 is used for all other containers. The four digit serial number that is permanently embossed on the label is a unique number that will be used through the "cradle to grave" tracking system used by NWSC Crane. The reason for not using the label displayed as Exhibit D-3 at the generation site is that it does not have the unique serial number and it would be very hard to get the information required for tracking. The generator is responsible to maintain the upper portion of the label for their records. As seen, the upper portion of the label has the four digit serial number as does the lower section. The generator/supervisors are informed to call Code 0924 office for container pick-up before ninety days passes from the start date on the hazardous waste label. Exhibits D-1 and D-2 are used throughout the time that the container is managed at NWSC Crane. When the container is placed in storage at Building 2993 (CSF) the four digit number, date contents, generator (building or process) and storage location is placed on the field log, Exhibit D-6, by the CSF operator/waste handlers and turned in daily to the Environmental Protection Branch office and is placed into our computer data base. If the material is a common/routine waste stream that has been sampled, analyzed and profiled for disposal, a 6 character sample number is also recorded by the CSF operators onto the field log and this is also placed into the computer data base. If it is a new waste stream then the words "needs sampled" is placed on the log sheet. Information from the generator pertaining to how the material was generated as well as an MSDS of the original material, concentrations, ignitability and pH is used to determine compatible storage. The material will then be sampled, analyzed and a disposal profile will be compiled.

After a waste disposal approval has been received from an approved disposal site, based on waste profile and analysis, transportation is then arranged through our current hazardous waste disposal contractor. On the day of shipment, the label that is displayed as Exhibit D-3 is then prepared using the proper DOT shipping name, UN/NA number, date of shipment and NWSC Crane manifest document number that will be placed on the hazardous waste manifest used to ship the containers.

This label is prepared from data obtained from the analysis and waste profile/approval at the designated TSD. Labeling before shipment with Exhibit D-3 is done by the CSF management personnel. As drums are placed on the transport vehicle, the four digit unique number and NWSC sample number is recorded on a field load log, Exhibit D-7 that is identified by the manifest number. After shipment is made this information is placed into the data base for the individual container in the CSF data file, Exhibit D-8a. and the date received at the TSD is also placed in our separate data file called our manifest data base, example in Exhibit D-8b.

After receiving our certification of disposal and the manifest is returned from the TSD facility, the date received at the facility is placed in the manifest data file. This completed the generation to disposal cycle of each container, tracks and stores manifest data that makes hazardous waste reporting more accurate.

Exhibit D-4 is a label that is used by NWSC Crane and CAAA to meet labeling requirements for reactive/explosive waste that is generated on Center from the various demilitarization, renovation and production of military ordnance items. This label is used on containers that are used to transport and the temporary storage of materials to be incinerated, open burned or open detonated at any of the three facilities at NWSC Crane.

Contents describes the material, Contact is the building Supervisor, Date is the date the material is placed into the containers.

Explosive/reactive waste is transported from production areas to the OB/OD sites daily.

These labels are not part of a tracking system. Their purpose is to meet requirements of 40 CFR 262.34 during transport and storage on NWSC Crane. Tracking generation to disposal is accomplished through the use of form NWSCC 6280/4, titled Contaminated Scrap Manifest, Exhibit D-10.

D-1a(3). Secondary Containment System Design and Operation

D-1a(3)(a). Requirement for Base or Liner to Contain Liquids: 329-IAC 3-48-6(b)(1)

Exhibit D-12 is a certification of testing for our acid resistant epoxy coating used to seal the floor and sumps in Building 2993 (CSF). The concrete floor, sump and curbs are cast in place with no separation or joints. The sealer was applied in a continuous manner and at any stop point the epoxy was overlapped.

The engineering evaluation is being prepared by an Engineering firm and will be submitted as Exhibit D-14.

D-1a(3)(b). Containment System Drainage

Shelves that are used to hold items five gallons or less are seven foot tall with the highest shelf being approximately six feet. Liquids are always placed in plastic or fiberglass tubs on the shelves.

Pallets used to hold the drums in the CSF are 48 inches by 48 inches which holds four 55 gallon drums. The pallets support the drums at an elevation of four inches. Drums on pallets are placed in the liquid storage areas that are sloped to the sumps. This insures that drums are above any spilled/leaked material.

D-1a(3)(c). Containment System Capacity

See Table (D-1) Section D-1a(1).

D-1a(3)(d). Control of Run-on: 329 IAC 3-34-6(1)(D) and 3-48-6(b)(4)

The outside liquid storage containment areas currently in use will be evaluated to determine if modifications can be made to allow these areas to meet standards set in IAC 3-34-6(1)(D) and IAC 3-48-6(b)(4). Currently run-on in heavy rain caused by the containments being very close to Building 2993 (CSF) can cause an increased amount of precipitation to enter the containment areas.

D-1a(3)(e). Removal of Liquids from Containment Systems: 329-IAC 3-34-6(1)(E) and 3-48-6(b)(5)

As noted earlier in this application, the inside liquid storage areas have sumps. The outside liquid storage area has six inch curb containment and these areas are inspected daily. Any liquid found in the inside sumps is removed as soon as it is discovered by transferring it into a new compatible container(s) of appropriate size and stored as before the spill or leak. Code 0924 has pumps, explosion proof wet/dry vacuum, buckets or absorbent material available to remove spilled/leaked material from sump. Then the containment area/sump would be decontaminated.

The decontamination solutions used would be dependent on the nature of the chemical contamination. Because of the variety of different types of chemicals stored in the different containment areas, the chemical decontaminating agent would be selected on its ability to neutralize or treat the residue efficiently and effectively without creating additional environmental or safety problems. Acids and bases would be neutralized to a pH close to neutrality (pH 6-8); cyanide would be treated with a hypochlorite solution; solvents and mixtures of chemicals would be handled in accordance with guidance provided by chemical manufacturing representatives, chemists and chemical reference texts. Samples would be taken and analyzed to determine the effectiveness of the decontaminating agent(s) used.

The outside containments can collect precipitation. The precipitation is visually inspected and all containers are inspected. If there is no reason to believe the precipitation has been contaminated, it will be removed immediately. If liquid appears (by visual observation, odor or pH) to be contaminated, it will be transferred to drums and analyzed to determine if it is hazardous waste. Containerized liquid will be handled as hazardous waste until analysis results are available to make the final decision.

The analytical parameters that the collected spill liquid/residue will be analyzed for will be based on the type of waste stored in that containment area.

D-1b. Containers Without Free Liquids

D-1b(1). Test for Free Liquids

To demonstrate the absence or presence of free liquids in either a containerized of a bulk waste, the following test will be used: Method 9095 (Paint Filter Liquids Test) as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemicals Methods". [EPA Publication No. SW-846].

D-1b(2). <u>Description of Containers:</u> 329 IAC 3-23-7 3-48-2 and 3-48-3

Dry (non-liquid) hazardous wastes are stored in various containers listed as follows:

- 5-gallon, 30-gallon, and 55-gallon steel drums; DOT Spec. 17-H
- Polyethylene drums; DOT Spec. 34-C, Exemption No. E-6800
- 55-gallon polyethylene, full removable head with bung, IDS/S
- 55-gallon "Plasti-drum", full removable head, DOT E-6800-55, and DOT E-7072-55

These drums and containers are purchased from the same vendor,as described in Section D-1a(1), and reconditioned to the same standards. Visual inspection is made by Code 0924 Hazardous Waste Handlers before delivery to generation site.

D-1b(3). <u>Container Management Practices:</u> 329 IAC 3-48-6

The non-liquid (dry) wastes are in sealed containers and will remain unopened during their storage period except when opened for sampling or repackaging.

While containers of dry wastes are in storage, they will be placed in a manner that does not allow contact with other dry containers. Pallets will be used to separate containers if stacked during storage.

NWSC Crane will maintain a minimum aisle space of three feet within the designated dry hazardous waste storage to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment.

A forklift will be the means of movement for non-liquid waste containers. The special requirements for ignitable or reactive wastes of 40 CFR 264.176 are satisfied since such wastes would be located in designated areas no closer to the Central Storage Facility boundary than the stated 50-foot minimum.

Further non-liquid container management practices are similar to those described in Paragraph D-1a(2).

NWSC Crane does meet requirements of 329 IAC 3-48-6(d), F027 waste is stored in an outside liquid containment area with each drum being double overpacked. The exterior container is a DOT E 9618 poly-overpack with a twist on lid.

D-1b(4). Container Storage Area Drainage

Average annual rainfall in the NWSC Crane vicinity is about 38 inches. Local storms of 10-year return frequency and a 20-minute time of concentration, for example, have an intensity of about 4.3 inches per hour.

The entire Central Storage Facility, which includes Building 2993, the outside liquid waste storage ares, and the designated non-liquid waste storage area, is situated on a local topographic "high spot". Surface water from precipitation at any point in the CFS is directed toward the boundary of the CFS and thereby away from Building 2993, the outside liquid waste storage area, and the designated non-liquid hazardous waste storage area.

HAZARDOUS WASTE

CONTENTS:

SERIAL № 7573

- - WARNING - -

HAZARDOUS WASTE

NAVAL WEAPONS SUPPORT CENTER

CONTENTS:

SERIAL № 7573

CONTACT: **EXT:**

START DATE:

FILL DATE:

EXHIBIT D-1

HAZARDOUS WASTE

CONTENTS:

SERIAL № 2594 **A**

WARNING

HAZARDOUS WASTE

NAVAL WEAPONS SUPPORT CENTER

CONTENTS:

SERIAL № 2594 **A**

CONTACT: **EXT:**

EXHIBIT D-2.

HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

IF FOUND, CONTACT THE NEAREST POLICE, OR
PUBLIC SAFETY AUTHORITY, OR THE
U.S. ENVIRONMENTAL PROTECTION AGENCY

PROPER D.O.T.
SHIPPING NAME ______________________ UN OR NA# ________

GENERATOR INFORMATION:

NAME NAVAL WEAPONS SUPPORT CENTER

ADDRESS BLDG. 2516

CITY CRANE STATE IN ZIP 47522

EPA
ID NO. IN5170023498

EPA
WASTE NO. ________

ACCUMULATION
START DATE ________

MANIFEST
DOCUMENT NO. ________

HANDLE WITH CARE!

CONTAINS HAZARDOUS OR TOXIC WASTES

STYLE WM-6-P

LABELMASTER, CHICAGO, IL 60646

EXHIBIT D-3

EXPLOSIVE

HAZARDOUS WASTE SCRAP

CONTENTS:

CONTACT:

DATE:

EXHIBIT D-4

INSTRUCTIONS FOR COMPLETING
HAZARDOUS WASTE LABELS

The hazardous waste label is a two part label. Both upper and lower portions must be filled out. The upper portion is retained by the generator for filing. This will assist in departmental logging and record keeping. The bottom portion should have the backing removed and the label attached to the Container of waste.

A permanent ink, fine-point marker should be used to fill out labels. Any fine-point marker will do. The labeling must be plain and readable.

If procurment of fine-point, permanant ink markers becomes a problem contact Code 0924 at Ext. 3114 for assistance.

<u>Contents</u>: Indicate the type and concentration of hazardous waste. Brand name should be avoided, if at all possible. Material Safety Data Sheets or other documentation from the manufacturer should indicate the chemical composition of a brand name waste. The chemical breakdown should be included on the label if available.

<u>Serial #</u>: The first four numbers are Crane serial numbers. The next four or more digits should be the code number of the generating organization.* If unsure of codes, at least place the building number that the waste was generated from.

Contact: The name of the person most knowledgeable of the wastes history and chemical composition should be included here. Project or Building Supervisor would be prefered.

Extension: Provide extension number of contact.

Start Date: The date that chemicals was first placed in the drum goes in this location. If the drum is completely filled at this time the filled date should be completed using the same date.

Filled Date: When the level of material reaches approximately three to four inches from the top, the container should be closed and that days date placed in the filled date location.

NOTE: At the time the "filled date" block is completed, Code 0924, Ext. 3114 should be called and given the following information.

1. Actual number of containers to be picked up
2. Location of the material
3. Type of material
4. Type of replacement containers you need
5. Serial numbers of containers

The person placing the call should receive a four digit call registration number from the Code 0924 office.

* For Army facilities use code letters as appropriate.

	DRUM #	CONT SIZE	GENERATOR		SAMPLE NUMBER	COMPOSITION		D-2993 LOCATION	DATE IN STORAGE		COMMENTS
65,74 579	6575 6580	55	38		GW 0110	METAL HYDROXIDE		N	1-23-89		
5954 5951 5950	5953 5955 5952	55	41		GW 0014	ALODINE		A	1-23-89		
	5949 5948	55	41		GW 0014	ALODINE		A	1-23-89		
	6643 6644 0133	55	2720		GW 0020	Paint & Thinner		L	1-24-89		
	6219	55	107		GW 0056	Trichloroethane ~~[illegible]~~		I	1-24-89		
	6201 6220	55	107		GW 0018	PAINT FILTERS		O	1-24-89		
	6225	55	107		GW 0019	PAINT SLUDGE		O	1-24-89		
	6203	55	107		Needs Sampled	Trichloroethane sludge		I	1-24-89		
	5186	55	169		Needs Sampled	TITANIUM TETRACHLORIDE VANADIUM OXYTRICHLORIDE CONT. MATERIAL		B	1-24-89		
	5082	55	169		GW 0025	TITANIUM TETRACHLORIDE VANADIUM OXYTRICHLORIDE		B	1-24-89		
	6885	55	1884		GW 0002	MACRO-DRAB		D	1-31-89		
	6884	55	1884		GW 0003	Chromic Acid		D	2-1-89		
88	6890 6889	55	1884		GW 0005	HCL Hydrochloric Acid waste		D	2-1-89		
	6883	55	1884		GW 0010	MIL-ETCH Sodium Hydroxide		G	2-1-89		
5552 553	6887 6886	55	10[illegible]		GW A043	SAFE (Butyl [illegible]		G	2-1-89		

EXHIBIT D-6

HAZARDOUS WASTE DRUM SHIPMENT

DATE: 8-16-89

MANIFEST No.(s) TN 0128709 SWI
~~TN 0128716~~ SWI

[illegible]	0011	0010	0005	0003	0001
860	5561	5568	6890	6884	5545
851	5560	5564	6889	6870	
613	2040	6868	6888	6882	
859		6883	6872	6880	
5604		6877	6874	6879	
5608		6871	6873	6878	
5605			[redacted]	5618	
5606			5610	5562	
[redacted]			6852	5609	
5607			6856	6863	
5614			5612	6864	
56			5557	6865	
5			5576		
[redacted]			5573		
5552			5572		
6857			5575		
6858			5574		
5553					
5563					
5556					
5555					
6866					
862					
6861					
6867					
6					
6					
25	3	6	16	13	1

TOTAL 63

CENTRAL STORAGE FACILITY
DATA FILE
EXHIBIT H-8a

Record No.	54
DRUMNO	6888
CONTSZ	55
UNIT	GL
GENERATOR	1884
COMP	HYDROCHLORIC ACID WASTE
SAMPDATE	06/28/88
SAMPNO	GW0005
INSTOR	02/01/89
MANNO	INA0128709
LOCA	D
SHIPDATE	02/16/89
COMMENTS	ARMY SWI

MANIFEST
DATA FILE
EXHIBIT H-8b

Record No.	5
STATE	IN
MANIFESTNO	0128709
CONTTYPE	DF
CONTAINNO	16
QUANTITY	880.00
UNIT	GL
WEIGHT	
WUNIT	
SHIPDATE	02/16/89
RECDATE	02/17/89
PROFILE	GW0005
COMP	WASTE HYDROCHLORIC ACID, SOLUTION
EPA	D002,6,7+
UN	UN 1789
HAZARD	CORROSIVE MAT
COMMENTS	SWI +D010

OFFICE OF SOLID AND HAZARDOUS WASTE MANAGEMENT
P.O. Box 7035
Indianapolis, IN 46207-7035

(Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039. Expires 9-30-

PLEASE PRINT OR TYPE

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: TN 5170023498 | Manifest Document No.: 9 0 01 0 | 2. Page 1 of

A. State Manifest Document Number: INA 0128709

3. Generator's Name and Mailing Address: Naval Weapons Support Center, Building 2516 Code 0924, Crane IN 47522-5009

4. Generator's Phone (812) 854-1225

5. Transporter 1 Company Name: ~~BTG~~ Environmental Trans Service | 6. US EPA ID Number: KD 981586605 | D. Transporter's Phone (05/715-2002

7. Transporter 2 Company Name: | 8. US EPA ID Number:

9. Designated Facility Name and Site Address: Special Waste Inc., 1713 Legion Road, Athens, TN 37303 | 10. US EPA ID Number: TND 034547141 | H. Facility's Phone 615/745-9222

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol.	I. Waste No.
a. ~~Waste Chromic Acid, Corrosive Material~~ Not Shipped	—	—	—		—
b. Waste Chromic Acid, Solution, Corrosive Material, UN1775, (D002,D005,D007,D010)	012	D.F	00660	G	D002
c. Waste Hydrochloric Acid,Solution Corrosive Material,UN1789 (D002,D006,D007,D010)	016	D.F	00880	G	D002
d.					

J. Additional Descriptions for Materials Listed Above
a) not shipped
b) also D005,D007,D010 approval#498003
c) also D006,D007,D010 approval#498005

K. Handling Codes for Wastes Listed Above
b) GW0003
c) GW0002

15. Special Handling Instructions and Additional Information
truck#N43 PO# ~~XDDE~~ #4004

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: Jerry L McCracken | Signature: Jerry L McCracken | Month Day Year: 02 16 89

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Chester A. Bitterman | Signature: Chester A. Bitterman | Month Day Year: 2 12 89

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: | Signature: | Month Day Year:

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Mark Saunders | Signature: Mark Saunders | Month Day Year: 02 13 89

EPA Form 8700-22 (Rev. 9-88)
Previous editions are obsolete.
State Form 11966

DISTRIBUTION: PAGE 1 (white) TSD MAIL TO GENERATOR; PAGE 2 (goldenrod) GENERATOR MAIL TO GENERATOR STATE; PAGE 3 (light green) TSD MAIL TO TSD STATE; PAGE 4 (light pink) OUT OF STATE GENERATOR/TSD MAIL TO IDEM; PAGE 5 (light blue) TSD COPY; PAGE 6 (canary) GENERATOR COPY; PAGE 7 (white) TRANSPORTER 1 COPY; PAGE 8 (white) TRANSPORTER 2 COPY

In case of an emergency or spill, call Indiana Office of Environmental Response at 317/243-5155 (day), or 317/633-0144 (nights) or National Response Center at 800/424-8802 or 202/426-2675

INA 0128709

MINATED SCRAP MANIFEST

6280/4 (REV. 6-84)

llowing material is hereby certified as being contaminated with explosives and/or pyrotechnics

TYPE OF SCRAP	TYPE OF CONTAINER	TYPE OF CONTAMINATION*	BUILDING/AREA AND CODE	APPROXIMATE QUANTITY (lb.)

*Indicate if material is mixed with water or other chemical solvents. Identify the specific chemical solvent used.

SIGNATURE *(Generator or Facility Supervisor-Extension No.)*	CODE	DATE

SIGNATURE *(Transporter)*	ORGANIZATION	DATE

TURE *(Operator at Treatment Facility)*	TREATMENT FACILITY	DATE

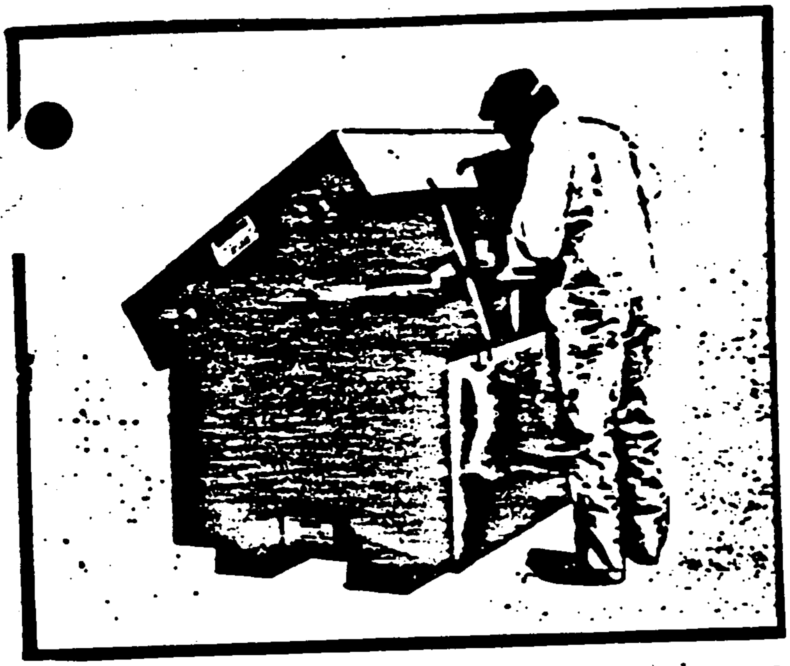
RIBUTION

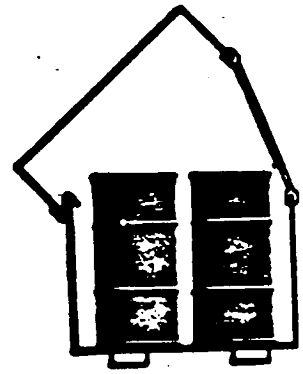
The following copies shall be withdrawn by the respective personnel and sent to Code 0924, Building 2516, within 5 work days.

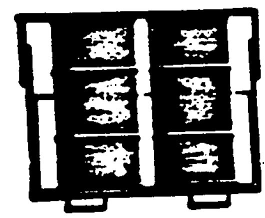
Gold - Generator; Yellow - Transporter; White - Treatment Facility Operator

NOTE: Generator - retains Pink; Operator of Treatment Facility retains Green

EXHIBIT D-10







	ENVIROPAC®D	ENVIROPAC®H
Floor Space	4 ft. x 5 ft.	4 ft. x 3 ft.
Stackable	Yes - Three high	Yes - Three High
55 gallon drums	4	2
30 gallon drums	5	3
5 gallon pails	32	18

MODEL	OUTSIDE DIMENSIONS			INSIDE DIMENSIONS			WEIGHT LBS.	DOOR OPENINGS		DESIGNED STORAGE CAPACITY			SUMP CAPACITY (GAL.)
	LENGTH	WIDTH	HEIGHT	LENGTH	WIDTH	HEIGHT		HEIGHT	WIDTH	WEIGHT (LBS.)	SQ. FT.	DRUMS	
6	6'	6'4"	6'4"	5'8"	[illegible]	[illegible]	1600	[illegible]	[illegible]	[illegible]	32	4-6	[illegible]

EXHIBIT D-11

B 2993
Floor Sem...nt

crawford laboratories

industrial coatings

4165 SOUTH EMERALD AVENUE CHICAGO, ILLINOIS 60609 (312) 376-7132

TO: NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

FROM: B. A. SCHMETTERER, PRESIDENT
CRAWFORD LABORATORIES, INC.
4165 S. EMERALD AVENUE
CHICAGO, ILLINOIS 60609

DATE: MARCH 4, 1985

SUBJECT: CERTIFICATION OF TESTING

PROJECT: CONTRACT NO. N62472-84-C-9071

In accordance with the above referenced contract, I hereby certify that all testing on our Acid Resistant Clear Epoxy (M0-018/U0-089) was performed in accordance with specified methods, and that all of the following results either met or exceeded the stated minimum requirements. The results are as follows:

Acid Resistant Epoxy has a compressive strength equal to or greater than 4000 psi when tested in conformance to ASTM C-579.

Acid Resistant Epoxy has a tensile strength equal to or greater than 400 psi when tested in conformance to ASTM C-307.

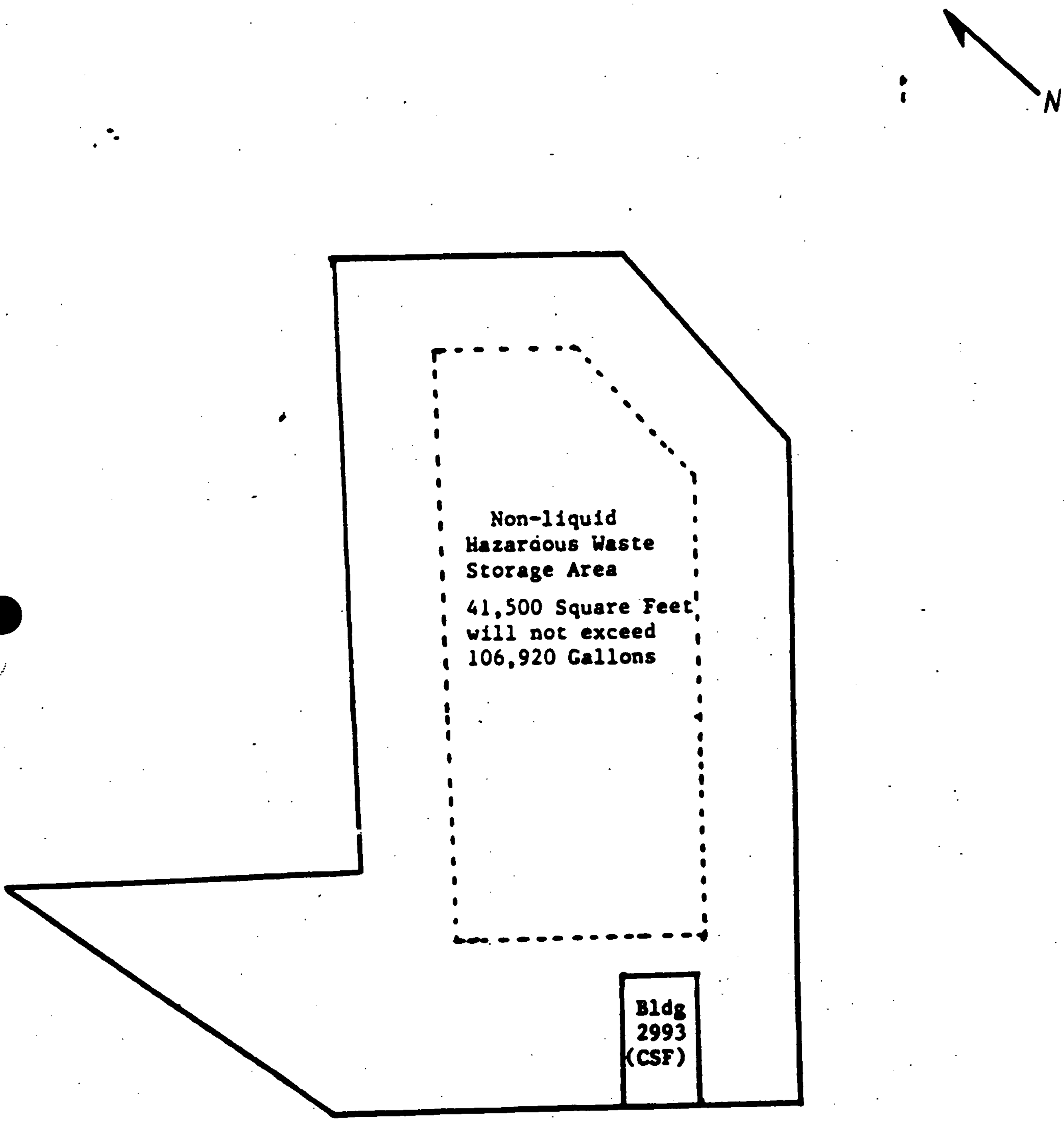
Acid Resistant Epoxy has a flexural strength equal to or greater than 4000 psi when tested in conformance to ASTM C-580.

Acid Resistant Epoxy has a water absorption content less than or equal to 0.5% when tested in conformance to ASTM C-413.

Acid Resitant Epoxy conforms to the requirements of Page 07951-3, para. 6.6, having resistance to the listed chemicals and solvents.

This is also to certify that all testing has been conducted in our laboratory within the last 12 months. Crawford Laboratories, Inc has a Q.A.M.A. (Qualified Approved Manufacturer Agreement), with Fred T. Latkowski, Director, Contract Management division for the General Services Administration, region 5, to conduct our own quality control. All our quality control is done in accordance with Federal Standard 368.

B. A. Schmetterer, President — NOTARY PUBLIC — 3/4/85 DATE



SCALE: 1" = 80'

Exhibit D-13

EXHIBIT D-14

ENGINEERING EVALUATION OF THE STRUCTURAL INTEGRITY OF THE BASES OF THE STORAGE AREAS

Engineering Evaluation of Floor and Sump Basins
Building 2993 - Central Storage Facility
Crane Navel Weapons Support Center (NWSC)
Crane, Indiana

The Central Storage Facility (CSF) is the single location for hazardous wastes to be stored at the NWSC, Crane (for periods which may exceed 90 days) prior to being removed to an approved off-site RCRA permitted facility.

At the CSF, hazardous wastes are stored either inside building 2993 (Storage Building); or in an uncovered outside liquid storage area; or the outside non-liquid storage area.

On Thursday, May 4, 1989, Triad Associates, Inc., a consulting engineering firm located in Indianapolis, Indiana, performed an engineering evaluation of the floor slab and sump basins of Building 2993. Roy E. Evans P.E., and Robert P. Walker of Triad, performed the investigation to determine:

1. Extent of cracks and gaps in the floor slab and sump basins
2. Imperviousness of base to wastes
3. Base design and materials of construction
4. Evaluation of structural integrity of base
5. Compatibility of base with wastes

Building 2993 is a metal sided structure, approximately 40' wide by 70.5' long. The building floor is a concrete slab sloped towards sump basins. The floor is a 6" thick reinforced concrete slab with 6" x 6" 6/6 welded wire fabric. The slab is underlain by polyethylene sheeting and the pre-existing 6" thick floor slab.

The inside perimeter is completely enclosed by a 6 inch high curb monolithic with the slab (no construction joints). Concrete curbs and sump basins have been constructed to separate waste storage areas and to prevent mixing of incompatible wastes. The sump basins were constructed with a 4" thick concrete base and walls monolithic with the 6" floor slab. Sump bases and walls are reinforced with 6" x 6" 6/6 welded wire fabric and are underlain with polyethylene sheeting.

The floor and sump basins are coated with an Acid Resistant Epoxy (Mo-018/U0-89). The Acid Resistant Epoxy was tested and certified on March 4, 1985 with the following results:

1. Acid Resistant Epoxy has a compressive strength equal to or greater than 4000 psi when tested in in conformance to ASTM C-579.

2. Acid Resistant Epoxy has a tensile strength equal to or greater than 400 psi when tested in conformance to ASTM C-307.

3. Acid Resistant Epoxy has a flexural strength equal to or greater than 4000 psi when tested in conformance to ASTM C-580.

4. Acid Resistant Epoxy has a water absorption content less than or equal to 0.5% when tested in conformance to ASTM C-413.

The certification testing also determined that the Acid Resistant Epoxy is resistant to the chemicals and solvents stored in building 2993. Crawford Laboratories, Inc., in Chicago, Illinois performed the certification testing with quality control in accordance with Federal Standard 368.

The outside liquid storage area consists of a 6" thick concrete reinforced with 6" x 6" x 6/6 welded wire fabric underlain by 12" of compacted #53 stone with powder. The outside liquid storage area is divided into five compartments with 6" high concrete curbs integrated with the slab.

Chemical resistant fiberglass manually operated valves with fiberglass pipe provide drainage of storm water which accumulates in each compartment. The outside liquid storage area is not coated with an Acid Resistant Epoxy.

Inspection of the floor in Building 2993 revealed two visible cracks in the concrete slab. There was no evidence of vertical or horizontal displacement at either location. It appeared as though the Acid Resistant Epoxy maintained an impervious seal along each crack. The overall condition of the floor slab and Acid Resistant Epoxy coating was found to be in good condition. There was no visible evidence of cracks or gaps in or along any of the sump basins. The conditions of the sump basins and Acid Resistant Epoxy coating was also found to be in good condition.

One drain from a lavatory inside Building 2993 passes through the concrete slab. Acid Resistant Epoxy was used to seal the area around the pipe. It appears as though the area is adequately sealed to prevent leakage of spilled solvents and chemicals.

Inspection of the outside liquid storage area revealed one crack in the base slab of the third compartment. There was no evidence of either horizontal or vertical displacement of the slab. There also appeared two cracks in separate locations of the 6" curbing. It appears as though the cracks has been treated with an Acid Resistant Epoxy sealant but that a complete seal was not achieved.

As a result of the inspection and evaluation of the floor slab, sump basins and outside liquid storage area of Building 2993, we submit the following summary of findings:

1. There was no visible evidence of cracks or gaps in the base or walls of the sump basins.

2. The floor slab of Building 2993 appeared to be adequately treated and sealed with an Acid Resistant Epoxy coating thus being impervious to spilled solvents and chemicals.

3. Construction design and materials of the floor base, sump basins and outside liquid storage area appear to be adequate for the present and continued use as storage facilities for hazardous wastes.

4. The structural integrity of the floor slab, sump basins and outside liquid storage area is considered good with minimum or insignificant deterioration of the facilities.

5. Pursuant to the certification testing of the Acid Resistant Epoxy performed in March, 1985 by Crawford Laboratories, Inc., the coating of the floor slab and sump basins is compatible to wastes stored in Building 2993.

6. The extent of cracks visible in the outside liquid storage area does not appear to represent a significant or potentially significant defect in the ability of compartments to contained spilled solvents and chemicals prior to clean-up by response teams.

The inspection and engineering evaluation of Building 2993 has been performed and prepared by Triad Associates, Inc., 520 Virginia Avenue, Suite 206, Indianapolis, Indiana, 46203, (317) 635-1240.

Roy E. Evans, P.E.

ROY E. EVANS
REGISTERED
No. 8537
STATE
OF
INDIANA
PROFESSIONAL ENGINEER

F. PROCEDURES TO PREVENT HAZARDS

F-1. Security Plan

F-1a. Security Procedures and Equipment

F-1a(1). 24-Hour Surveillance System: 329 IAC 3-41-5(b)(1)

NWSC Crane is a Department of Defense closed installation. Physical security is maintained 24 hours per day. The size of the force is large enough to satisfy the Department of Defense requirements for an installation of this size and sensitive nature.

Being a closed installation means that NWSC Crane is not open to the General Public except when specifically allowed by the Commanding Officer and then only in areas specifically designated by the Commanding Officer.

All areas described and discussed within this Part "B" application have been officially designated as "Restricted Areas" by direction of the Commanding Officer. This insures that no one will be allowed unaccompanied access to these areas.

NWSC Crane Police/Guard division will check our facility entry points (gates) more than two times during closed hours from 1600 to 0600. On weekends and holidays entry points and barriers will be checked six to eight times per twenty four hour period. Police/Guard patrols are armed and equipped with two-way radios and are in constant contact with police/fire communications centers.

As stated before the patrol will check to insure that gates and doors are locked and can check the perimeter of the fence to determine any possible forced entry. Patrols will not enter the facility but if any unusual situation should be observed they can contact the fire shift captain and or Navy Officer of the Day. The Officer of the Day and the Fire Chief/Captain have specific instruction/training to respond as necessary to any possible situation. If an incident occurs that involves explosive, reactive or shock sensitive material, NWSC Crane has an Explosive Ordnance Disposal detachment housed on station and a team assigned daily to be on call to the Officer of the Day (during off duty hours). In case of fire inside the CSF, alarms sensors activated by heat are located within as shown on Exhibit B-3 (page 7 of 7). These alarms sound directly in the Fire/Police communications center which is manned 24 hours per day.

F-1a(2). Barrier and Means to Control Entry

F-1a(2)(a). Barrier

A six foot high security fence surrounds the entire Central Storage Facility. Entry to the fenced area is through gates which are secured by locks when not in use. The fence that runs North to South is adjoined to the West end of Building 2993, allowing access directly into the building through one walk through doorway that is kept locked. This door is equipped with "Panic Hardware" on the inside to allow emergency exit without delay. There is also a vehicle passage door on the West end that can only be opened from the inside. The fence is displayed in Exhibit F-1.

F-1a(2)(b). Means to Control Entry: 329 IAC 3-41-5(b)(2)(B)

The entire CSF is enclosed with a chain link fence. Access can only be gained through two gates and through one doorway of Building 2993 (CSF) all of which are located on the West end of the facility. The entry points are locked when not in use.

The keys to these locks are maintained by authorized personnel. Authorized personnel would include the hazardous waste facility operators, Environmental Protection Branch personnel and as in all buildings on NWSC Crane the Officer of the Day as well as the Police/Fire shift commander. No access by maintenance personnel would be allowed unless accompanied by a trained Environmental Protection Branch representative.

F-1a(3). Warning Signs

Signs bearing the legend "Danger - Unauthorized Personnel Keep Out" written in English and legible from 25 feet are posted on the fence in sufficient numbers to be seen from any approach to the CSF. The signs at the CSF are approximately 60 feet apart.

F-2. INSPECTION SCHEDULE

F-2a. General Inspection Requirements: 329 IAC 3-34-5(b)(5)

NWSC Crane hazardous waste facility operators (hazardous waste handlers) as well as the Environmental Protection Branch management personnel regularly inspect all hazardous waste management sites and the CSF.

Buildings that are less than 90 day storage areas (accumulation by generator) vary at NWSC Crane. Some production/process operations continue to use hazardous materials that results in production of hazardous waste. These areas are inspected weekly to insure all labeling and container management practices are maintained. See Exhibit F-2 at the end of Section F for an example of the form used for this. Due to the size of NWSC Crane and the variety of production processes and repair/renovation programs that change routinely, some areas meet requirements for inspections as generators from 100 Kg/mo to over 1000 Kg/mo. These areas are inspected to insure the following:

1. All hazardous wastes are moved to the CSF in 90 days or less.

2. Containers are in good condition, non-leaking and they are compatible with wastes.

The containers are kept closed except when adding or transferring waste. They are managed to avoid rupture and inspected weekly. Incompatible wastes are not mixed in the same container. Incompatible waste in separate containers are segregated by berms or containment to avoid possible mixing of spills.

3. Labeling requirements are met as described in Section D-1a (2) and Exhibit D-5 of this permit.

The CSF (Building 2993) is inspected weekly by a representative of the Environmental Protection Branch office (Code 0924). The form used to record the inspection is seen in Exhibit F-3.

F-2a (1). Types of Problems: 329 IAC 3-41-6(b)(3)

F-2a (2). General Inspection Requirements/Frequency of Inspections

Daily Inspections

(To be performed when facility is opened by operators before work begins)

Item	Type of Problem
1. Telephone	Dial Tone/Place call to Code 0924 office
2. Fire Extinguishers	Seal intact/Gauge in green
3. Liquid Storage Area: Inside	
a. Floors	Signs of container leakage
b. Sumps	Look for liquids in sumps
4. Containers	Damage, corrosion, expansion, caps in place, leakage, labeled compatibility
5. Liquid Storage: Outside	
a. Valves	Normally closed
b. Containment	Precipitation collection Check for visual indication of contamination

6. Containers	Rust/corrosion, caps in place, damage, compatibility, labels
7. Fence	Check fence for damage or erosion
8. Gates	Open/close properly, locks are working and in place
9. Water	Insure there is proper water pressure at eye wash station

Any items that do not function properly will be reported to Code 0924 for immediate correction before operations will continue. The new form developed for this inspection is displayed at the end of Section F as <u>Exhibit F-4</u>.

WEEKLY INSPECTION

To be performed by Code 0924 or representative of the Environmental Protection Branch Manager and kept on file in Building 2516. <u>Exhibit F-2</u>, at the end of this section is used to conduct and record the weekly inspection of Building 2993 (CSF). This inspection form after completion is maintained as a permanent record in the Environmental Protection Branch office for a three year period.

MONTHLY/INSPECTION/EQUIPMENT TESTS

A schedule is being developed with NWSC Fire Prevention Division to conduct monthly tests of the radio signal controlled fire alarm system that is in place at Building 2993 (CSF). The detection sensors are heat activated which send a signal to the Fire/Security Communication desk. The test will include activation in normal mode (with AC power) and in back up mode (DC power).

Also on a monthly schedule the safety eye wash and showers will be flushed. This inspection/test will be performed by CSF operators and recorded in a log book maintained by CSF operators as well as a tag attached to the safety eye wash/shower stations.

F.3 Documentation of Preparedness and Prevention Requirements

F-3a. Equipment Requirements: 329 IAC 3-34-5(b) and 3-42-3

F-3a(1). Internal Communications: 329 IAC 3-42-3(1)

The internal communication or alarm system that is used to make facility operators aware of any situation that may cause a need to evacuate the building will depend on the incident.

The building is less than seventy feet long with exits at both ends. A voice notification would be used if there is a release of chemicals during a time that the facility is occupied.

F-3a(2). External Communications: 329 IAC 3-42-3(2)

If the incident involves fire that is determined not controllable by a fire extinguisher, the manual alarm would be pulled or may have already been activated by heat generation. The locations of these alarm switches are displayed in Exhibit B (page 2 0f 7) at the end of this application. This will sound an audible alarm as well as provide notification to the Fire/Security Department.

Other means of communications include two-way radios in vehicles used to transport operators to the CSF as well as a telephone outside the facility.

F-3a(3). Emergency Equipment: 329 IAC 3-42-3(3)

The (CSF), Building 2993 has four carbon dioxide fire extinguishers placed throughout the facility. They are of a size to suppress a fire of the size that operations could logically and safely extinguish.

The NWSC Fire Department can be on the scene within five to six minutes. Table F-1 lists fire fighting and control equipment available to them. The fire fighting personnel are trained to respond to hazardous material incidents.

All hazardous waste handlers that operate at the CSF are officed at Building 2189. They transport with them to the facility daily chemical resistant Tyvek coveralls, rubber gloves, full face respirators with a full variety of cartridges to handle all chemicals at low levels of exposures. Also, they have self contained breathing apparatuses assigned to each of them for use in spill clean-up response or as needed.

Within Building 2993 (CSF) a stock of more than forty bags of ground clay absorbent (80 pound each) is maintained. Twenty bags (100 pounds each) of caustic soda is also kept as shown on Exhibit B (page 2 of 7).

Section F-3a(2) describes the basic operations of the fire alarm system including detectors. Exhibit B (page 7 of 7) will show the electrical diagrams of the alarm system as installed at the Central Storage Facility.

TABLE F-1
EMERGENCY EQUIPMENT

Section A: Fire Fighting Equipment

Item	Capability/Add'l Description	Location	Phone
1 ea. 4-wheel Dr. pumper	500 GPM, 200' of 1 1/2 hose, 300' booster hose, 12 back pumps (5 gallon capacity each) and brush fire fighting tools (rakes, axes, shovels)	B-10	1235 or 1458
1 ea. 4-wheel Dr. 3/4 Ton Pickup Truck	Skid mount pump 10 GPM, 50 gallon tank capacity	B-10	1235 or 1458
2 ea. 4-wheel Dr. Jeeps	Skid mount pump 10 GPM, high pressure, 50 gallon tank capacity	B-10	1235 or 1458
2 ea. 4x4 1-Ton Trucks	Skid mount pump 250 GPM, 300 gallon tank capacity	B-10	1235 or 1458
1 ea. Command Station Wagon	Includes maps, technical books, plans, and an emergency recall list; equipped with 2-way radio	B-10	1235 or
2 ea. Rail - Road Combin-ation pump/ tank cars	500 GPM pump, 100 amp generator 2-10,000 gallon tank cars, 500 GPM deck gun	B-10	1235 or 1458
1 ea. First Response Pumper	700 GPM, 1,500' of 3" hose, 300' hose, 300' of booster hose, 6 bio-packs (60 minutes air capacity foam proportioner with 30 gal. foam tank)	B-10	1235 or 1458
1 ea. Second Response Pumper	750 GPM, 1,500' of 3" hose, 800' of 1-3/4" hose, 300' of booster hose, mounted/preconnected deluge gun with fog nozzle, 6 bio-packs (60 minutes air capacity)	B-10	1235 or 1458
1 ea. Rescue Pumper	250 GPM, 600' of 1-3/4" hose, 300' of booster hose, Hurst tool, 3 biopacks (60 minute air capacity)	B-10	1235 or 1458
1 ea. ABG Pumper	100 GPM, 200' of 1" hose, 500 gal. tank, combination spray/nozzle	ABG	1470

Absorbent (HAZ-SORB)	50 pound bags, spill containment for all types of chemicals	B-374	3114
Absorbent Pillows	4 liter absorption capacity for all types of chemicals	B-374	3114
Absorbent Pads/Roll Absorbent	3/8" thick pads, 3' x 3'; roll 3' x 150' long	B-374	3114
Hazardous Material Response Kit	Variety of plugs (metal, rubber plastic); tape, C-clamps, cement compounds as applicable	Vehicle	3114
Tank/Pipe Patch Kit	Pressurized collars and patches for leak control; chemical resistant	Vehicle	3114
Polypropylene Squeegees	1 ea., 18" head; 1 ea., 8" head	B-2189	3114
Hand Bilge Pump	Chemical resistant; diaphragm of butyl rubber; lift capacity 15' 15 GPM; 5 strokes/gallon	B-2189	1922
PVC Hand Pump (Piston Type)	Length 24"; diameter 3"; 14" stroke; intake 7' PVC tubing; discharge 3' PVC tubing; 6 strokes /gallons; 16 GPM; handles variety of chemicals	B-2189	1922
2 ea. Electric Drum Pump	Use on non-flammable liquids; 1/2 horsepower motor; 25 GPM; maximum pressure 31' head; intake 1 5/8" diameter; 5' discharge tubing; 3' intake tubing	B-2993	3114
Air Driven drum pump for use with flammables	For use with flammables; 6,000 RPM; 50-90 psi operating range; 15' air hose; intake 1-5/8" diameter, discharge 7'; intake 3'; max. pressure 7' head; 10 GPM	B-2993	3114
Hand Pump	0.22 gal. per stroke; has adapter for 55 gal. drum; use for petroleum products and solvents	B-2189	1922
Centrifugal Pump	Air-powered; side port; 30 GPM; 1" discharge and intake ports; for chlorinated solvents	B-2189	1922

Section B: Spill Response Equipment

Teflon Pump	Air-operated; 2" suction and discharge ports; self-priming; range 2-120 GPM; and 2-100 psi; explosion-proof; can pump up to 5/8" solids in slurries; for use with any chemical	B-2189	1922
3 ea. shovels	Square and round point	B-2993	1922
5 ea. Scott air-packs	Self-contained breathing apparatus 60 min capacity; weight 25 lbs.; alarm sounds at 25% residual capacity has 6.5 cubic feet O_2 cylinders at 2,250 psi; positive pressure; complete face piece; shell is fire-retardant	B-2189	1922
Respirators	NIOSH/MSHA approved; full face mask or partial available; filters available for dust, mist, organic vapor, chlorine, hydrogen chloride, sulfur dioxide, and ammonia	B-2189	1922
Chemical Resistant Rain Gear	PVC jackets with net cotton lining, 3 ea. medium; 3 ea. large; flame retardant conductive, corrosive resistant	B-2189	1922
Tyvek Chemical Suits & Booties	Overalls, medium & large available booties, medium & large available; completely chemical resistant	B-2189	1922
Gloves	Disposable, vinyl coated; Latex; rubber; cotton; variety of sizes	B-2189	1922
Face Mask/	Splash proof; complete face mask or goggles available	B-2189	1922
Boots	Rubber overshoes (10 pair); fire fighter boots; insulated, steel shanks, shock-absorbent padding; hip length, folds down; sizes 6,8, 10, 12 available	B-2189	1922
Sorbent Booms	10' length, 8' diameter, for spills on surface waters	B-374	3114
Permasorb	Multi-purpose gelling material for water soluble contaminants, 25 lbs. limited to pH range 3 to 10; salt concentration less than 3% concentration of miscibles less than 20%	B-374	3114

Galvanized holding tank	10,000 gallon storage for petroleum products	B-2993	3114
2 ea. Septic Tanks	1,500 gallon storage, concrete	B-54	3114
Compressor-Heavy Duty	Diesel operated; 365 cfm; 100 psi constant	B-1820	1703
Compressor - Portable	7.6 cfm; 20 gallon tank; 100 psi 115 volts; needs 5 kw generator	B-2189	1922
Generator - Heavy Duty	5 kw diesel or gasoline; position 5' from ignitables; explosion proof motor; has spotlight system	B-1820	1703
Generator - Portable	AC 120 volts; 2.8 amp max.; 450 watts; AC/DC 12 volt	B-2189	1922
Heavy Equipment	Bulldozers (5 ea.); backhoe/ loader (3 ea.); loader (1 ea.)	B-2713	3138 or 1540
Portable Safety shower	16 nozzles off 1" line for complete body shower; can be adapted to connect to pumper truck or hydrant	B-2993	1922
Portable Eye Wash	Self-contained; 2 stream heads; 10 gallon capacity; 6' of hose	B-2189/ truck	1922
Drum Sling	All types	B-2993	1922/ 3132
Toxic Gas Detection	Available through the Industrial Hygiene Office	B-12	3447
Caustic Soda	For neutralization of acid spills pallets of 50 lbs. sacks	B-2993	3114
Sodium Hydrogen Phosphate	For neutralization of caustic spills; pallets of 50 lbs. sacks	B-2993	3114
Containers/ Drums	5 gallon pails; 15, 30, 55 gallon drums of polyethylene of steel; 85 gallon recovery drum	B-374	3114

F-3a(4). Water for Fire Control: 329 IAC 3-42-3(4)

Lake Greenwood is the primary source of water for NWSC Crane. The central water treatment plant is rated at 2.16 million gallons per day. Approximately 600,000 gallons of water are dedicated for fire protection.

The water is discharged into the fire main distribution system at about 70 pounds per square inch. A fire hydrant is located at aout 90 feet from Building 2993.

F-3b. Aisle Space Requirements 329 IAC 3-42-6 and 3-48-4

As stated in Sections D-1a(2) and D-1b(3), NWSC Crane will maintain two and one-half to three feet aisle space in the liquid waste storage areas as well as the solid waste storage areas.

F-3c. Arrangements with Local Authorities
329 IAC 3-4-7 and 3-43-3(c)

As described in Section F-1, NWSC Crane Security/Police/Fire Division has a primary responsibility for the protection and physical security of all buildings and production areas that store and use many types of defense related explosives/reactive hazardous materials.

This arrangement for the CSF, Building 2993, is implied with the overall security plan for the entire installation directed by the Department of Defense Regulations and the Commanding Officer.

* For the purpose of this application, a memorandum of understanding will be entered with the Police/Fire Division. This document will include specific procedures to follow for the safety of the police officers and protection of the environment.

F-4 Preventive Procedures, Structures Equipment

F-4a. Unloading Operations: 329 IAC 3-34-5(b)(8)(A)

Personnel responsible for handling hazardous waste containers will be trained with respect to proper handling so as to prevent container breakage or rupture.

Safety is constantly stressed to the hazardous waste handlers. All handlers are trained in Hazardous Material Safety and Material Handling Equipment Safety.

Normally, containers will be unloaded from their delivery vehicle bed using a hydraulic tailgate and transferred by hand to the pallet that will be used for storage. At times drums will be placed on pallets by use of the drum cradle and forklift and positioned by hand. This may be done on the smooth surface asphalt pad outside the CSF and then moved into proper storage by use of a forklift or battery powered transporter (palletjack). When using drum handling devices, operators are advised to use a two person system that allows one person on the ground to insure that the device has been properly secured to the drum before lifting. The drum is kept as close to the ground as possible to lessen the distance and shock to the container should the drum release from the handling device. The drum cradle and forklift will be used during inclement weather. An example would be when the bed of the delivery vehicle is wet or ice covered. It is unsafe for the hazardous waste handler to attempt to move drums by hand without a good dry surface beneath their feet. There are also times that drums of solids may exceed six hundred pounds.

The asphalt drive/pad used for the above unloading/loading currently does not have specific containment. Modifications will be made to comply with requirements to contain a possible spill in the unloading/loading areas.

Procedures used to ensure that wastes are removed from satellite sites to the CSF are properly logged in on an operating log and segregated according to hazard and compatibility as described in Section D-1a(2), page D-5.

Non-compatible material is not transported together.

Drums are not normally transported on pallets, but when this is done a ratchet type, four inch nylon strap is placed around the girth of the drums to prevent movement on the pallet. Another strap of the same size is placed across the top of the drums and secured to the bed of the truck, this prevents shifting of the pallet.

Drums are normally placed on the floor of the truck and moved all the way to the front of the bed. A nylon ratchet strap is then fastened to the front stakes of the bed approximately two feet above the floor and around the girth of the rear drums and ratchet snugged up. This prevents side to side or front back movement of drums in transport. Careful driving skills are then used.

F-4b. <u>Runoff Prevention</u> 329 IAC 3-34-5(b)(8)(B)

The outside non-liquid storage area is located on a compacted lime stone lot. Drums containing non-liquid waste are stored on pallets and kept closed except for sampling, adding or removing waste. Containers are not opened during rains. The containers are inspected regularly as described in Section F-2 of this application, it would be unlikely that there would be a release of material from these containers onto the ground.

As noted earlier in this application, the inside liquid storage areas have sumps. The outside liquid storage area has six inch curb containment and these areas are inspected daily. Any liquid found in the inside sumps is removed as soon as it is discovered. The outside containments can collect precipitation. The precipitation is visually inspected and all containers are inspected. If there is no reason to believe the precipitation has been contaminated, it will be removed immediately.

The equipment available to remove these materials and procedures are described in Section D-1a(3)(e) of this application.

F-4c. <u>Water Supplies</u> IAC 3-34-5(b)(8)(c)

Contamination of groundwater and surface water will be prevented during normal operations or any upset conditions by nature and design of the units, and by careful operations or emergency procedures.

F-4d. <u>Equipment Failure and Power Outages</u>
IAC 3-34-5\9b\0(8)(D)

Electricity is purchased from Public Service Indiana and distributed to either of NWSC Cranes two substations, this permits a radical distribution of power from one substation while the other is de-energized only a portion of the year. In case of power failure with Public Service Indiana two hook-ups, NWSC Crane also has an emergency connection with Hoosier Energy.

In the event of an electrical power failure NWSC Crane has many gasoline and diesel powered generators that can operate pumps and the heating system as might be needed. The emergency alarm system automatically switches to DC power when there is a loss of AC power. The CSF would not be affected in any other way.

F-4(e). <u>Personnel Protection Equipment</u> -329 IAC 3-34-5(b)(E)

All hazardous waste handlers are provided with and trained to select and use proper respiratory protection devices. This includes annual refresher training and certification by the local Medical Department and Industrial Hygiene Office. They are required to use these devices when exposed to vapors and open containers and during any operation that could result in accidental spill or release. The operators routinely wear chemical resistant Tyvek disposable, one piece coveralls, rubber gloves and boots. These garments provide adequate protection from any chemical handled at the CSF.

If it becomes necessary to open containers of unknown chemicals, self contained breathing apparatus equipment would be used for respiratory protection in place of the cartridge type respirators.

All personnel protection equipment used is stocked/stored in the office/storage area where the Operators/Hazardous Waste Handlers start their day out. Some spare/replacement garments/gloves/cartridges are kept in a locker inside Building 2993 (CSF) and also on the transport vehicle, but this is not the primary supply point.

The location of the two emergency safety shower and eyewash stations are shown on Exhibit B, page 2 of 7, located at the end of this application. The frequency of inspection/tests are described in Section F-2A(2).
Fire alarm pull switches and actuating devices are discussed in Section F-3a(2) and shown in Exhibit B, page 7 of 7, at the end of this application.

F-5. Prevention of Reaction of Ignitible, Reactive and Incompatible Wastes

F-5a. Precautions to Prevent Ignition or Reaction of Ignitible or Reactive Waste

Ignitible and reactive wastes to be stored at Building 2993 (CSF) and the outside liquid storage areas are listed in Section C of this application as Table C-1. Separate areas divided by curbs and sumps are provided as indicated in Exhibit B-3 at the end of this application.

Ignitable wastes will placed in compatible containers. Therefore, the only source of ignition is external to the containers.

Reactive wastes will be stored in water tight and air tight containers to prevent combustion.

F-5b. General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste

Smoking is limited to designated indoor areas at NWSC Crane. No smoking is allowed at any of the areas to be permitted. Only spark proof tools, such as brass hammers, wrenches, etc. are used near containers of ignitable wastes. Cutting, welding and spark producing tools will not be used at the facility except when properly permitted by the Fire Division, Fire Prevention Inspectors. When necessary, all ignitable hazards will be moved and a manned fire truck will be on hand as stand-by.

Incompatible wastes will not be mixed.

F-5c. Management of Ignitable or Reactive Wastes in Containers

Ignitable or reactive wastes will only be placed in compatible containers as described by the Bureau of Explosives, BOE-6000F, specifications for shipping containers.

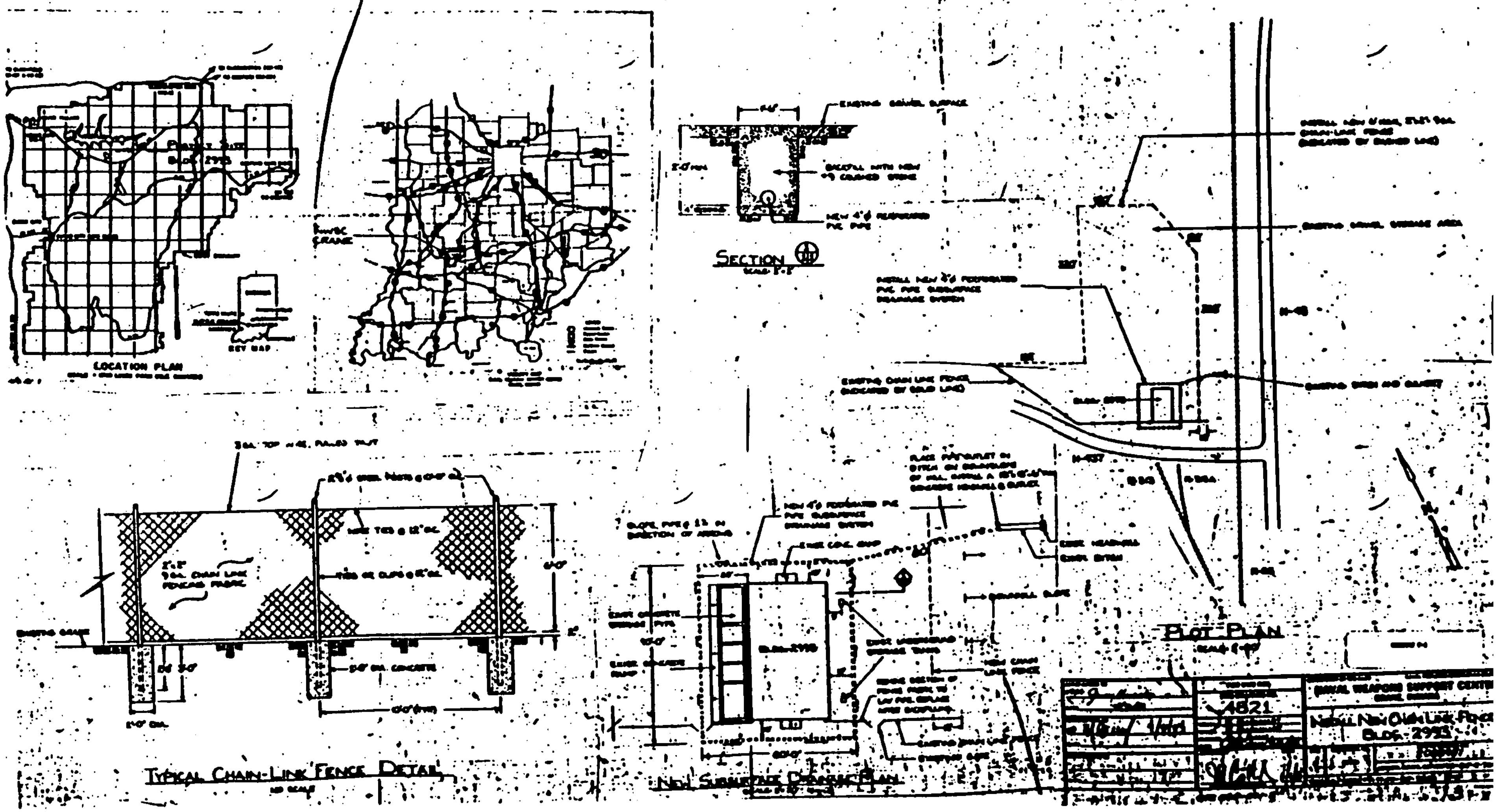
No ignitable or reactive waste will be stored within fifty feet of the boundary fence.

F-5d. Management of Incompatible Wastes in Containers: 329 IAC 3-23-7(c), 3-34-6(3) and (4), 3-41-8(b) 3-48-8

Container storage for compatibility is determined by using the compatibility guide found as Exhibit F-5 at the end of this section. It is the equivalent to the EPA publication 600/2-80-076, "A Method for Determining the Compatibility of Hazardous Wastes".

Small volumes of chemicals (five gallons or less) that are stored on shelves in the CSF are placed in tubs made of plastic or fiberglass for compatible segregation and containment. This is also discussed in Section D-1a(2).

INSTALL NEW CHAIN-LINK FENCE, BLDG. - 2993



HAZARDOUS WASTE SITE INSPECTION LOG
WSCC 5090/2 (4/87)

DG. NO.	WASTE - CONDITION OF CONTAINERS AND COMMENTS	LABELING	DATE	INIT.(s)
7				
56-2889				
2521				
104				
107				
106				
143				
200				
2805				
138				
1820				
1818				
121				
126 AREA				
2698				
2697				
3064				
34				
36				
37				
38				
2906				
41 NE				
41 NW				
2038				
2088				
2734				
2728				
2993				
1487				
147				

Note: The number of facilities (less 90-day storage) being inspected on weekly basis will vary due to production schedule.

EXHIBIT F-3

ENVIRONMENTAL PROTECTION WEEKLY INSPECTION LOG

CENTRAL STORAGE FACILITY
NWSCC 5090/4 (5/88)

INSPECTOR'S NAME *(Printed/Title)*

SIGNATURE *(Inspector's)*

DATE OF INSPECTION *(Month, Day, Year)*

TIME OF INSPECTION *(Military time)*

ITEM	REASON FOR INSPECTION	STATUS ACCEPTABLE (A) UNACCEPTABLE (U)	OBSERVATIONS	DATE AND NATURE OF REPAIRS AND/OR REMEDIAL ACTION
RADIO ALARM SYSTEM TELEPHONE	OPERABILITY			
FIRE EXTINGUISHERS	NEED RECHARGING			
GATE LOCK	DEFECTIVE			
GATES	DAMAGED; DOES NOT CLOSE PROPERLY			
DOOR LOCKS	DEFECTIVE			
DOORS	DAMAGED			
COMPATIBLE STORAGE	NONCOMPATIBLE STORED TOGETHER			

Continued

ENVIRONMENTAL PROTECTION DAILY INSPECTION LOG
CENTRAL STORAGE FACILITY

ITEM	REASON FOR INSPECTION	STATUS ACCEPTABLE (A) UNACCEPTABLE (U)	OBSERVATIONS	DATE AND NATURE OF REPAIRS AND/OR REMEDIAL ACTION
TELEPHONE	Dial Tone/Place call to 0924 Office			
FIRE EXTINGUISHERS	Seal Intact/Gauge in Green			
LIQUID STORAGE: INSIDE				
FLOORS	Signs of container leakage			
SUMPS	Look for liquids in Sumps			
CONTAINERS	Damage, Corrosion, Expansion caps in place, leakage, labeled, compatability			
LIQUID STORAGE: OUTSIDE				
VALVES	Normally closed			
CONTAINMENT	Precipitation collection, check for visual indication of contamination			
CONTAINERS	Rust/corrosion, caps in place, damage, compatability, labels			
FENCE	Check for damage or erosion			
GATES	Open/close properly, locks working and in place			
WATER	Insure there is proper water pressure at Eye Wash Station			

EXHIBIT F-4

APPENDICES

APPENDIX I. LIST OF CHEMICAL SUBSTANCES

This appendix lists the chemical substances that may be found in hazardous wastestreams. The list is not inclusive but represents the data compiled through a literature survey and examination of hazardous waste management practices.

The list consists of three columns. The first column lists the chemical or trade names in alphabetical order. The trade names are denoted by asterisks (*). The second column list the synonyms or common names of the chemical substances when available. The third column lists the reactivity group numbers (RGN) assigned to the substances as derived in Appendix 2. A compound may be assigned more than one RGN.

This appendix is used to obtain the RGN of waste constituents when known specifically. The RGN is used to determine the compatibility of the combinations of wastes according to the compatibility method in Section 4.

The chemical substances listed were compiled from several sources. The list of Hazardous Wastes and Hazardous Materials and List of Extremely Hazardous Wastes and Extremely Hazardous Materials in California's Industrial Waste Law of 1972 (Ref. 44) served as the starting reference. The primary sources of information consisted of published reports (Ref. 1, 7, 12, 13, 14, 32, and 52) identifying the hazardous chemical substances in industrial wastestreams. Additional chemical entries were abstracted from the California Waste Haulers Record files (Ref. 10), California Extremely Hazardous Waste Disposal Permit files (Ref. 8), and the TRW Systems' report on recommended methods of reduction, neutralization, recovery, and disposal of hazardous wastes (Ref. 77).

Names	Synonyms	RGN
Abate*		32
Acenaphthene		16
Acetamide		6
Acetaldehyde		5
Acetic acid		3
Acetic anhydride		107
Acetone	Dimethyl ketone	19
Acetone cyanohydrin	Hydroxyisobutyronitrile	4, 26
Acetonitrile	Methyl cyanide	26
Acetophenone		19
Acetoxybutane	Butyl acetate	13
Acetoxypentane	Amyl acetate	13
Acetyl acetone		19

Names	Synonyms	RGN
Aminopropane	Isopropyl amine	7
Amino propionitrile		7, 26
Aminothiazole		7, 8
Aminotoluene	Toluidine	7
Ammonia		10
Ammonium arsenate		24
Ammonium azide		102
Ammonium bifluoride		15
Ammonium chlorate		102, 104
Ammonium dichromate		24, 102
Ammonium fluoride		15
Ammonium hexanitrocobaltate		24, 102
Ammonium hydroxide		10
Ammonium hypophosphide		105
Ammonium molybdate		24
Ammonium nitrate		102
Ammonium nitridoösmate		24, 104
Ammonium nitrite		102
Ammonium perchlorate		104
Ammonium periodate		102, 104
Ammonium permanganate		24, 102, 104
Ammonium persulfate		104
Ammonium picrate		102
Ammonium sulfide		33, 105
Ammonium tetrachromate		24, 104
Ammonium tetraperoxychromate		24, 102, 104
Ammonium trichromate		24, 104
Amyl acetate	Acetoxy pentane	13
Amyl alcohol		4
Amyl chloride	Chloropentane	17
Amyl cyanide		26
Amylamine	Aminopentane	7
Amylene	Pentene	28
Amyl mercaptan	Pentanethiol	20
Aniline		7
Animert* V-101	Tetrasul	20
Anisole		14
Anisole chloride		107
Anthracene		16
Antimony		23, 24
Antimony chloride	Antimony trichloride	24, 107
Antimony fluoride	Antimony trifluoride	24, 107
Antimony nitride		24, 25
Antimony oxychloride		24
Antimony oxide	Antimony trioxide	24
Antimony pentachloride		24
Antimony pentafluoride		24
Antimony pentasulfide		24, 33, 105
Antimony perchlorate		24, 104
Antimony potassium tartrate		24

Names	Synonyms	RGN
Bromomethane	Methyl bromide	17
Bromophenol		17, 31
Bromopropene	Allyl bromide	17
Bromopropyne		17
Bromosilane		105
Bromotoluene	Benzyl bromide	17
Bromotrichloromethane		17
Bromotrifluomethane		17
Bromoxynil	3,5-Dibromo-4-hydroxy benzonitrile	17, 26, 31
Bronze		23
Buna-N*		101
Bunker fuel oil		101
Butacarb		9
Butadiene		28, 103
Butadiyne	Diacetylene	28
Butanal	Butyraldehyde	5
Butane		29
Butanediol		4
Butanethiol	Butyl mercaptan	20
Butanetriol trinitrate		102
Butanol	Butyl alcohol	4
Butanone	Methyl ethyl ketone	19
Butenal	Crotonaldehyde	5
Butene		28
Butene-2-one	Methyl vinyl ketone	19
Butyl acetate	Acetoxybutane	13
n-Butyl acrylate		13, 103
Butylamine	Aminobutane	7
Butyl alcohol	Butanol	4
t-Butyl azidoformate		8
Butyl benzene	Phenylbutane	16
Butyl benzyl phthalate		13
Butyl cellusolve*		4
Butyl dichloroborane		105
Butyl ether	Dibutyl ether	14
Butly formate		13
Butyl fluoride		17
Butyl glycidyl ether		34
Butyl hydroperoxide		30
t-Butyl hypochlorite		102, 104
n-Butyl lithium		105, 107
Butyl mercaptan	Butanethiol	20
Butyl peroxide		30
Butyl peroxyacetate	t-Butyl perbenzoate	30
Butyl peroxybenzoate		30
Butyl peroxypivalate		30
t-Butyl perbenzoate	Butyl peroxyacetate	30
t-Butyl-3-phenyl oxazirane		34
Butyl trichlorosilane		107

Names	Synonyms	RGN
Caproic acid	Hexanoic acid	3
Caprylic acid		3
Caprylyl peroxide	Octyl peroxide	30
Carbacrol		31
Carbaryl		9
Carbetamide		6
Carbanolate	Banol	9
Carbofuran	Furadan*	9
Carbolic acid	Phenol	31
Carbolic oil		31
Carbon, activated, spent		101
Carbon bisulfide	Carbon disulfide	20
Carbon disulfide	Carbon bisulfide	20
Carbon tetrachloride	Tetrachloromethane	17
Carbon tetrafluoride		17
Carbon tetraiodide		17
Castrix	Crimidine	7
Catechol		31
Caustic potash	Potassium hydroxide	10
Caustic soda	Sodium hydroxide	10
CDEC		12
Cellulose		101
Cellulose nitrate	Nitro cellulose	27, 102
Cerium		22
Cerium hydride		105
Cerium trisulfide		33, 105
Cerous phosphide		105
Cesium		21
Cesium amide		107
Cesium azide		102
Cesium carbide		105
Cesium fluoride		15
Cesium hexahydroaluminate		105
Cesium hydride		105, 107
Cesium phosphide		107
Cesium sulfide		33, 105
Chloral hydrate	Trichloroacetaldehyde	5
Chlordane		17
Chlorestol	Polychlorinated biphenyl	17
Chlorfenvinphos		32
Chloric acid		2, 104
Chlorine		104
Chlorine azide		102
Chlorine dioxide		102, 104, 107
Chlorine fluoroxide		102, 104
Chlorine monofluoride		104, 107
Chlorine monoxide		104
Chlorine pentafluoride		104, 107
Chlorine trifluoride		104, 107
Chlorine trioxide		102, 104

Names	Synonyms	RGN
Chromic anyhdride	Chromium trioxide, Chromic acid	2, 24, 104
Chromic chloride	Chromium trichloride	24
Chromic fluoride	Chromium trifluoride	15, 24
Chromic oxide		24
Chromic sulfate	Chromium sulfate	24
Chromium		23, 24
Chromium sulfate	Chromic sulfate	24
Chromic sulfide		24, 33, 105
Chromium trichloride	Chromic chloride	24
Chromium trifluoride	Chromic fluoride	15, 24
Chromium trioxide	Chromic acid, Chromic anhydride	2, 24, 104
Chromyl chloride	Chloro chromic anhydride	24, 104, 107
Chrysene		16
CMME	Methyl chloromethyl ether	14, 17
Coal oil		101
Coal tar		31
Cobalt		22, 23, 24
Cobalt bromide	Cobaltous bromide	24
Cobalt chloride	Cobaltous chloride	24
Cobalt nitrate	Cobaltous nitrate	24, 104
Cobaltous bromide	Cobalt bromide	24
Cobaltous chloride	Cobalt chloride	24
Cobaltous nitrate	Cobalt nitrate	24, 104
Cobaltous resinate	Cobalt resinate	24
Cobaltous sulfate	Cobalt sulfate	24
Cobalt resinate	Cobaltous resinate	24
Cobalt sulfate	Cobaltous sulfate	24
Collodion	Pyroxylin	27
Copper		23, 24
Copper acetoarsenite	Paris Green	24
Copper acetylide		24, 102, 105, 107
Copper arsenate	Cupric arsenate	24
Copper arsenite	Cupric arsenite	24
Copper chloride	Cupric chloride	24
Copper chlorotetrazole		24
Copper cyanide	Cupric cyanide	11, 24
Copper nitrate	Cupric nitrate	24, 104
Copper nitride		24, 25
Copper sulfate	Cupric sulfate, Blue vitriol	24
Copper sulfide		24, 33, 105
Compound 1836	Diethyl chlorvinyl phosphate	17, 32
Coroxon*		32
Coumafuryl	Fumarin	19
Coumatetralyl		19
Cresol		31
Cresol glydicyl ether		34
Cresote '		31
Crimidine	Castrix	7

Names	Synonyms	RGN
Decyl benzene		16
Delnav*	Dioxathion	32
Demeton-s-methyl sulfoxid	Metasystox R*	32
Diacetone alcohol		4, 19
Diacetyl		19
Diacetylene	Butadiyne	28
Diamine	Hydrazine	8, 105
Diaminobenzene	Phenylene diamine	7
Diaminohexane	Hexamethylenediamine	7
Diazidoethane		8, 102
Diazinon*		32
Diazodinitrophenol	DDNP	27, 102
Dibenzoyl peroxide	Benzoyl peroxide	30, 102
Diborane	Diboron hexahydride	105, 107
Diboron hexahydride	Diborane	105, 107
Dibutyl ether	Butyl ether	14
Dibutyl phthalate		13
3,5-Dibromo-4-hydroxybenzonitrile	Bromoxynil	17, 26, 31
Dibromochloropropane	DBCP, Fumazone*, Nemagon*	17
Dibromoethane	Ethylene dibromide	17
Dichloroacetone		17, 19
Dichloroamine		104
Dichlororobenzene	DCB	17
Dichlorobenzidine		7, 17
Dichlorodimethylsilane	Dimethyl dichlorosilane	107
Dichloroethane	Ethylene dichloride	17
Dichloroethene	Dichloroethylene	17
Dichloroether	Dichloroethyl ether	14, 17
Dichloroethylarsine		24, 107
Ethyl dichlorosilane		107
Ethyl ether	Dichloroether	14, 17
Dichloroisocyanuric acid	Dichloro-s-triazine-2,4,5-trione	104
Dichloromethane	Methylene chloride	17
Dichlorophene		17
Dichlorophenol		17, 31
Dichlorophenoxyacetic acid	2,4-D	3, 17
Dichloropropane	Propylene dichloride	17
Dichloropropanol		4, 17
Dichloropropene	Dichloropropylene	17
Dichloropropylene	Dichloropropene	17
Dichloro-s-triazine-2,4,5-trione	Dichloroisocyanuric acid	104
Dichlorovos	DDVP	17, 32
Dicumyl peroxide		30
Dicyclopentadiene		28
Dieldrin		17
Diethanolamine		4, 7
Diethyl aluminum chloride	Aluminum diethylmonochloride, DEAL	105, 107
Diethylamine		7
Diethyl benzene		16

Names	Synonyms	RGN
Dinoseb	2,4-Dinitro-6-sec-butylphenol	27, 31
Dioxacarb		9
Dioxane	Diethylene dioxide	14
Dioxathion	Delnav*	32
Dipentaerythritol hexanitrate		27, 102
Dipentene		28
Diphenamide		6
Diphenyl	Phenylbenzene	16
Diphenyl acetylene		16
Diphenylamine		7
Diphenylamine chloroarsine	Phenarsazine chloride	7, 24
Diphenyl ethane		16
Diphenyl ethylene	Stilbene	16
Diphenyl methane	Benzylbenzene	16
Diphenylmethane diisocyanate		18, 107
Diphenyl oxide		14
Dipicryl amine	Hexanitrodiphenylamine	7, 27, 102
Dipropyl amine		7
Disulfoton	Disyston*	32
Disulfuric acid		1
Disulfur dinitride		25, 102
Disulfuryl chloride		107
Disyston*	Disulfoton	32
Dithane* M-45		12
Dithione*	Sulfotepp	32
DNOC	Dinitrocresol	27, 31
Dodecene		28
Dodecyl benzene		16
Dodecyl trichlorosilane		107
Dowco-139*	Mexacarbate	9
Dowicide 1	o-Phenyl phenol	31
Dowtherm		16
Durene		16
Dyfonate*	Fonofos	32
Dynes Thinner		101
Elgetol 30	Dinitrocresol	27, 31
Endolsulfan	Thiodan*	17, 20
Endothall		3
Endothion	Exothion	32
Endrin		17
EPN		32
Epichlorohydrin	Chloropropylene oxide	17, 34
Epoxybutane		34
Epoxybutene		34
Epoxyethane	Ethylene oxide	34, 103
Epoxyethylbenzene		34
Bis(2-3-Epoxypropyl) ether	Diglycidyl ether	34
Ethane		29
Ethanethiol	Ethyl mercaptan	20
Ethanol	Ethyl alcohol	4

Names	Synonyms	RGN
Fluorosulfonic acid	Fluosulfonic acid	1, 107
Fluosulfonic acid	Fluorosulfonic acid	1, 107
Fluosilicic acid		1, 15
Fonofos*	Dyfonate*	32
Formaldehyde	Methanal	5
Formamide		6
Formetanate hydrochloride		6
Formic acid	Methanoic acid	3
Fostion*	Prothoate	32
Freon*		17
Fumaric acid		3
Fumarin	Coumafuryl	19
Fumazone*	Dibromochloropropane	17
Furadan*	Carbofuran	9
Furan	Furfuran	14
Furfural		5
Furfuran		14
Gas oil, cracked		101
Gasoline		101
Germanium sulfide		33, 105
Glutaraldehyde		5
Glycerin		4
Glycidol		34
Glycol diacetate		13
Glycol dinitrate	Ethylene glycol dinitrate	27, 102
Glycol ether		14
Glycolic acid		3
Glycol monolactate trinitrate		27, 102
Glycolonitrile		26
Gold acetylide		105, 107
Gold cyanate	Gold fulminate	102
Gold fulminate	Gold cyanate	102
Gold sulfide		33, 105
Grease		101
Guaiacol		31
Guanyl nitrosaminoguanylidene hydrazine		8, 102
Guanidine nitrate		27, 104
Gun cotton	Nitrocellulose	27, 102
Guthion*		32
Hafnium		22
Hanane*	Dimefox	6, 32
Hemimellitene		16
Heptachlor		17
Heptane		29
Heptanal		5
Heptanol		4
Heptanone		19
Heptene		28
Hexaborane		105
Hexachlorobenzene		17

Names	Synonyms	RGN
Iron		23
Iron arsenate	Ferrous arsenate	24
Isobutane		29
Isobutanol		4
Isobutyl acetate		13
Isobutyl acrylate		13, 103
Isobutylene		28
Isodecyl acrylate		13
Isodurene		16
Isoeugenol		31
Isohexane		29
Isooctane	Trimethylpentane	29
Isooctene		28
Isopentane	Methylbutane	29
Isophorone		19
Isoprene	Methyl butadiene	28, 103
Isopropanol		4
Isopropyl acetate		13
Isopropyl acetylene		28
Isopropylamine	Aminopropane	7
Isopropyl benzene	Cumene	16
Isopropyl chloride	Chloropropane	17
Isopropyl ether	Diisopropyl ether	14
Isopropyl mercaptan		20
N-Isopropylmethylcarbamate		9
α-Isopropyl methylphosphoryl fluoride		17, 32
Isopropyl percarbonate	Diisopropyl peroxydicarbonate	30
Isotactic propylene		101
J-100		101
Jet oil		101
Kerosene		101
Lacquer thinner		101
Landrin*		9
Lannate*	Methomyl	9, 20
Lauroyl peroxide		30
Lead		23, 24
Lead acetate		24
Lead arsenate	Lead orthoarsenate	24
Lead arsenite		24
Lead azide		24, 102
Lead carbonate		24
Lead chlorite		24, 104
Lead cyanide		11, 24
Lead dinitroresorcinate		24, 27, 102
Lead mononitroresorcinate		24, 27, 102
Lead nitrate		24, 104
Lead orthoarsenate	Lead arsenate	24
Lead oxide		24
Lead styphnate	Lead trinitroresorcinate	24, 27, 102
Lead sulfide		24, 33, 104

Names	Synonyms	RGN
Mercarbam		32
Mercuric acetate		24
Mercuric ammonium chloride	Mercury ammonium chloride	24
Mercuric benzoate	Mercury benzoate	24
Mercuric bromide		24
Mercuric chloride	Mercury chloride	24
Mercuric cyanide	Mercury cyanide	11, 24
Mercuric dioxysulfate	Mercuric subsulfate	24
Mercuric iodide	Mercury iodide	24
Mercuric nitrate	Mercury nitrate	24, 104
Mercuric oleate	Mercury oleate	24
Mercuric oxide		24
Mercuric oxycyanide		11, 24, 102
Mercuric potassium iodide	Mayer's reagent	24
Mercuric salicylate	Salicylated mercury	24
Mercuric subsulfate	Mercuric dioxysulfate	24
Mercuric sulfate	Mercury sulfate	24
Mercuric sulfide		24, 33, 105
Mercuric thiocyanate	Mercury thiocyanide	24
Mercuric thiocyanide	Mercury thiocyanate	24
Mercurol	Mercury nucleate	24
Mercurous bromide		24
Mercurous gluconate		24
Mercurous iodide		24
Mercurous nitrate		24, 104
Mercurous oxide		24
Mercurous sulfate	Mercury bisulfate	24
Mercury		24
Mercury (vapor)		22, 24
Mercury acetate	Mercuric acetate	24
Mercury ammonium chloride	Mercuric ammonium chloride	24
Mercury benzoate	Mercuric benzoate	24
Mercury bisulfate	Mercurous sulfate	24
Mercury chloride	Mercuric chloride	24
Mercury cyanide	Mercuric cyanide	11, 24
Mercury fulminate		24, 102
Mercury iodide	Mercuric iodide	24
Mercury nitrate	Mercuric nitrate	24, 104
Mercury nucleate	Mercurol	24
Mercury oleate	Mercuric oleate	24
Mercury sulfate	Mercuric sulfate	24
Mesitylene	1,3,5-trimethylbenzene	16
Mesityl oxide		19
Mesurol*		9
Metasystox-R	Demeton-S-methyl sulfoxid	32
Metham		12
Methanal	Formaldehyde	5
Methane		29
Methanethiol	Methyl mercaptan	20
Methanoic acid	Formic acid	3

Names	Synonyms	RGN
Methyl methacrylate		13, 103
Methyl naphthalene		16
Methyl parathion		32
Methyl pentanoate	Methyl valerate	13
Methyl propionate		13
Methyl n-propyl ketone		19
Methyl styrene		28, 103
Methyl sulfide	Dimethyl sulfide	20
Methyl trichlorosilane		107
Methyl valerate	Methyl pentanoate	13
Methyl vinyl ketone	Butene-2-one	19
Methyl yellow	Dimethylamino azobenzene	7, 8
Mevinphos	Phosdrin*	32
Mexacarbate	Dowco-139*	9
Mineral spirits		101
Mintacol*	Paraoxon	32
Mipcin*		9
Mobam*		9
Mocap*		32
Molybdenum		22, 23, 24
Molybdenum anhydride	Molybdenum trioxide	24
Molybdenum sulfide		24, 33, 105
Molybdenum trioxide	Molybdenum anhydride	24
Molybdic acid		24
Monochloroacetone	Chloroacetone	17, 19
Monochloroacetic acid	Chloroacetic acid	3, 17
Monocrotophos	Azodrin*	32
Monoethanol amine		4, 7
Monofluorophosphoric acid		1
Monoisopropanolamine		4, 7
Monomethyl hydrazine	Methyl hydrazine	8
Morpholine		7
Municipal solid waste	Refuse	101
Muriatic acid	Hydrochloric acid	1
Nabam		12
Nack	Sodium-potassium alloy	21, 107
Nak	Sodium-potassium alloy	21, 107
Naptha		101
Naphthalene		16
Naphthol		31
Naphthylamine		7
Naphthyl mercaptan		20
Naphtite	Trinitronaphthalene	27, 102
Nemagon*	Dibromochloropropane	17
Neohexane	Dimethyl butane	29
4-NBP	Nitrobiphenyl	27
Niacide*		12
Nialate	Ethion	32
Nickel		22, 24
Nickel acetate		24

Names	Synonyms	RGN
Octanone		19
Octanol		4
Octene		28
Octyl peroxide	Caprylyl peroxide	30
Octyl trichlorosilane		107
Oil of bergamot		101
Oil of vitriol	Sulfuric acid	1
Oleum	Sulfuric acid	2, 24
Orris root		101
Orthozenol	o-Phenyl phenol	31
Osmium		23, 24
Osmium amine nitrate		24, 104
Osmium amine perchlorate		24, 104
Oxamyl		9
Oxalic acid		3
Oxygen difluoride		104, 107
PCB	Polychlorinated biphenyl	17
Paper		101
Paraoxon	Mintacol*	32
Parathion		32
Paris green	Copper acetoarsenite	24
PETD	Polyram combi*	12
PETN	Pentaerythrityl tetranitrate, Pentaerythritol tetranitrate	27, 102
Pentaborane		105
Pentachlorophenol		17, 31
Pentaerythritol tetranitrate	Pentaerythrityl tetranitrate, PETN	27, 102
Pentamethyl benzene		16
Pentane		29
Pentanethiol	Amyl mercaptan	20
Pentanal	Valeraldehyde	5
Pentanone		19
Pentene	Amylene	28
Pentylamine		7
Pentyne		28
Peracetic acid	Peroxyacetic acid	3, 30
Perbromic acid		2
Perchloric acid		2
Perchloroethylene	Tetrachloroethylene	17
Perchloromethyl mercaptan	Trichloromethylsulfenylchloride	17, 20
Perchlorous acid		2
Perchloryl fluoride		104
Periodic acid		2
Permonosulfuric acid		1
Peroxyacetic acid	Peracetic acid	3, 30
PETD	Polyram combi*	12
Petroleum naptha		101
Petroleum oil		101
Phenanthrene		16
Phenarsazine chloride	Diphenylamine chloroarsine	7, 24

Names	Synonyms	RGN
Polybutene		28
Polychlorinated biphenyls	PCB, Askarel, Arochlor*, Chlorextol, Inerteen	17
Polychlorinated triphenyls		17
Polethylene		101
Polyester resin		101
Polymeric oil		101
Polyphenyl polymethylisocyanate		18, 107
Polypropylene		28, 101
Polyram combi*	PETD	12
Polysulfide polymer		20, 101
Polystyrene		101
Polyurethane		101
Polyvinyl acetate		101
Polyvinyl chloride		101
Polyvinyl nitrate		27, 102
Potasan		32
Potassium		21, 107
Potassium acid fluoride	Potassium fluoride	15
Potassium aluminate		10
Potassium arsenate		24
Potassium arsenite		24
Potassium bifluoride	Potassium fluoride	15
Potassium bichromate	Potassium dichromate	24, 104
Potassium bromate		104
Potassium butoxide		10
Potassium cyanide		11
Potassium dichloroisocyanurate		104
Potassium dichromate	Potassium bichromate	24, 104
Potassium dinitrobenzfuroxan		27, 102
Potassium fluoride	Potassium acid fluoride	15
Potassium hydride		105, 107
Potassium hydroxide	Caustic potash	10
Potassium nitrate	Saltpeter	102, 104
Potassium nitride		25
Potassium nitrite		104
Potassium oxide		107
Potassium perchlorate		104
Potassium permanganate		24, 104
Potassium peroxide		104, 107
Potassium sulfide		33, 105
Promecarb		9
Propanal	Propionaldehyde	5
Propane		29
Propanethiol	Propyl mercaptan	20
Propanoic acid	Propionic acid	3
Propanol	Propyl alcohol	4
Propargyl bromide		17
Propargyl chloride		17
2-Propen-1-ol	Allyl alcohol	4

Names	Synonyms	RGN
Silver sulfide		24, 33, 105
Silver tetrazene		24, 102
Silver trinitroresorcinate	Silver styphnate	24, 27, 102
Slaked lime	Calcium oxide	10, 107
Smokeless powder		102
Sodamide	Sodium amide	10, 107
Soda niter	Sodium nitrate	104
Sodium		21, 105, 107
Sodium acid fluoride	Sodium fluoride	15
Sodium aluminate		10, 105
Sodium aluminum hydride		105, 107
Sodium amide	Sodamide	10, 107
Sodium arsenate		24
Sodium arsenite		24
Sodium azide		102
Sodium bichromate	Sodium dichromate	24, 104
Sodium bifluoride	Sodium fluoride	15
Sodium bromate		104
Sodium cacodylate	Sodium dimethylarsenate	24
Sodium carbonate		10
Sodium carbonate peroxide		104
Sodium chlorate		104
Sodium chlorite		104
Sodium chromate		24
Sodium cyanide		11
Sodium dichloroisocyanurate		104
Sodium dichromate	Sodium bichromate	24, 104
Sodium dimethylarsenate	Sodium cacodylate	24
Sodium fluoride	Sodium acid fluoride	15
Sodium hydride		105, 107
Sodium hydroxide	Caustic soda, Lye	10
Sodium hypochlorite		10, 104
Sodium hyposulfite	Sodium thiosulfate	105
Sodium methylate	Sodium methoxide	10, 107
Sodium methoxide	Sodium methylate	10, 107
Sodium molybdate		24
Sodium monoxide	Sodium oxide	10, 107
Sodium nitrate	Soda niter	104
Sodium nitride		25
Sodium nitrite		104
Sodium oxide	Sodium monoxide	10, 107
Sodium pentachlorophenate		31
Sodium perchlorate		104
Sodium permanganate		24, 104
Sodium peroxide		104, 107
Sodium phenolsulfonate		31
Sodium picramate		27, 102
Sodium polysulfide		101
Sodium potassium alloy	Nak, Nack	21, 107
Sodium selenate		24

Names	Synonyms	RGN
Tetraborane		105
Tetrachlorodibenzo-p-dioxin	TCDD	14, 17
Tetrachloroethane		17
Tetrachloroethylene	Perchloroethylene	17
Tetrachloromethane	Carbon tetrachloride	17
Tetrachlorophenol		17, 31
Tetrachloropropyl ether		14, 17
Tetradecene		28
Tetraethyl dithionopyrophosphate	TEDP	32
Tetraethyl lead	TEL	24
Tetraethyl pyrophosphate	TEPP	32
Tetrahydrofuran	THF	14
Tetramethylenediamine		7
Tetramethyl lead	TML	24
Tetramethyl succinonitrile		26
Tetranitromethane		27, 102
Tetraphenyl ethylene		16
Tetraphosphorus trisulfide	Phosphorus sesquisulfide	33, 105, 107
Tetraselenium tetranitride		24, 25, 102
Tetrasul	Animert* V-101	20
Tetrasulfur tetranitride		25, 102
Tetrazene		8, 102
Thallium		24
Thallium nitride		24, 25, 102
Thallium sulfide		24, 33, 105
Thallous sulfate		24
Thimet*	Phorate	32
Thionyl chloride	Sulfur oxychloride	107
Thiocarbonyl chloride	Thiophosgene	107
Thiodan*	Endosulfan	17, 20
Thionazin	Zinophos*	32
Thionyl chloride	Sulfur oxychloride	107
Thiophosgene	Thiocarbonyl chloride	107
Thiophosphoryl chloride		107
Thiram		12
Thorium		22, 23, 24
Tin tetrachloride	Stannic chloride	24, 107
Titanic chloride	Titanium tetrachloride	24, 107
Titanium		22, 23, 24
Titanium sesquisulfide		24, 33, 105
Titanium sulfate		24
Titanium sulfide		24, 33, 105
Titanium tetrachloride	Titanic chloride	24, 107
TMA	Trimethylamine	7
TNB	Trinitrobenzene	27, 102
TNT	Trinitrotoluene	27, 102
Tolualdehyde		5
Toluene	Toluol, Methylbenzene	16
Toluene diisocyanate		18, 107
Toluic acid		3

Names	Synonyms	RGN
Trinitrobenzoic acid		3, 27, 102
Trinitroglycerin	Nitroglycerin	27, 102
Trinitronaphthalene	Naphtite	27, 102
Trinitrophenol	Picric acid	27, 31, 102
Trinitrophenyl methyl ether	Trinitroanisole	14, 27
Trinitroresorcinol	Styphnic acid	27, 31, 102
Trinitrotoluene	TNT	27, 102
Trioctyl aluminum		105, 107
Triphenyl ethylene		16
Triphenyl methane		16
Tripropylamine		7
Tripropyl stibine		24, 107
Trisilyl arsine		24, 107
Tris-(1-aziridinyl) phosphine oxide	TEPA, Triethylene phosphoramide	6, 32
Trithion		32
Trithorium tetranitride		24, 25
Trivinyl stibine		24, 107
Tsumacide*		9
Tungstic acid		24
Turpentine		101
UDMH	Dimethyl hydrazine	8
Ultracide*	Supracide*	32
Undecene		28
Unisolve		101
Uranium nitrate	Uranyl nitrate	24, 104
Uranium sulfide		24, 33, 105
Uranyl nitrate	Uranium nitrate	24, 104
Urea formaldehyde		5
Urea nitrate		27, 102, 104
VC	Vinylidene chloride	17, 103
Valeraldehyde	Pentanal	5
Valeramide		6
Valeric acid		3
Vanadic acid anhydride	Vanadium pentoxide	24
Vanadium oxytrichloride		24
Vanadium pentoxide	Vanadic acid anhydride	24
Vanadium sulfate	Vanadyl sulfate	24
Vanadium tetroxide		24
Vanadium trichloride		24, 107
Vanadium trioxide		24
Vanadyl sulfate	Vanadium sulfate	24
Vapona*	DDVP	32
Vinyl acetate		13, 103
Vinyl azide		102
Vinylbenzene	Styrene	16, 28, 103
Vinyl chloride		17, 103
Vinyl cyanide		26, 103
Vinyl ethyl ether		14
Vinyl isopropyl ether		17

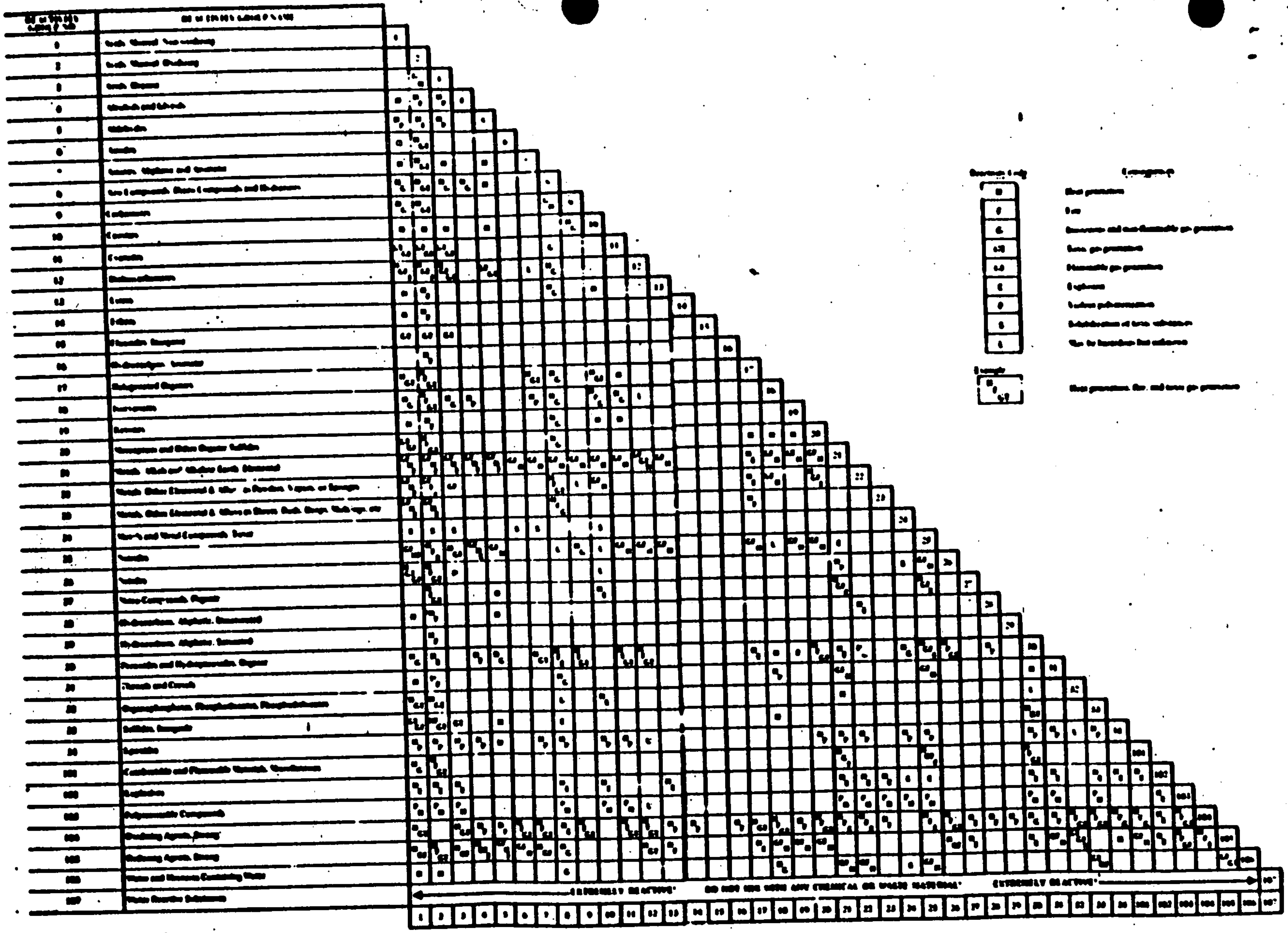


Figure 1. Hazardous waste compatibility chart.

Names	Synonyms	RGN
Barium hydride		24, 105
Barium hydroxide		10, 24
Barium hypophosphide		24, 105
Barium iodate		24, 104
Barium iodide		24
Barium monoxide	Barium oxide	10, 24, 107
Barium nitrate		24, 104
Barium oxide	Barium monoxide	10, 24, 107
Barium perchlorate		24, 104
Barium permanganate		24, 104
Barium peroxide		24, 104
Barium phosphate		24
Barium stearate		24
Barium sulfide		24, 33, 105, 107
Barium sulfite		24
Bassa*	BPMC	9
Bayer 25141	Fensulfothion	32
Baygon*		9
Benzadox	Topcide*	6
Benzal bromide		17
Benzal chloride		17
Benzaldehyde		5
Benz-a-pyrene		16
Benzene		16
Benzene diazonium chloride		8, 102
Benzene phosphorus dichloride		107
Benzidine		7
Benzoic acid		3
Benzonitrile		26
Benzophenone		19
Benzoquinone	Quinone	19
Benzotriazole		8, 102
Benzotribromide		17
Benzotrichloride		17
Benzotrifluoride	Trifluoromethylbenzene	17
Benzoyl chloride		107
Benzoyl peroxide	Dibenzoyl peroxide	30, 102
Benzyl alcohol		4
Benzylamine		7
Benzyl benzene	Diphenylmethane	16
Benzyl bromide	Bromotoluene	17
Benzyl chloride	Chlorotoluene	17
Benzyl chlorocarbonate	Benzyl chloroformate	17
Benzyl chloroformate	Benzyl chlorocarbonate	17
Benzyl silane		105, 107
Benzyl sodium		105
Beryllium		24
Beryllium copper alloy		24
Beryllium fluoride		15, 24
Beryllium hydride		24, 105, 107

ATTACHMENT III

RCRA CORRECTIVE ACTION PLAN AND ACTIVITIES

RCRA Corrective Action Plan
for
United States Department of Navy
Naval Weapons Support Center
IN5 170 023 498

This RCRA Corrective Action Plan (CAP) relates especially to the United States Department of Navy facility in Crane, Indiana. The Agency will be consulted routinely throughout the program to provide continued review and comments.

In this RCRA CAP, the "Agency" or "U.S. EPA" refers to the United States Environmental Protection Agency, and the "Permittee" refers to the United States Department of Navy with respect to the Naval Weapons Support Center (NWSC) Facility, Crane, Indiana.

The CAP consists of three separate studies, and is conditioned on the data gathered to identify if a release of hazardous waste or hazardous constituents has occurred, is occurring, or will occur. The Permittee shall implement any RCRA Facility Investigation (RFI) based on the scope identified in this plan. If a release is confirmed, or measures are identified that are necessary to prevent a release, the Permittee shall implement a Corrective Measure Study (CMS). Upon approval by the Agency, a corrective measure shall be chosen and the Permittee shall perform a Corrective Measure Implementation (CMI).

The Permittee shall furnish all personnel, materials, and services necessary for, or incidental to, performing the RCRA CAP at the Naval Weapons Support Center Facility.

I. Purpose

The purpose of the RFI is to determine the presence or absence, nature, the rate and extent of migration, and the concentrations of hazardous wastes or hazardous constituents, released from Solid Waste Management Units (SWMUs) into the soil, ground water, surface water and air. This information is necessary to determine the need, scope, and design of a Corrective Measures Study (CMS).

II. Scope

A. RFI Phase I Environmental Monitoring Report

1. Task A: RFI Phase I Description of Current Conditions

a. Facility Background

b. Identification and Summary of Permits

c. Existing Data Assessment

2. Task B: RFI Phase I Source Characterization

a. Unit/Disposal Area Characteristics

b. Maintenance

c. Waste Characteristics

3. Task C: RFI Phase I Identification of the Presence or Absence of a Release

a. Investigations to Identify Releases

b. Corrective Measures Taken

c. Protection Standards Set

B. RFI Phase II Release Assessment

1. Task A: RFI Phase II Work Plan

a. RFI Phase II Project Management Plan

b. RFI Phase II Sampling and Analysis Plan

c. RFI Phase II Construction Plan

d. RFI Phase II Data Collection Quality Assurance/Quality Control Plans

e. RFI Phase II Data Management Plan

f. RFI Phase II Health and Safety Plan

2. <u>Task B: RFI Phase II Facility Investigation</u>

   a. RFI Phase II Environmental Setting

3. <u>Task C: RFI Phase II Investigation Analysis</u>

4. <u>Task D: RFI Phase II Reports</u>

   a. RFI Phase II Work Plan

   b. RFI Phase II Progress Reports

   c. RFI Phase II Draft and Final Reports

C. <u>RFI Phase III Release Characterization</u>

1. <u>Task A: RFI Phase III Work Plan</u>

   a. RFI Phase III Project Management Plan

   b. RFI Phase III Sampling and Analysis Plan

   c. RFI Phase III Construction Plan

   d. RFI Phase III Data Collection Quality Assurance/Quality Control Plans

   e. RFI Phase III Data Management Plan

   f. RFI Phase III Health and Safety Plan

2. <u>Task B: RFI Phase III Facility Investigation</u>

   a. RFI Phase III Environmental Setting and Impact

3. <u>Task C: RFI Phase III Investigation Analysis</u>

4. <u>Task D: RFI Phase III Reports</u>

   a. RFI Phase III Work Plan

   b. RFI Phase III Progress Reports

   c. RFI Phase III Draft and Final Reports

D. <u>Facility CAP Submission Schedule</u>

III. RFI Phases

Following is an outline of information necessary to complete the RFI Phase I Environmental Monitoring Report, the RFI Phase II Release Assessment, and the RFI Phase III Release Characterization. If the Regional Administrator determines, at the end of Phase I or Phase II, that a release of hazardous waste or hazardous constituents has not or will not occur, and no further action is necessary, the following Phases (e.g., Phase III) will not be required. All Phases are outlined to cover all media and all Solid Waste Management Units (SWMUs) at the facility, The Regional Administrator may determine that all media or all SWMUs do not need further investigation, and the Permittee shall be notified which media and SWMUs shall be deleted from further investigation at the end of the Phase I or Phase II investigations.

A. RFI PHASE I ENVIRONMENTAL MONITORING REPORT

1. Task A: RFI Phase I Description of Current Conditions

The Permittee shall submit for U.S. EPA approval a report providing the background information pertinent to the facility, contamination, and interim measures as set forth below. The data gathered during any previous investigations or inspections and other relevant data shall be included.

a. Facility Background

The Permittee's report shall summarize the regional location, pertinent boundary features, general facility physiography, and historical use of all hazardous and nonhazardous waste SWMUs. The report shall include:

(1) Identification of SWMUs if they are used to manage any solid wastes or solid waste residues;

(2) A current facility map(s) depicting the following:

(a) General geographic location;

(b) The legal description of property boundaries:

(i) Identification must include all contiguous property owned by the Departments of the Navy and Army.

(c) Topography and surface drainage:

(i) Contour interval of 2 feet; and

(ii) Scale of 1 inch equal to not more than 400 feet for the entire facility, and a scale of 1 inch equal to not more than 200 feet for individual SWMUs.

(d) Identification of all SWMUs including hazardous and nonhazardous landfill cells, loading and unloading areas, waste treatment areas, truck washes, injection wells, container and tank storage, and surface impoundments, etc.;

(e) Locations of all production and ground water monitoring wells, with ID numbers, and all piezometers; and

(f) All known past and present tanks and piping.

(3) All available information on dates or periods of past waste spills or releases, identification of the materials spilled or released, the location of the event, a description of the response actions conducted (local, State, or Federal response or private parties), including any inspection reports or technical reports generated as a result of the response;

(4) A history and description of ownership and operation of waste management activities at the facility; and

(5) A description of known wastes managed in the SWMUs.

b. <u>Identification and Summary of Permits</u>

A summary of past and present permits requested, received, and/or denied, and enforcement actions associated with them.

(1) Air;

(2) Ground Water;

(3) Surface Water Bodies; and

(4) Soil.

c. Existing Data Assessment

The Permittee shall prepare an assessment of available monitoring data for all SWMUs, for all media (air, ground water, surface water, sediments, and soil). The assessment shall include:

(1) Information on design and construction of monitoring devices; and

(2) A description of potential migration pathways, and impact(s) on human health and the environment.

2. Task B: RFI Phase I Source Characterization

The Permittee shall summarize all available data to characterize the wastes and the areas where wastes have been placed, collected, or removed, including, but not limited to: type; quantity; physical form; deposition; and facility characteristics affecting release (e.g., engineered barriers). This shall include quantification of the following specific characteristics, at each source area:

a. Unit/Disposal Area Characteristics

(1) Location of unit/disposal area;

(2) Type of unit/disposal area;

(3) Design features;

(4) Operating practices (past and present);

(5) Period of operation;

(6) Age of unit/disposal area;

(7) General physical conditions; and

(8) Method used to close the unit/disposal area.

b. Maintenance

(1) Inspection Activities; and

(2) Scheduling.

c. Waste Characteristics

(1) Type of waste placed in the unit

(a) Hazardous classification;

(b) Quantity; and

(c) Chemical composition.

(2) Physical and chemical characteristics

(a) Physical form (solid, liquid, gas);

(b) Physical description (powder, oily sludge);

(c) Temperature;

(d) pH;

(e) General chemical class (acid, base, solvent);

(f) Molecular weight;

(g) Density;

(h) Viscosity;

(i) Solubility in water;

(j) Cohesiveness of the waste; and

(k) Vapor pressure.

(3) Migration and dispersal characteristics of the waste

(a) Sorption;

(b) Biodegradability, bioconcentration, biotransformation;

(c) Hydrolysis rates; and

(d) Chemical transformations.

The Permittee shall document the available procedures used in making the above determinations.

3. Task C: RFI Phase I Identification of the Presence or Absence of a Release

This task will describe past or current investigations that have taken place at the facility to identify or clean up a release, and the cleanup standards that were established (i.e., background, health based, visual).

a. Investigations to Identify Releases;

b. Corrective Measures Taken; and

c. Protection Standard Set.

B. RFI PHASE II RELEASE ASSESSMENT

1. Task A: RFI Phase II Work Plan

The Permittee shall prepare a RCRA Facility Investigation (RFI) Phase II Work Plan which includes the following:

a. RFI Phase II Project Management Plan

The Permittee shall prepare a Phase II Project Management Plan which will outline RFI objectives, technical approach, personnel (facility or contractor), budget, and schedules (bar chart format with day zero as approval date of the Phase II Work Plan).

b. RFI Phase II Sampling and Analysis Plan(s)

The Permittee shall prepare a detailed Phase II Sampling and Analysis Plan to address all field activities to obtain additional site data. The Phase II Sampling and Analysis Plan must be able to characterize the hazardous waste or hazardous constituents which are released to the environment. The Phase II Sampling and Analysis Plan shall address, but not be limited to, the following:

(1) Statement of sampling objectives;

(2) List of equipment (sampling and containers);

(3) A list of analytical parameters and their test methods;

(4) Sample types (including background);

(5) Sample locations, depths and frequency;

(6) Sampling schedule;

(7) A description of sampling procedures;

(8) A description of rationale for sampling location, analysis, analytes chosen;

(9) Environmental conditions at the time of sampling;

(10) Chain-of-custody forms and procedures;

(11) Decontamination procedures;

(12) Documentation (field logs, photos, lab logs);

(13) Calibration of field devices; and

(14) Sample preservation.

c. <u>RFI Phase II Construction Plan</u>

The Permittee shall prepare a detailed Phase II Construction Plan for any installations of monitoring devices (e.g., monitoring wells, piezometers, etc.). The plan shall include, but not be limited to, the following:

(1) Statement of objective behind construction of device;

(2) List of equipment (drill rigs, etc.);

(3) List of construction materials (casing, screens, etc.);

(4) Construction location, depths, and frequency;

(5) Construction schedule;

(6) A description of construction procedures;

(7) A description of rationale for construction location, depths, materials chosen;

(8) Environmental conditions at the time of construction;

(9) Decontamination procedures;

(10) Documentation (well logs, photos, field logs);

(11) Well development procedures;

(12) Soil classifications and descriptions of any cores; and

(13) Survey data.

d. RFI Phase II Quality Assurance/Quality Control (QA/QC) Plans

The Permittee shall prepare a detailed Phase II QA/QC Plan to document all monitoring procedures, including but not limited to: sampling, field measurements, and sample analysis, and a detailed Phase II QA/QC Plan to document all construction procedures (e.g., well placement), performed during the RFI to characterize the environmental setting, source, and contamination. These plans shall be of sufficient detail to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented. These plans shall contain, but not be limited to, the following sections:

(1) RFI Phase II Data Collection Strategy

The Phase II Data Collection Strategy section of the Phase II QA/QC Plan shall address, but not be limited to, the following:

(a) Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

(b) Description of methods and procedures to be used to access the precision, accuracy and completeness of the measurement data;

(c) Description of the rationale used to assure that the data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Examples of factors which shall be considered and discussed include:

(i) Environmental conditions at the time of sampling or construction;

(ii) Number of sample points;

(iii) Representativeness of selected media;

(iv) Representativeness of selected analytical parameters; and

(v) Representativeness of selected construction materials.

(d) Description of the measures to be taken to assure that the following data sets can be compared to each other:

(i) RFI data generated by the Permittee over some time period;

(ii) RFI data generated by an outside laboratory or consultant versus data generated by the Permittee;

(iii) Data generated by separate consultants or laboratories; and

(iv) Data generated by an outside consultant or laboratory over some time period.

(e) Details relating to the schedule and information to be provided in quality assurance reports. The reports shall include, but not be limited to:

(i) Periodic assessment of measurement data accuracy, precision, and completeness;

(ii) Results of performance audits;

(iii) Results of system audits;

(iv) Significant quality assurance problems and recommended solutions; and

(v) Resolutions of previously stated problems.

(2) <u>RFI Phase II Sampling</u>

The Phase II Sampling section of the Phase II QA/QC Plan shall address:

(a) Selecting appropriate sampling locations, depths, etc.;

(b) Providing a statistically sufficient number of sampling sites;

(c) Measuring all necessary ancillary data;

(d) Determining conditions under which sampling should be conducted;

(e) Determining which parameters are to be measured and where;

(f) Selecting the frequency of sampling and length of sampling period;

(g) Selecting the types of sample (e.g., cores versus grabs), and numbers of samples to be collected;

(h) Documenting field sampling operations and procedures, including:

(i) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sampling (e.g., filters, and absorbing reagents);

(ii) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;

(iii) Documentation and specific sample preservation method;

(iv) Collection of replicate samples;

(v) Submission of field-biased blanks, where appropriate;

(vi) Potential interferences present at the facility;

(vii) Construction materials and techniques, associated with monitoring wells and piezometers;

(viii) Field equipment listing and sample containers;

(ix) Sampling order; and

(x) Decontamination procedures.

(i) Selecting appropriate sample containers;

(j) Sample preservation; and

(k) Chain-of-custody, including:

(i) Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and

(ii) Pre-prepared sample labels containing all information necessary for effective sample tracking.

(3) <u>RFI Phase II Field Measurements</u>

The Phase II Field Measurements section of the Phase II QA/QC Plan shall address:

(a) Selecting appropriate field measurement locations, depths, etc.;

(b) Providing a statistically sufficient number of field measurements;

(c) Measuring all necessary ancillary data;

(d) Determining conditions under which field measurement should be conducted;

(e) Determining which media are to be addressed by appropriate field measurements (e.g., ground water, surface water, air, soil, and sediment);

(f) Determining which parameters are to be measured and where;

(g) Selecting the frequency of field measurement and length of field measurements period; and

(h) Documenting field measurement operations and procedures, including:

(i) Procedures and forms for recording raw data and the exact location, time, and facility-specific consideration associated with the data acquisition;

(ii) Calibration of field devices;

(iii) Collection of replicate measurements;

(iv) Submission of field-biased blanks, where appropriate;

(v) Potential interferences present at the facility;

(vi) Construction materials and techniques associated with monitoring wells and piezometers;

(vii) Field equipment listing;

(viii) Order in which field measurements were made; and

(ix) Decontamination procedures.

(4) <u>RFI Phase II Sample Analysis</u>

The Phase II Sample Analysis section of the Phase II QA/QC Plan shall specify the following:

(a) Chain-of-custody procedures, including:

(i) Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered into the sample custody records;

(ii) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and

(iii) Specification of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.

(b) Sample storage;

(c) Sample preparation methods;

(d) Analytical procedures, including:

(i) Scope and application of the procedure;

(ii) Sample matrix;

(iii) Potential interferences;

(iv) Precision and accuracy of the methodology; and

(v) Method detection limits.

(e) Calibration procedures and frequency;

(f) Data reduction, validation, and reporting;

(g) Internal quality control checks, laboratory performance and systems audits and frequency, including:

(i) Method blank(s);

(ii) Laboratory control sample(s);

(iii) Calibration check sample(s);

(iv) Replicate sample(s);

(v) Matrix-spiked sample(s);

(vi) "Blind" quality control sample(s);

(vii) Control charts;

(viii) Surrogate samples;

(ix) Zero and span gases; and

(x) Reagent quality control checks.

(h) Preventive maintenance procedures and schedules;

(i) Corrective action (for laboratory problems); and

(j) Turnaround time.

e. RFI Phase II Data Management Plan

The Permittee shall develop and initiate a Phase II Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation. Specific sections of the Phase II Data Management Plan shall include, but not be limited to, the following:

(1) RFI Phase II Data Record

The Phase II Data Record shall include the following:

(a) Unique sample or field measurement code;

(b) Sampling or field measurement location and sample or measurement type;

(c) Sampling or field measurement raw data;

(d) Laboratory analysis ID number;

(e) Property or component measured; and

(f) Result of analysis (e.g., concentration).

(2) RFI Phase II Tabular Displays

The following data shall be presented in Phase II Tabular Displays:

(a) Unsorted (raw) data;

(b) Results for each medium, or for each constituent monitored;

(c) Data reduction for statistical analysis;

(d) Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and

(e) Summary data.

(3) <u>RFI Phase II Graphical Displays</u>

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional diagrams, etc.):

(a) Display sampling location and sampling grid;

(b) Indicate boundaries of sampling area, and areas where more data are required;

(c) Display levels of contamination at each sampling location;

(d) Display geographical extent of contamination;

(e) Illustrate changes in concentration in relation to distance from the source, time, depth, or other parameters;

(f) Indicate features affecting intramedia transport and show potential receptors; and

(g) Display contamination levels, averages, and maxima.

f. <u>RFI Phase II Health and Safety Plan</u>

The Permittee shall prepare a facility Health and Safety Plan. The plan shall include, but not be limited to:

(1) Facility description including availability of resources such as roads, water supply, electricity and telephone service;

(2) Describe the known hazards and evaluate the risks associated with the incident and with each activity conducted;

(3) List key personnel and alternate, responsible for site safety, responses operations, and for protection of public health;

(4) Delineate work area;

(5) Describe levels of protection to be worn by personnel in work area;

(6) Establish procedures to control site access;

(7) Describe decontamination procedures for personnel and equipment;

(8) Establish site emergency procedures;

(9) Address emergency medical care for injuries and toxicological problems;

(10) Describe requirements for an environmental surveillance program;

(11) Specify any routine and special training required for responders;

(12) Establish procedures for protecting workers from weather-related problems; and

(13) The plan shall be consistent with:

(a) NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

(b) EPA Order 1440.1 - Respiratory Protection;

(c) EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

(d) Facility Contingency Plan;

(e) EPA Standard Operating Safety Guide (1984);

(f) OSHA regulations particularly in 29 CFR 1910 and 1926; and

(g) State and local regulations.

3. Task B: RFI Phase II Facility Investigation

The Permittee shall conduct those investigations necessary to characterize the facility (Environmental Setting). The investigations should result in data of adequate technical quality to support the development and evaluation of the corrective measure alternative during the Corrective Measures Study (CMS), if such a program is necessary.

The Phase II Facility Investigation activities shall follow the plans set forth in Phase II Task A. All sampling and analyses shall be conducted in accordance with the Phase II QA/QC Plan. All sampling locations shall be documented in a log and identified on a detailed site map. Analytical methods shall conform with U.S. EPA SW-846, third edition, or any later revision. Data resulting from the following investigation will be submitted to the Agency as early as practicable. Results of laboratory analyses will be submitted to the Agency following the analysis of each batch of samples, organized in the order that samples were analyzed, with supporting data.

a. RFI Phase II Environmental Setting

The Permittee shall collect information to supplement and verify existing information on the environmental setting and impact at the facility. The Permittee shall characterize the following:

(1) RFI Phase II Hydrogeology/Hydrology

The Permittee shall develop and conduct a program to evaluate ground water flow patterns, and the presence or absence of a release to ground water. Efforts should begin with a survey of previous hydrogeologic studies and other existing data. Phase II should address the degree of hazard, the mobility of pollutants considered, discharge/recharge areas, regional flow directions and the concentration of contaminants. Geophysical techniques may be applied to help define site geology and the accuracy of contamination assessment. Where existing data does not supply sufficient information, techniques such as seismic refraction may be used to define depth to bedrock. Resistivity or conductivity testing, where applicable, may be used to help delineate areas with contaminated ground water. However, no geophysical investigation shall be used to replace direct sampling and analysis for contaminants.

(a) The plan for evaluating ground water flow patterns shall be designed to provide the following information:

(i) A description of the regional geologic and hydrogeologic characteristics in the vicinity, including:

(A) Local stratigraphy;

(B) Regional hydrogeologic flow; and

(C) Areas of recharge and discharge.

(ii) An analysis of any topographic or geomorphic features that might influence the ground water flow system;

(iii) A classification and description of the hydrogeologic properties of all the hydrogeologic units found at the site, down to 15 feet into the first bedrock aquitard, including:

(A) Hydraulic conductivity and porosity;

(B) Texture;

(C) Uniformity and lithology;

(D) An interpretation of hydraulic interconnections between saturated zones; and

(E) Zones of significant fracturing or channeling in the unconsolidated and consolidated deposits.

(iv) Using the facility map as a base, isopach and structural contour maps, and at least two (2) geologic cross-sections showing the extent (depth, thickness, lateral extent) of all hydrogeologic units within the facility boundary, down to 15 feet into the first bedrock unit, identifying:

(A) All units in the unconsolidated and consolidated deposits;

(B) Zones of higher permeability or lower permeability that might direct or restrict the flow of contaminants;

(C) Perched aquifers; and

(D) The first saturated zone that may have a potential for migration of contaminants;

(v) A description of water level or fluid pressure monitoring, including:

(A) Water level contour maps and vertical gradient sections;

(B) Well or piezometer hydrographs;

(C) An interpretation of changes in hydraulic gradients; and

(D) Seasonal fluctuation.

(vi) A description of man-made influences that may affect the hydrogeology of the site, identifying local water supply and production wells within an approximate schedule of pumping and identifying all known man-made hydraulic structures.

(b) The plans for evaluating the presence or absence of ground water contamination shall include the following:

(i) The design and installation of all ground water monitoring wells shall be in accordance with the latest version of the Technical Enforcement Guidance Document (TEGD)(OSWER-9950.11), or otherwise approved by the U.S. EPA, specifically:

(A) The ground water monitoring system must consist of monitoring wells in the uppermost saturated zone or aquifer and in each underlying aquifer which is hydraulically interconnected;

(B) At least one background monitoring well in each aquifer shall be installed hydraulically upgradient (i.e., in the direction of increasing static head) from the limit of the SWMU. Their number, locations, and depths must be sufficient to yield ground water samples that are:

(I) Representative of background quality in the uppermost aquifer and aquifers hydraulically interconnected beneath the facility; and

(II) Not affected by the SWMU.

(C) Phase II monitoring wells in each aquifer shall be installed hydraulically downgradient (i.e., in the direction of decreasing static head) at the limit of the SWMU. Their number, locations, and depths must ensure that they immediately detect any statistically significant amounts of hazardous waste or hazardous constituents, over background, that migrate from the SWMU.

(ii) Phase II sampling and analysis of all wells shall be carried out in accordance with the approved Phase II QA/QC Plans and the Phase II Ground Water Sampling and Analysis Plans, and Phase II Construction Plans. The plans must specify:

(A) The parameters of constituents to be used in each effort to establish the presence or absence of a plume;

(B) The basis for selecting the parameters or constituents in (A) above;

(C) The methodology for investigating the hydrostratigraphic units at the site, and the locations, depths, and construction specifications for each monitoring well to be used in the Phase II sampling effort;

(D) Sampling procedures for each parameter or constituent to be analyzed in the Phase II effort; and

(E) Procedures for evaluating analytical results to establish the presence or absence of any plume.

(c) The five rounds of Phase II samples for the new wells shall be analyzed for the 40 CFR §264 Appendix IX constituents and the constituents not listed on the Appendix IX list which are expected to be derived from the waste and a mass balance of all cations and anions, or a list approved by the U.S. EPA which will be based on waste characterization and provide adequate screening for hazardous waste constituents.

(2) RFI Phase II Soils

The Permittee shall develop and conduct a program to evaluate the presence or absence of a release and the extent and effects of the release to soil. Efforts should begin with a survey of previous soil studies and other existing data. Phase II should address the degree of hazard, the mobility of pollutants considered, a characterization of the soil and rock above the water table at the facility, and the presence or absence of contaminants.

(a) The Phase II Soil Plan for characterizing soil and rock units above the water table shall include, but not be limited to, the following information:

(i) SCS soil classification;

(ii) Surface soil distribution;

(iii) Soil profile, including ASTM classification of soils;

(iv) Transects or cross-sections of soil stratigraphy;

(v) Hyraulic conductivity (saturated and unsaturated);

(vi) Relative permeability;

(vii) Bulk density;

(viii) Porosity;

(ix) Soil sorptive capacity;

(x) Cation exchange capacity (CEC);

(xi) Oil organic content;

(xii) Soil pH;

(xiii) Particle size distribution;

(xiv) Depth of water table;

(xv) Moisture content;

(xvi) Effect of stratification on unsaturated flow;

(xvii) Infiltration;

(xviii) Evapotranspiration;

(xix) Storage capacity;

(xx) Vertical flow rate; and

(xxi) Petrographic analysis.

(b) The Phase II Soil Plan for evaluating the presence or absence of soil contamination shall include the following:

(i) Phase II sampling and analysis shall be carried out in accordance with the approved Phase II QA/QC Plans and the Phase II Soil Sampling and Analysis Plans. The plans must specify:

(A) The parameters of constituents to be used in each effort to establish the presence or absence of a plume;

(B) The basis for selecting the parameters or constituent to be analyzed in (A) above;

(C) The methodology for characterizing the soil and rock units at the site, and the locations, depths, coring specifications for each soil sample to be taken in the Phase II effort;

(D) Sampling procedures for each parameter or constituent to be analyzed in the Phase II effort;

(E) Procedures for evaluating analytical results to establish the presence or absence of any plume;

(F) The location and depths of background soil samples. A minimum of three background soil samples per stratigraphic unit must be taken to compare with SWMU soil samples; and

(G) A grid system to be used to establish SWMU soil sample locations.

(ii) Phase II soil samples shall be analyzed for the 40 CFR §264 Appendix IX constituents and the constituents not listed on the Appendix IX list which are expected to be derived from the waste, or a list approved by the U.S. EPA which will be based on waste characterization and provide adequate screening for hazardous waste constituents.

(3) RFI Phase II Surface Water Bodies

The Permittee shall develop and conduct a program to evaluate surface water bodies (sediments and water) in the vicinity of the facility, and the presence or absence of a release to the surface water body. Efforts should begin with a survey of previous surface water studies and other existing data.

Phase II should address the degree of hazard, the mobility of pollutants considered, point source discharges and mixing zones, flow directions, ground water discharge and recharge areas, and the presence or absence of contaminants.

(a) The Phase II plan for characterizing surface water bodies shall include, but not be limited to, the following activities and information:

(i) A description of the temporal and permanent surface water bodies in the vicinity, including:

(A) For lake and estuaries:

(I) Location;

(II) Elevation;

(III) Surface area and volume;

(IV) Inflow and outflow;

(V) Depth; and

(VI) Stratification.

(B) For impoundments, streams, ditches, drains, swamps and channels:

(I) Location;

(II) Elevation;

(III) Surface area and volume;

(IV) Depth and width;

(V) Freeboard, if applicable;

(VI) Purpose, if any (i.e., treatment of wastes);

(VII) Flow rate;

(VIII) Construction, if applicable;

(IX) Seasonal fluctuations; and

(X) Flooding tendencies (i.e., up to 100-year event).

(C) Drainage patterns; and

(D) Evapotranspiration.

(ii) A description of the chemistry of the natural surface water body. This includes determining the pH, total dissolved solids, total suspended solids, temperature, biological oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients, chemical oxygen demand, total organic carbon, specific conductivity, specific contamiant concentrations, etc.;

(iii) A description of sediment characteristics including:

(A) Deposition area;

(B) Thickness profile; and

(C) Physical and chemical parameters including:

(I) Grain size;

(II) Density;

(III) Organic carbon content;

(IV) Ion exchange capacity; and

(V) pH.

(b) The Phase II plans for evaluating the presence or absence of surface water contamination shall include, but not be limited to, the following:

(i) Phase II sampling and analysis of surface water bodies shall be carried out in accordance with the approved Phase II QA/QC Plans, and the Phase II Surface Water Sampling and Analysis Plans. The plans must specify:

(A) The parameters of constituents to be used in each effort to establish the presence or absence of a plume;

(B) The basis for selecting the parameters or constituents in (A) above;

(C) The methodology for investigating the surface water bodies at and adjacent to the facility, and the locations and depths, for each sampling point to be used in the Phase II effort;

(D) Sampling procedures for each parameter, or constituent to be analyzed in the Phase II effort; and

(E) Procedures for evaluating analytical results to establish the presence or absence of any plume.

(ii) Phase II samples shall be analyzed for the 40 CFR §264 Appendix IX constituents, and the constituents not listed on the Appendix IX list which are expected to be defined from the waste, or a list approved by the U.S. EPA which will be based on waste characterization and provide adequate screening for hazardous waste constituents, and water quality parameters.

(4) RFI Phase II Air

The Permittee shall develop and conduct a Phase II program to evaluate the presence or absence of a release to the atmosphere. Efforts should begin with a survey of previous air studies and other existing data. Phase II should address the degree of hazard, the mobility of pollutants considered, a characterization of the climate in the vicinity of the facility, and the presence or absence of contaminants.

(a) The Phase II plan for characterizing the climate in the vicinity of the facility shall include, but not be limited to, the following information:

(i) A description of the following parameters:

(A) Annual and monthly rainfall averages;

(B) Monthly temperature averages and extremes;

(C) Wind speed and direction;

(D) Relative humidity/dew point;

(E) Evaporation data;

(F) Development of inversions; and

(G) Climate extremes that have been known to occur in the vicinity of the facility, including frequency of occurrence.

(ii) A description of topographic and man-made features which affect air flow and emission patterns, including:

(A) Hills and large dikes;

(B) Surface water bodies;

(C) Wind breaks and forests; and

(D) Airports.

(b) The plans for evaluating the presence or absence of air contamination shall include the following:

(i) The design and placement of air monitoring devices including:

(A) The Phase II air monitoring system shall consist of at least one background monitoring device placed upwind from the limit of the SWMU, and not affected by the rest of the facility. Their number, locations, and elevations must be sufficient to yield air samples that are:

(I) Representative of background quality of the atmosphere around the facility; and

(II) Not affected by the SWMU.

(B) Phase II monitoring devices shall be placed downwind at the limit of the SWMU. Their number, locations, and elevations must ensure that they immediately detect any statistically significant amounts of hazardous constituents over background, that migrate from the SWMU.

(ii) Phase II sampling and analysis of monitoring devices shall be carried out in accordance with the approved Phase II Plans, and the Phase II Air Sampling and Analysis Plans. The plans must specify:

(A) The parameters of constituents to be used in each Phase II effort to establish the presence or absence of any plume;

(B) The basis for selecting the parameters or constituents in (A) above;

(C) The methodology for investigating the climatic conditions at the facility, and the locations, elevations, and design specifications for each monitoring device to be used in the Phase II sampling effort;

(D) Sampling procedures for each parameter or constituent to be analyzed in the Phase II effort;

(E) Procedures for evaluating analytical results to establish the presence or absence of any plume.

(iii) At least three to five rounds of Phase II samples for the air monitoring shall be analyzed for a list from the 40 CFR §264 Appendix IX constituents, and the constituents not listed on the Appendix IX list which are expected to be derived from the waste, or a list approved by the U.S. EPA which will be based on waste characterization and provide adequate screening for hazardous constituents.

3. <u>Task C: RFI Phase II Investigation Analysis</u>

The Permittee shall prepare a thorough analysis and summary of all site investigations and their results. The objective of this task will be to ensure that the investigation data are sufficient in quality and quantity to identify if a release of hazardous waste or hazardous constituents has occurred, is occurring, or will occur, and to support further Corrective Action investigations or programs, if such are necessary.

4. <u>Task D: RFI Phase II Reports</u>

a. <u>RFI Phase II Work Plan</u>

The Permittee shall submit to the Regional Administrator the Task A: RFI Phase II Work Plan.

b. <u>RFI Phase II Progress Reports</u>

During the course of Tasks B and C of Phase II, the Permittee shall, at a minimum, provide the Regional Administrator with signed bi-monthly progress reports containing:

(1) An estimate of the percentage of the project completed;

(2) Summaries of all problems or potential problems encountered during the reporting period;

(3) Actions being taken to rectify problems;

(4) Changes in personnel during the reporting period;

(5) Projected work for the next reporting period; and

(6) Copies of daily reports, inspection reports, laboratory/monitoring data, etc., upon request of the Regional Administrator.

c. RFI Phase II Draft and Final Reports

The Permittee will prepare a Draft RFI Phase II Report summarizing the results and data from all site investigations, organized and presented logically, so that the relationships between site investigations for each medium are apparent. The Permittee will analyze all site investigation data and develop a summary of the type of contamination at the site. The summary will describe the extent of contamination (qualitative/ quantitative), if any, in relation to background levels for that area. If the results of the investigation indicate that there is no release of hazardous waste or constituents or no potential threat exists, a recommendation to stop the facility investigation may be made. The RFI Phase II Release Assessment Report shall be developed in final format incorporating U.S. EPA comments on the Draft RFI Phase II Release Assessment.

C. RFI PHASE III RELEASE CHARACTERIZATION

1. Task A: RFI Phase III Work Plan

The Permittee shall prepare a RCRA Facility Investigation (RFI) Phase III Work Plan which includes the following:

a. RFI Phase III Project Management Plan

The Permittee shall prepare a Phase III Project Management Plan which will outline RFI objectives, technical approach, personnel (facility or contractor), budget, and schedules (bar chart format with day zero as approval date of the RFI Phase III Work Plan).

b. RFI Phase III Sampling and Analysis Plan(s)

The Permittee shall prepare a detailed Phase III Sampling and Analysis Plan(s) to address all field activities to obtain additional site data. The Phase III Sampling and Analysis Plan must be able to determine the nature, rate and extent, and concentrations of hazardous waste and hazardous constituents that were released to the environment. The Phase III Sampling and Analysis Plan shall address, but not be limited to, the following:

(1) Statement of sampling objectives;

(2) List of equipment (sampling and containers);

(3) A list of analytical parameters and their test methods;

(4) Sample types (including background);

(5) Sample locations, depths and frequency;

(6) Sample schedule;

(7) A description of sampling procedures;

(8) A description of rationale for sampling location, analysis, analytes chosen;

(9) Environmental conditions at the time of sampling;

(10) Chain-of-custody forms and procedures;

(11) Decontamination procedures;

(12) Documentation (i.e., field logs, photos, lab logs, etc.);

(13) Calibration of field devices; and

(14) Sample preservation.

c. RFI Phase III Construction Plan

The Permittee shall prepare a detailed Phase III Construction Plan for any installations of monitoring devices (e.g., monitoring wells, piezometers, etc.). The plan shall include, but not be limited to, the following:

(1) Statement of objective behind construction of device;

(2) List of equipment (drill rigs, etc.);

(3) List of construction materials (casing, screens, etc.);

(4) Construction location, depth, and frequency;

(5) Construction schedule;

(6) A description of construction procedures;

(7) A description of rationale for construction location, depths, materials chosen;

(8) Environmental conditions at the time of construction;

(9) Decontamination procedures;

(10) Documentation (well logs, photos, field logs);

(11) Well development procedures;

(12) Soil classifications and descriptions of any cores; and

(13) Survey data.

d. <u>RFI Phase III Quality Assurance/Quality Control (QA/QC) Plans</u>

The Permittee shall prepare a detailed Phase III QA/QC Plan to document all monitoring procedures, including but not limited to: sampling, field measurements, and sample analysis, and a detailed Phase III QA/QC Plan to document all construction procedures (well placement), performed during the RFI to characterize the rate and extent of contamination. These plans shall be of sufficient detail to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented. These plans shall contain, but not be limited to, the following sections:

(1) <u>RFI Phase III Data Collection Strategy</u>

The Phase III Data Collection Strategy section of the Phase III QA/QC Plan shall address, but not be limited to, the following:

(a) Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

(b) Description of methods and procedures to be used to assess the precision, accuracy and completeness of the measurement data;

(c) Description of the rationale used to assure that the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Examples of factors which shall be considered and discussed include:

(i) Environmental conditions at the time of sampling or construction;

(ii) Number of sample points;

(iii) Representativeness of selected media;

(iv) Representativeness of selected analytical parameters; and

(v) Representativeness of selected construction materials.

(d) Description of the measures to be taken to assure that the following data sets can be compared to each other:

(i) RFI data generated by the Permittee over some time period;

(ii) RFI data generated by an outside laboratory or consultant versus data generated by the Permittee;

(iii) Data generated by separate consultants or laboratories; and

(iv) Data generated by an outside consultant or laboratory over some time period.

(e) Details relating to the schedule and information to be provided in quality assurance reports. The reports shall include, but not be limited to:

(i) Periodic assessment of measurement data accuracy, precision, and completeness;

(ii) Results of performance audits;

(iii) Results of system audits;

(iv) Significant quality assurance problems and recommended solutions; and

(v) Resolutions of previously stated problems.

(2) RFI Phase III Sampling

The Phase III Sampling section of the Phase III QA/QC Plan shall address:

(a) Selecting appropriate sampling locations, depths, etc.;

(b) Measuring all ancillary data;

(c) Determining conditions under which sampling should be conducted;

(d) Determining which parameters are to be measured and where;

(e) Selecting the frequency of sampling and length of sampling period;

(f) Selecting the types of sample (e.g., core versus grabs), and numbers of samples to be collected;

(g) Documenting field operations and procedures, including:

(i) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sampling (e.g., filters, and absorbing reagents);

(ii) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;

(iii) Documentation and specific sample preservation method;

(iv) Collection of replicate samples;

(v) Submission of field biased blanks, where appropriate;

(vi) Potential interferences present at the facility;

(vii) Construction materials and techniques, associated with monitoring wells and piezometers;

(viii) Field equipment listing and sample containers;

(ix) Sampling order; and

(x) Decontamination procedures.

(h) Selecting appropriate sample containers;

(i) Sample preservation; and

(j) Chain-of-custody, including:

(i) Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and

(ii) Pre-prepared sample labels containing all information necessary for effective sample tracking.

(3) RFI Phase III Field Measurements

The Phase III Field Measurements section of the Phase III QA/QC Plan shall address:

(a) Selecting appropriate field measurement locations, depths, etc.;

(b) Measuring all necessary ancillary data;

(c) Determining under which field measurement should be conducted;

(d) Determining which media are to be addressed by appropriate field measurements (e.g., ground water, surface water, air, soil, and sediment);

(e) Determining which parameters are to be measured and where;

(f) Selecting frequency of field measurements and length of field measurements period; and

(g) Documenting field operations and procedures, including:

(i) Procedures and forms for recording raw data and the exact location, time, and facility specific consideration associated with the data acquisition;

(ii) Calibration of field devices;

(iii) Collection of field replicate measurements;

(iv) Submission of field biased blanks, where appropriate;

(v) Potential interferences present at the facility;

(vi) Construction materials and techniques associated with monitoring wells and piezometers used to collect field data;

(vii) Field equipment listing;

(viii) Order in which field measurements were made; and

(ix) Decontamination procedures.

(4) RFI Phase III Sample Analysis

The Phase III Sample Analysis section of the Phase III QA/QC Plan shall specify the following:

(a) Chain-of-custody procedures, including:

(i) Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered into the sample custody records;

(ii) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and

(iii) Specification of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.

(b) Sample storage;

(c) Sample preparation methods;

(d) Analytical procedures, including:

- (i) Scope and application of the procedure;
- (ii) Sample matrix;
- (iii) Potential interferences;
- (iv) Precision and accuracy of the methodology; and
- (v) Method detection limits.

(e) Calibration procedures and frequency;

(f) Data reduction, validation, and reporting;

(g) Internal quality control checks, laboratory performance and system audits and frequency, including:

- (i) Method blank(s);
- (ii) Laboratory control sample(s);
- (iii) Calibration check sample(s);
- (iv) Replicate sample(s);
- (v) Matrix-spiked sample(s);
- (vi) "Blind" quality control sample(s);
- (vii) Control charts;
- (viii) Surrogate samples;
- (ix) Zero and span gases; and
- (x) Reagent quality control checks.

(h) Preventive maintenance procedures and schedules;

(i) Corrective action (for laboratory problems); and

(j) Turnaround time.

e. RFI Phase III Data Management Plan

The Permittee shall develop and initiate a Phase III Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation. Specific sections of the Phase III Data Management Plan shall include, but not be limited to, the following:

(1) RFI Phase III Data Record

The Phase III Data Record shall include the following:

(a) Unique sample or field measurement code;

(b) Sampling or field measurement location and sample or measurement type;

(c) Sampling or field measurement raw data;

(d) Laboratory analysis ID number;

(e) Property or component measured; and

(f) Result of analysis (e.g., concentration).

(2) RFI Phase III Tabular Displays

The following data shall be presented in the Phase III Tabular Displays:

(a) Unsorted (raw) data;

(b) Results for each medium, or for each constituent monitored;

(c) Sorting of data by potential stratification factors (e.g., location, soil layer, saturated zone); and

(d) Summary data.

(3) RFI Phase III Graphical Displays

The following data shall be presented in Phase III Graphical Formats (e.g., bar graphs, line graphs, area or plan graphs, isopleth plots, cross-sectional plots and transects, three dimensional diagrams, etc.):

(a) Display sampling location and sampling grid;

(b) Indicate boundaries of sampling area, and areas where more data are required;

(c) Display levels of contamination at each sampling location;

(d) Display geographical extent of contamination;

(e) Display contamination levels, averages, and maxima;

(f) Illustrate changes in concentration in relation to distance from the source, time, depth, or other parameters; and

(g) Indicate features affecting transport and show potential receptors.

f. RFI Phase III Health and Safety Plan

The Permittee shall prepare a facility Phase III Health and Safety Plan. The plan shall include, but not be limited to, the following:

(1) Facility description including availability of resources such as roads, water supply, electricity and telephone service;

(2) Describe the known hazards and evaluate the risks associated with the incident and with each activity conducted;

(3) List key personnel and alternate, responsible for site safety, response operations, and for protection of public health;

(4) Delineate work area;

(5) Describe levels of protection worn by personnel in work area;

(6) Establish procedures to control site access;

(7) Describe decontamination procedures for personnel and equipment;

(8) Establish site emergency procedures;

(9) Address emergency medical care for injuries and toxicological problems;

(10) Describe requirements for an environmental surveillance program;

(11) Specify any routine and special training required for responders;

(12) Establish procedures for protecting workers from weather-related problems; and

(13) The plan shall be consistent with:

(a) NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

(b) EPA Order 1440.1 - Respiratory Protection;

(c) EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

(d) Facility Contingency Plan;

(e) EPA Standard Operating Safety Guide (1984);

(f) OSHA regulations particularly in 29 CFR 1910 and 1926; and

(g) State and local regulations.

2. <u>Task B: RFI Phase III Facility Investigation</u>

The Permittee shall conduct those investigations necessary to: define the degree and extent of contamination (Release Characterization); and identify actual or potential receptors.

The investigations should result in data of adequate technical quality to support the development and evaluation of the corrective measure alternative(s) during the Corrective Measures Study (CMS), if such a program is necessary.

The site investigation activities shall follow the plans set forth in Phase III Task A. All Phase III sampling and analyses shall be conducted in accordance with the Phase III QA/QC Plan. All sampling locations shall be documented in a log and identified on a detailed site map. Analytical methods shall conform with U.S. EPA SW-846, third edition, or any later revision. Data resulting from the following investigation will be submitted to the Agency as early as practicable. Results of laboratory analyses will be submitted to the Agency following the analysis of each batch of samples, organized in the order that samples were analyzed, with supporting data.

a. RFI Phase III Environmental Setting and Impact

The Permittee shall collect information to supplement and verify existing information on the environmental setting and impact at the facility. The Permittee shall characterize the following:

(1) RFI Phase III Hydrogeology/Hydrology

The Permittee shall develop and conduct a program to evaluate ground water flow patterns and the extent and effects of the release to ground water. Efforts should begin with a survey of previous hydrogeologic studies and other existing data. Phase III should determine the horizontal and vertical distribution of contaminants and predict the long term disposition of contaminants. Geophysical techniques may be applied to help define site geology and the accuracy of contamination assessment. Where existing data does not supply sufficient information, techniques such as seismic refraction may be used to define depth to bedrock. Resistivity or conductivity testing, where applicable, may be used to help delineate areas with contaminated ground water. However, no geophysical investigation shall be used to replace direct sampling and analysis for contaminants.

(a) The Phase III plan for evaluating ground water flow patterns shall be designed to provide the flow paths of any plume of contamination.

(b) Using the facility map as a base, isopach and structural contour maps, and at least two (2) geologic cross-sections showing the extent (depth, thickness, lateral extent) of all hydrogeologic units within the facility boundary, down to 15 feet into the first bedrock aquitard, identifying:

(i) All units in the unconsolidated and consolidated deposits;

(ii) Zones of higher permeability or lower permeability that might direct or restrict the flow of contaminants;

(iii) Perched aquifers;

(iv) The first saturated zone that may have a potential for migration of contaminants; and

(v) Definition of the plume of contamination by constituent and concentration.

(c) A description of water level or fluid pressure monitoring, including:

(i) Water level contour maps and vertical gradient sections;

(ii) Well or piezometer hydrographs;

(iii) An interpretation of changes in hydraulic gradients; and

(iv) Seasonal fluctuation.

(d) Identification of man-made influences that may affect the flow path of the plume of contamination, or constructed within the plume in the case of soil contamination.

(e) The plans for evaluating the extent and effects of ground water contamination shall include the following:

(i) The design and installation of all ground water monitoring wells shall be in accordance with the latest version of the Technical Enforcement Guidance Document (TEGD) (OSWER-9950.11), or otherwise as approved by the U.S. EPA, specifically:

(A) The ground water monitoring system must consist of monitoring wells in the uppermost saturated zone or aquifer and in each underlying aquifer which is hydraulically interconnected;

(B) At least one background monitoring well in each aquifer shall be installed hydraulically upgradient (i.e., in the direction of increasing static head) from the limit of the SWMU. Their number, locations, and depth must be sufficient to yield ground water samples that are:

(I) Representative of background quality in the uppermost aquifer and aquifers hydraulically interconnected beneath the facility; and

(II) Not affected by the SWMU.

(C) Phase III monitoring wells shall be installed so as to completely characterize the nature, rate, and extent, and concentration of hazardous waste or hazardous constituents that have, are, or may be migrating from the SWMU.

(ii) Phase III sampling and analysis of all wells shall be carried out in accordance with the approved Phase III QA/QC Plans, the Phase III Ground Water Sampling and Analysis Plans, and the Phase III Construction Plans. The plans must specify:

(A) The parameters or constituents to be used in each effort to establish the rate and extent of any plume;

(B) The basis for selecting the parameters or constituents in (A) above;

(C) The locations, depths, and construction specifications for each monitoring well to be used in the Phase III sampling effort;

(D) Sampling procedures for each parameter or constituent to be analyzed in the Phase III effort; and

(E) Proposals for establishing the locations, depths, and construction specifications for additional monitoring wells necessary to delineate the extent of any plume.

(iii) Phase III sampling shall be analyzed for the 40 CFR §264 Appendix IX constituents and the constituents not listed on the Appendix IX list which are expected to be derived from the waste and a mass balance of all the cations and anions, or a list approved by the U.S. EPA which will be based on waste characterization and provide adequate screening for hazardous constituents.

(iv) The Phase III samples shall be analyzed at a minimum for constituents discovered in the ground water as a result of the RFI Phase II sampling and analysis. This list of constituents must be approved by the Regional Administrator.

(f) The Phase III investigation to characterize any plumes of contamination in ground water shall include, but not be limited to, the following:

(i) A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the facility;

(ii) The horizontal and vertical direction of contamination movement;

(iii) The velocity of contaminant movement;

(iv) The horizontal and vertical concentration profiles of 40 CFR §264 Appendix IX constituents and any other 40 CFR §261 Appendix VIII constituents in the plume(s);

(v) An evaluation of factors influencing the plume movement; and

(vi) An extrapolation of future contaminant movement.

(2) <u>RFI Phase III Soils</u>

The Permittee shall develop and conduct a program to evaluate the extent and effects of the release to soil. Efforts should begin with a survey of previous soil studies and other existing data. Phase III should determine the horizontal and vertical distribution of contaminants and predict the long term disposition of contaminants.

(a) The plans for evaluating the extent and effects of soil contamination shall include the following:

(i) Phase III sampling and analysis shall be carried out in accordance with the approved Phase III QA/QC Plans and the Phase III Soil Sampling and Analysis Plans. The plans must specify:

(A) The parameters of constituents to be used in each effort to establish the rate and extent of any plume;

(B) The basis for selecting the parameters or constituents in (A) above;

(C) The methodology for characterizing the soil and rock units at the site, and the locations, depths, coring specifications for each soil sample to be taken in the Phase III sampling effort;

(D) Sampling procedures for each parameter or constituent to be analyzed in the Phase III effort;

(E) Procedures for evaluating analytical results to establish the rate and extent of any plume;

(F) Proposals for establishing the locations, depths, and coring specifications for additional soil cores necessary to delineate the extent of any plume;

(G) The location and depths of background soil samples. A minimum of three background soil samples per stratigraphic unit must be taken to compare with SWMU soil samples;

(H) A grid system to be used to establish SWMU soil sample locations; and

(I) The Phase III soil samples shall be analyzed at a minimum for constituents discovered in the soil as a result of the Phase II sampling and analysis. The list of constituents must be approved by the Regional Administrator.

(b) The Phase III investigation to characterize any plumes of contamination in soil shall include, but not be limited to, the following:

(i) A description of the vertical and horizontal extent of contamination;

(ii) A description of contaminant and soil chemical properties within the contaminant source area and plume. This includes solubility, adsorption, leachability, exchange capacity, biodegradability, and other factors that might affect contaminant migration and transformation;

(iii) Specific contaminant concentrations; and

(iv) Extrapolation of future contaminant movement.

(3) RFI Phase III Surface Water Bodies

The Permittee shall develop and conduct a program to evaluate the extent and effects of the release to the surface water body. Efforts should begin with a survey of previous surface water studies and other existing data. Phase III should determine the distribution and concentrations of contaminants and predict the potential long term health effects of contaminants.

(a) The Phase III plan for characterizing surface water bodies shall include, but not be limited to, the following:

(i) A description of the chemistry of the natural surface water body at the time of the Phase III effort.

(b) The Phase III plans for evaluating the extent and effects of surface water contamination shall include the following:

(i) Phase III sampling and analysis of surface water bodies shall be carried out in accordance with the approved Phase III QA/QC Plans and the Phase III Surface Water Sampling and Analysis Plans. The plans must specify:

(A) The parameters of constituents to be used in each effort to establish the rate and extent of any plume;

(B) The basis for selecting the parameters or constituents in (A) above;

(C) The methodology for investigating the surface water bodies at and adjacent to the facility, and the locations and depths for each sampling point to be used in the Phase III effort;

(D) Sampling procedures for each parameter or constituent to be analyzed in the Phase III effort;

(E) Procedures for evaluating analytical results to establish the rate and extent of any plume; and

(F) Proposals for establishing the locations and depths for any additional sampling points necessary to delineate the rate and extent of any plume.

(ii) Phase III samples shall be analyzed at a minimum for constituents discovered in the surface water body as a result of the Phase II sampling and analysis. This list of constituents must be approved by the Regional Administrator.

(c) The Phase III investigation to characterize any plumes of contamination in surface water bodies shall include, but not be limited to, the following:

(i) A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the facility, and the extent of contamination in underlying sediments;

(ii) The horizontal and vertical direction of contaminant movement;

(iii) The contaminant velocity;

(iv) An evaluation of the physical, biological and chemical factors influencing contaminant movement;

(v) An extrapolation of future contaminant movement; and

(vi) A description of the chemistry of the contaminated surface water body. This includes determining pH, total dissolved solids, specific contaminant concentrations, etc.

(vi) Specific contaminant concentrations;

(v) An evaluation of climatic conditions influencing contaminant movement; and

(vi) An extrapolation of future contaminant movement.

3. Task C: RFI Phase III Investigation Analysis

The Permittee shall prepare a thorough analysis and summary of all site investigations and their results. The objective of this task will be to ensure that the investigation data are sufficient in quality and quantity to define the rate and extent of hazardous waste or hazardous constituents, and to support further Corrective Action investigations or programs, if such are necessary.

4. Task D: RFI Phase III Reports

a. RFI Phase III Work Plan

The Permittee shall submit to the Regional Administrator the Task A RFI Phase III Work Plan.

b. RFI Phase III Progress Reports

During the course of Tasks B and C of Phase III, the Permittee shall, at a minimum, provide the Regional Administrator with signed bi-monthly progress reports containing:

(1) An estimate of the percentage of the project completed;

(2) Summaries of all problems or potential problems encountered during the reporting period;

(3) Actions being taken to rectify problems;

(4) Changes in personnel during the reporting period;

(5) Projected work for the next reporting period; and

(6) Copies of daily reports, inspection reports, laboratory/monitoring data, etc., upon request by the Agency.

c. RFI Phase III Draft and Final Reports

The Permittee will prepare a Draft RFI Phase III Report containing the results and data from all site investigations organized and presented logically so that the relationships between site investigations for each medium are apparent. The Permittee will analyze all site investigation data and develop a summary of the type of contamination at the site. The summary will describe the rate and extent of contamination (qualitative/quantitative), in relation to background levels indicative for that area. The RFI Phase III Release Characterization Report shall be developed in final format incorporating U.S. EPA comments on the Draft RFI Phase III Release Characterization.

D. FACILITY CAP SUBMISSION SCHEDULE

The schedule of submissions is detailed in the main body of the permit.

SCOPE OF WORK FOR A CORRECTIVE MEASURES STUDY
FOR
UNITED STATES DEPARTMENT OF NAVY
NAVAL WEAPONS SUPPORT CENTER
IN5 170 023 498

I. PURPOSE

The purpose of the Corrective Measures Study (CMS) is to develop and evaluate the corrective action alternatives and to recommend the Corrective Measure (CM or measures to be taken at the Naval Weapons Support Center for Solid Waste Management Units (SWMUs). The Permittee will furnish the personnel, materials, and services necessary to prepare the CMS, except as otherwise specified.

II. SCOPE

The CMS consists of four tasks:

Task I: Identification and Development of the CM Alternatives

A. Description of Current Situation

B. Establishment of Corrective Action Objectives

C. Screening of CM Technologies

D. Identification of the CM Alternatives

Task II: Evaluation of the CM Alternatives

A. Technical/Environmental/Human Health/Institutional

B. Cost Estimate

Task III: Justification and Recommendation of the CM(s)

A. Technical

B. Environmental

C. Human Health

Task IV: Reports

A. Draft

B. Final

III. Task I: Identification and Development of the Corrective Measure Alternatives

Based on the results of previous investigations, bench scale tests, and preliminary CM technologies, the Permittee shall identify, screen, and develop the alternative for removal, containment, treatment, and other remediation of the SWMU, based on the objectives established for the corrective action.

A. Description of Current Situation

The Permittee shall submit an update to the information describing the current situation at the facility and the known nature and extent of the contamination. The Permittee shall provide information on any previous response activities and any interim measure which have been or are being implemented at the facility. The Permittee shall also make a facility-specific statement of the purpose for the response, based on all available data to date. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by CMs.

B. Establishment of Corrective Action Objectives

The Permittee, in conjunction with the United States Environmental Protection Agency (U.S. EPA), shall establish site-specific objectives for the corrective action. These objectives shall be based on public health and environmental criteria, information gathered during studies for the facility, U.S. EPA guidance, and the requirements of any applicable Federal statutes.

C. Screening of Corrective Measure Technologies

The Permittee shall screen any preliminary CM technology used and any supplemental technologies to eliminate those that may prove infeasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the CM objective within a reasonable time period. This screening process focuses on eliminating those technologies which have severe limitations for a given set of waste- or site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations. Site, waste, and technology characteristic requirements are described in more detail below:

1. Site Characteristics

Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration;

2. Waste Characteristics

Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these waste characteristics should be eliminated from consideration. Waste characteristics particularly affect the feasibility of removals, collection methods and treatment methods; and

3. Technology Limitations

During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process.

D. Identification of the Corrective Measure Alternatives

The Permittee shall develop the CM alternatives, based on the corrective action objectives, and analysis of any preliminary CM technology, and as supplemented by the U.S. EPA. The alternatives developed should represent a workable number of options that each appear to adequately address all SWMU problems and corrective action objectives. Each alternative may consist of an individual technology or a combination of technologies. The Permittee shall document the reasons for excluding technologies. Cost is not an exclusion factor.

IV. Task II: Evaluation of the Corrective Measure Alternatives

The Permittee shall describe each CM alternative that passes through the Initial Screening and evaluate each CM alternative and its components. The evaluation shall be based on technical, environmental, human health, and institutional concerns. The Permittee shall also develop cost estimates of each CM.

A. Technical/Environmental/Human Health/Institutional

The Permittee shall provide a description of each CM alternative which includes, but is not limited to, the following: preliminary process flow sheets; preliminary sizing and type of construction for buildings and structures; and rough quantities of utilities required. The Permittee shall evaluate each alternative in the four following areas:

1. <u>Technical</u>

The Permittee shall evaluate each CM alternative based on performance, reliability, implementability, safety, and cross-media impacts.

a. The Permittee shall evaluate performance base on the effectiveness and useful life of the CM:

(1) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, collection, removal, destruction, or treatment. The effectiveness of each CM shall be determined either through design specifications or by performance evaluation. Any specific waste or site characteristcs which could potentially impede effectiveness shall be considered. The evaluation should also consider the effectiveness of combinations of technologies; and

(2) Useful life is defined as the length of time the level of effectiveness can be maintained. Most CM technologies, with the exception of destruction, deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each CM shall be evaluated in terms of the projected service lives of its component technologies, must be considered in estimating the useful life of the project.

b. The Permittee shall provide information on the reliability of each CM including their operation and maintenance requirements and their demonstrated reliablity:

(1) Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activities should be regarded as less reliable than technologies requiring little or straightforward operation and maintenance. The availability of labor and materials to meet these requirements shall also be considered; and

(2) Demonstrated and expected reliability is a way of measuring the risk and effect of failure. The Permittee should evaluate whether the technologies have been used effectively under analogous

conditions; whether the combination of technologies have been used together effectively; whether failure of any one technology has an immediate impact on receptors; and whether the CM has the flexibility to deal with uncontrollable changes at the site.

c. The Permittee shall describe the implementability of each CM, including the relative ease of installation (constructability) and the time required to achieve a given level of response:

(1) Constructability is determined by conditions both internal and external to the facility conditions and include such items as location of underground utilities, depth to water table, heterogeneity of subsurface materials, location of the facility, and influence of water bodies, etc. The Permittee shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities; and

(2) Time has two components that shall be addressed: the time it takes to implement a CM; and the time it takes to actually see beneficial results. Beneficial results are defined as the reduction of leachate levels to some acceptable, pre-established level.

d. The Permittee shall evaluate each CM alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments, as well as those to workers during implementation. Factors to consider are exposure to hazardous substances and chemical reactions.

e. The Permittee shall evaluate each CM alternative with regard to cross media impact. This evaluation shall include potential contamination to air, soil, surface water bodies, and ground water. Factors to consider include working in contaminated areas.

2. <u>Environmental</u>

The Permittee shall perform an Environmental Assessment for each alternative. The Environmental Assessment shall focus on the facility conditions and pathways of contamination actually addressed by each alternative. The Environmental Assessment for each alternative will include, at a minimum, an evaluation of: the short- and long-term beneficial and adverse effects of the response alternative; any adverse effects on environmentally sensitive areas; and an analysis of measures to mitigate adverse effects and bioaccumulation effects.

3. <u>Human Health</u>

The Permittee shall assess each alternative in terms of the extent of which it mitigates short- and long-term potential exposure to any residual contamination and protects human health both during and after implementation of the CM. The assessment will describe the levels and characteristics of contaminants on-site, potential exposure routes, and potential affected population. Each alternative will be evaluated to determine the level of exposure to contaminants and their reduction over time. For management of mitigation measures, the relative reduction of impact will be determined by comparing residual levels of each alternative with existing criteria, standards, or guidelinges acceptable to the U.S. EPA.

4. <u>Institutional</u>

The Permittee shall assess relevant institutional needs for each alternative. Specifically, the effects of Federal, State, and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations on the design, operation, and timing of each alternative.

5. <u>Timing</u>

The Permittee shall assess the time required to begin and complete each alternative.

B. <u>Cost Estimate</u>

The Permittee shall develop an estimate of the cost of each CM alternative (and for each phase or segment of the alternative). The cost estimate shall include both capital and operation and maintenance costs.

1. Capital costs consist of direct (construction) and indirect (nonconstruction and overhead) costs.

   a. Direct capital costs include:

(1) Construction costs: Costs of materials, labor (including fringe benefits and workers' compensation), and equipment required to install the CM;

(2) Equipment costs: Costs of treatment, containment, disposal, and/or service equipment necessary to implement the action, these materials remain until the action is complete;

(3) Land and site-development costs: Expenses associated with purchase of land and development of existing property; and

(4) Buildings and service costs: Costs of process and nonprocess buildings, utility connections, purchased services, and disposal costs.

b. Indirect capital costs include:

(1) Engineering expenses: Costs of administration, design, construction supervision, drafting, and testing of CM alternatives;

(2) Legal fees and license or permit costs: Administrative and technical costs necessary to obtain licenses and permits for installation and operation;

(3) Start up and shakedown costs: Costs incurred during CM startup; and

(4) Contingency allowances: Funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, inadequate facility characterization.

2. Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of the CM. The Permittee shall consider the following operation and maintenance cost components:

a. Operating labor costs Wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operations;

b. Maintenance materials and labor costs: Costs for labor, parts, and other resources required for routine maintenance of facilities and equipment;

c. Auxiliary materials and energy: Costs of such items as chemicals and electricity for treatment plant operations, water and sewer service, and fuel;

d. Purchased services: Sampling costs, laboratory fees, and professional fees for which the need can be predicted;

e. Disposal and treatment costs: Costs of transporting and disposing of waste and/or leachate materials, such as treatment plant residues generated during operations;

f. Administrative costs: Costs associated with administration of CM operation and maintenance not included under other categories;

g. Insurance, taxes, and licensing costs: Costs of such items as liability and sudden accident insurance; real estate taxes on purchased land or rights-of way, licensing fees for certain technologies, and permit renewal and reporting costs;

h. Maintenance reserve and contingency funds: Annual payments into escrow funds to cover, (1) costs of anticipated replacement or rebuilding of equipment, and (2) any large unanticipated operation and maintenance costs; and

i. Other costs: Items that do not fit into any of the above categories.

V. <u>Task III: Justification and Recommendation of the Corrective Measures</u>

The Permittee shall justify and recommend a CM alternative using technical, human health, and environmental criteria. This recommendation shall include summary tables which allow the alternatives to be understood easily. Tradeoffs among health risks, environmental effects, and other pertinent factors shall be highlighted. The U.S. EPA will select the CM alternative or alternatives to be implemented based on Tasks II and III. At a minimum, the following criteria will be used to justify the final CM or CMs.

A. <u>Technical</u>

1. Performance - CM(s) which are most effective at performing their intended function and in maintaining the performance over extended periods of time will be given preference;

2. Reliability - CM(s) which do not require frequent or complex operation and maintenance activities and that have proven effective under waste and facility conditions similar to those anticipated will be given preference;

3. Implementability - CM(s) which can be constructed and operated to significantly reduce the toxicity, mobility and volume within a reasonable time, will be preferred; and

4. Safety - CM(s) which pose the least threat to the safety of nearby residents and environments, as well as workers, during implementation will be preferred.

B. Human Health

The CM(s) must comply with existing U.S. EPA criteria, standards, or guidelines for the protection of human health. CMs which provide the minimum level of exposure to contaminants and the maximum reduction in exposure with time are preferred.

C. Environmental

The CM(s) posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be favored.

IV. Task IV: Reports

The Permittee shall prepare a CM Study Report presenting the results of Task I through III and recommending a CM alterative(s). Five copies of the preliminary report shall be provided by the Permittee. If the process takes longer than 2 months, progress reports must be submitted.

A. Draft

The report shall at a minimum include:

1. A description of the facility including site topographic maps and preliminary layouts;

2. A summary of the CMs including a description of the CMs and the rationale for selection, performance expectations, preliminary design criteria and rationale, general operation and maintenance requirements, and long-term monitoring requirements;

3. A summary of previous studies and impact on the selected CM including field studies (ground water, surface water, sediment, soil, and air), and laboratory studies (bench scale for treatment, etc.);

4. Design and implementation precautions including special technical problems, additional engineering data required, permits and regulatory requirements, access, easements, rights-of-way, health and safety requirements, and community relations activities; and

5. Cost estimates and schedules including capital cost estimate, operation and maintenance cost estimate, and project schedule (design and operation).

B. Final

The Permittee shall finalize the CM Study Report incorporating comments received from the U.S. EPA on the Draft CM Study Report.

CORRECTIVE ACTION MONITORING PLAN

Information to be Submitted
by
The Department of Navy
Naval Weapons Support Center
Crane, Indiana

A. Performance Standard

The Corrective Action Monitoring Plan (CAMP) is designed to ensure that the Solid Waste Management Unit (SWMU) is maintained and controlled to minimize or eliminate threats to human health and the environment by preventing release of hazardous waste or hazardous constituents into the ground water beyond the SWMU's boundary. If there is evidence of spills or leaks, samples will be collected, evaluated, and analyzed if necessary, to determine the extent, if any, of contamination in the soil and/or in the ground water.

B. Content of the CAMP

The CAMP shall include the following:

1. Cap (cover) Maintenance and Monitoring

   a. A description of the design and construction of the cap of the SWMU;

   b. A description of the long-term minimization of migration of liquids through the cap of the SWMU;

   c. A description of maintenance procedures and schedules, to control and minimize erosion or failure of the cap of the SWMU;

   d. A description of how settling and subsidence will affect the cap's integrity to prevent infiltration of rainfall or ground water into the SWMU;

   e. A description of cap repair procedures; and

   f. A description of procedures to prevent animals from burrowing into the cap, if applicable.

2. Run-on and Run-off Control Maintenance and Monitoring

   a. A description of the design and construction of any run-on and run-off controls on or around the SWMU; and

b. A description of maintenance procedures and schedules, to control and minimize erosion or failure of any run-on and run-off controls on or around the SWMU.

3. <u>Ground Water Monitoring and/or Collection System Maintenance and Monitoring</u>

a. A detailed description of the ground water monitoring system around the SWMU, or a system used to control a release from the SWMU, including procedures for sampling and analysis; and

b. A description of maintenance procedures and schedules to control and minimize erosion or failure of any ground water monitoring system being used, or present, to monitor the SWMU, or to collect contaminated ground water.

4. <u>Surveyed Bench Mark Maintenance</u>

a. A description of maintenance procedures and schedules, to control and minimize erosion or destruction of surveyed bench marks used to identify the location of the SWMU; and

b. A surveyed map and legal description identifying the location of the SWMU and the bench mark.

5. <u>Inspection Information</u>

a. The name, address, and phone number of the person or office to contact about the SWMU during the CAMP's monitoring timeframe; and

b. Examples of any inspection logs concerning the SWMU.

6. <u>Reporting Requirements</u>

a. The Permittee shall, at a minimum, report the following information to the Regional Administrator:

(1) A notice when repairs are necessary, including a description of the intended repair and a work schedule;

(2) A notice when the Permittee intends to do any construction within the SWMU area that may change the integrity of the cap or monitoring systems; and

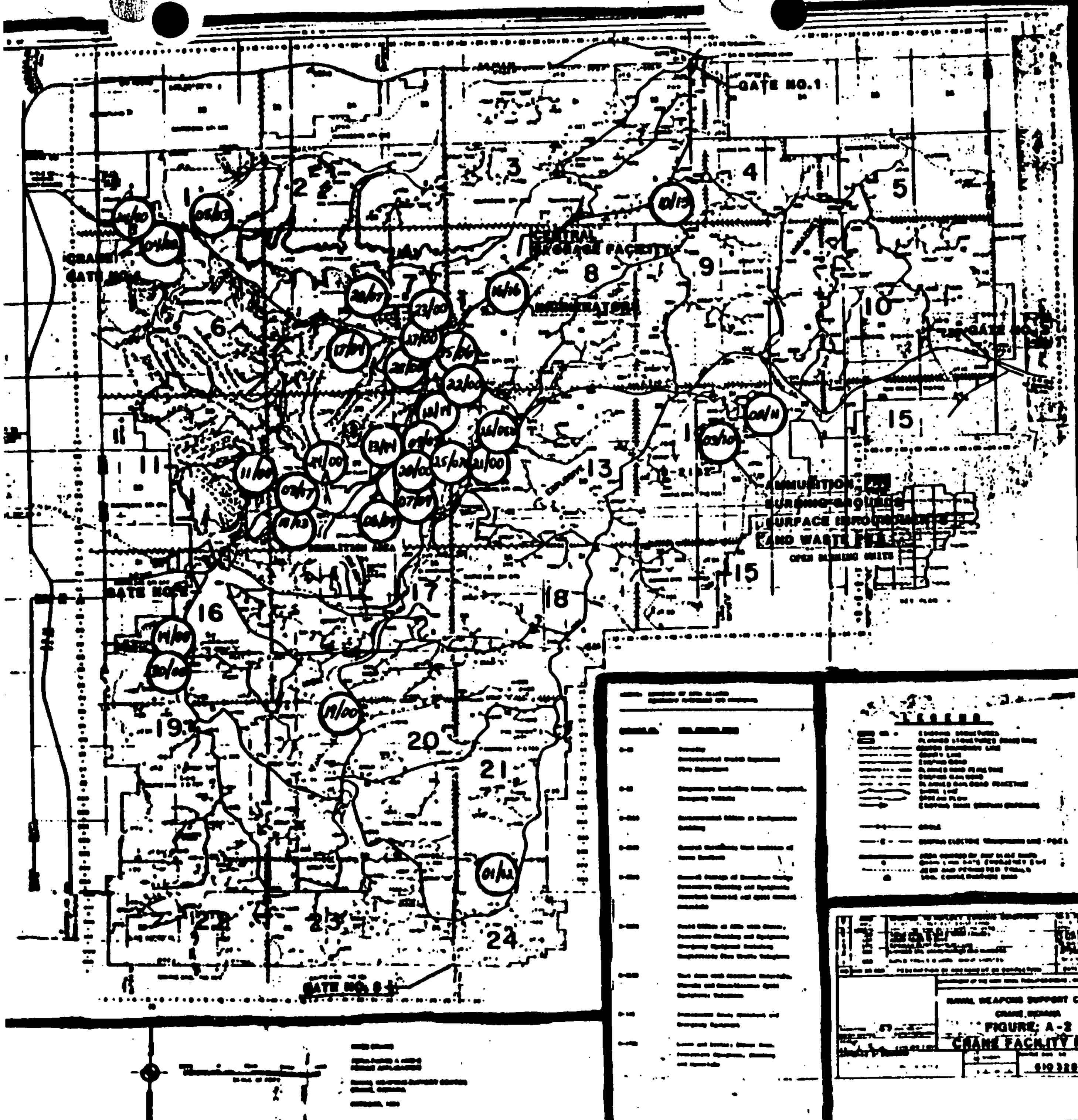
(3) A report when a release has been found, including leachate seeps and releases into the ground water or soil, and the planned corrective actions to contain and/or clean up the release.

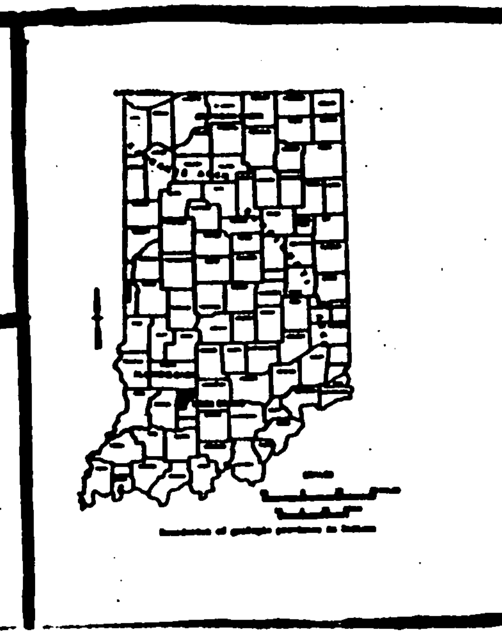
b. The Permittee shall maintain at the facility all inspection records for the SWMU, for a period of at least 3 years from the date of the inspection. Any inspection report shall be made available to the U.S. EPA upon request.

SOLID WASTE MANAGEMENT RELEASES TABLE

Map I
Naval Weapons Support Center General SWMU Location Map

SWMU ID Number	SWMU Name
02/10	Ammunition Burning Grounds (ABG)
10/15	Rockeye
06/09	Demolition Area (Demo Area)
07/09	Old Rifle Range
03/11	Dye Burial Grounds (DBG)
04/03	Pesticide Control Area / A-150 Tank
05/03	Old Burning Pit
09/02	McComish Gorge
01/14	Mustard Gas Burial Grounds
11/00	Old Storage Building 225
08/17	Load and Fill Area, Building 106 Pond
12/14	Mine Fill A
13/14	Mine Fill B
14/00	Sanitary Landfill / Lithium Battery
15/16	Roads & Grounds Area
16/16	Cast High Explosives Fill / Incinerator
17/09	PCB Capacitor Burial / Pole Yard
18/13	Load and Fill Area Building 5
19/00	Pyrotechnic Test Area
20/00	CAAA QA/QE Test Area
21/00	DRMO Storage Lot
22/00	Lead Azide
23/00	Battery Shop
24/00	Sludge Drying Beds A & B
25/07D	Highway 58 Dump Site A
26/08D	Highway 58 Dump Site B
27/00	Illuminant Building 116
28/00	Maintenance Shop, Building 1820
29/07	PCP Dip Tank, Building 3
30/00	Lead Farm





3.0 RELEASES FROM CURRENT SOLID WASTE MANAGEMENT UNITS OPERATIONS

SOLID WASTE MANAGEMENT UNIT	DATE OF RELEASE	TYPE OF WASTE RELEASED	QUANITY/VOLUME OF WASTE RELEASED	DESCRIBE NATURE OF RELEASE	COMMENTS
Wastewater Treat- ment Units Bldg. 3044 *	July 14, 1982	Pink Water K047 TNT Concentration 40-50 PPM	2600-3000 gallons gallons	Outside holding sump for treatment unit overflowed.	Approximately 2600 [illegible] of the spill was co[illegible] & collected, remain[illegible] into Sulphur Creek [illegible] to 1 PPM).
Wastewater Treat- ment Units Bldg. 3044 *	May 31, 1983	Pink Water -K047 TNT Concentration 40-50 PPM	5500 gallons	Outside holding sump for treatment unit overflowed.	Contained/collected [illegible] gallons. Lost into Sulphur Creek 3000 [illegible] results showed signi[illegible] diluted by time it r[illegible] creek.
Wastewater Treat- ment Units Bldg. 3044 *	July 6, 1983	Pink Water -K047 TNT Concentration 40-50 PPM	4000-5000 gallons	Outside holding sump for treatment unit overflowed.	To reduce effects of diluted with 120,00[illegible] of water. Designing containment structu[illegible] area.
Wastewater Treat- ment Units Bldg. 3044 *	December 19,1984	Pink Water -K047 TNT Concentration 40-50 PPM	100-200 gallons	Smaller holding sump for production building overflowed.	Entire amount was c[illegible] appeared no surface [illegible] were affected.
Waste Pile Ammunition Burning Grounds (1)	Continuous	Heavy metal contaminated ash from open burning.	Unknown	Pile was not covered ash was carried off by wind dispersion & surface water runoff.	
Waste Treatment Unit Open Burning Ammunition Burn- ing Ground (1)	Continuous	Heavy metal contaminated ash from open burning.	Unknown	Ash removed each day - safety requires that ash must cool before being removed from pads. Wind dispersion & surface water runoff can carry it off.	Have requested fun[illegible] recontour burning [illegible] control surface wa[illegible] & runoff.

SOLID WASTE MGT. UNITS *(1)	DESCRIPTION OF WASTE - TREATED - STORED - DISPOSED	HAZARDOUS WASTE	HAZARDOUS CONSTITUENTS	CAPACITY	DIMENSIONS	VOLUMES OF WASTE DISPOSED OF	COMMENTS
Storage Tank (Underground) Ammunition Burning Grounds	Collection tank for red phosphorus contaminated water from surface impoundment used to dewater red phosphorus sludges.	No	No	12,000 Gallons	-	Estimated 2.9 million gallons/year	Started using 1[illegible] Water stored le[illegible] than 90 days.
Waste Treatment Unit *(2) Ammunition Burning Grounds	Thermal treatment of waste explosives, explosives cont. waste, waste pyrotechnics, pyrotechnics cont. waste & propellants.	D003 K045	Yes	-	40 Acres	1981-2461 Tons 1982-2307 Tons 1983-3770 Tons 1984-1783 Tons	Started in 1940'
Waste Treatment Unit *(2) Demolition Range	Open detonation of explosive, pyrotechnic loaded, unsafe & waste munitions.	D003 P009	Yes	-	Estimated 40-60 Acres	1981-3600 Tons 1982- 403 Tons 1983- 273 Tons 1984- 409 Tons	Started in 1940
Waste Treatment Unit *(2) Rifle Range *(3)	Thermal treatment of ammonium picrate, ammonium picrate loaded rounds & explosives cont. materials.	D003 P009	Yes	-	10 Acres	1981- 240 Tons 1982- 7 Tons 1983- 20 Tons 1984- 23 Tons	
Sanitary Landfill Leachate Collection Ponds *(2)	Any leachate generated in landfill cells drain to these 2 collection ponds.	No	No	Estimate 30,000 gallons	1/4 Acre	As leachate collects it is pump[illegible] from holding ponds into sanitar[illegible] sewer for treatment at Sewage Treatment Plant.	

NOTES: *(1) Past practices pertaining to these units are identified in Section III, Appendix I.
*(2) Discharge points associated with these solid waste management units are covered by NPDES Permit# IN0021539.
*(3) The Rifle Range is located within the boundaries of the Demolition Range.

The following location map shows location of each current Solid Waste Mgt. Unit.

SOLID WASTE MGT. UNITS *(1)	DESCRIPTION OF WASTE TREATED -	HAZARDOUS WASTE	HAZARDOUS CONSTITUENTS	CAPACITY	DIMENSIONS	VOLUME OF WASTE DISPOSED OF	[illegible]
Storage Tank (underground) Bldg. 1820	Waste Oil	No	No	500 gallons	-	Used for temporary storage of waste oil to moving it to underground tank or Bl or to boilers for use as fuel.	
Storage Tank (underground) Ammunition Burning Grounds	Collection tank for pink water from surface impoundments used to dewater explosive sludges.	Yes K047	No	25,000 gallons	-	Estimated 5.8 million gallons/yr.	Started using 12/83 - Water stored less tha 90 days.
Wastewater Treatment Unit Bldg. 160 *(2)	Treatment of pink water with activated carbon	K047 Yes	No	14,400 gallons/day	-	Have treated 30,000-40,000 gallons of water in past 4 years	Plant constructed in
Wastewater Treatment Unit Bldg. 3044 *(2)	Treatment of pink water using activated carbon.	K047 Yes	No	57,000 gallons/day	-	1981-1.3 M gal. 1982-2.2 M gal. 1983-11.7 M gal. 1984-6.8 M gal.	Plant started operati in 1978.
Wastewater Treatment Unit Bldg. 136 *(2)	Treatment of wastewater cont. with lead based initiating compounds.	K046	Yes	6,700 gallons/day	-	Unit has been used very little since built.	Plant constructed in
Wastewater Treatment Unit Bldg. 3064 *(2)	Pretreatment facility for plating shop.	Yes	Yes	17,000 gallons/day	-	-	Been in operation si 1979.
Wastewater Treatment Unit Bldg. 3049 *(2)	Sewage Treatment Plant - tertiary treatment provided by rotating biological contractors.	No	No	1.2 M gal./day	-	Average .03 M gal/day	Plant built in 1978.

SECTION II
1.0 EXISTING SOLID WASTE MANAGEMENT UNITS
AT
NAVAL WEAPONS SUPPORT CENTER CRANE

SOLID WASTE MGT. UNITS *(1)	DESCRIPTION OF WASTE TREATED - STORED - DISPOSED	HAZARDOUS WASTE	HAZARDOUS CONSTITUENTS	CAPACITY	DIMENSIONS	VOLUME OF WASTE DISPOSED OF	COMMENTS
Sanitary Landfill (Operating Permit #51-2)	Trash demolition - construction debris asbestos	No	No	4.2 million yd^3	65 Acres	1000 yd^3/day	Started operation in 197 1976 - Bldg. 225 Fire debris sent to landfill. See Sec. III, Apendix A
Solidfill Sites -3	Demolition/construction debris	No	No	10,400 yd^3	4 Acres	10 yd^3/day	
Classified Material Incinerator	Classified papers and documents	No	No	975 lbs./hr.	-	Average 80-100 ton/yr.	Built in 1962. Registered with Indiana as an air source.
Land Farm	Land application of sludge from tertiary sewage treatment plant (aerobic digestor)	No	No	Applied along approximately 18 miles of roadside	-	40,000 gallons/ month	Start land application liquid sludge from tert plant in 1980.
Storage Tank (above ground) Bldg. 2801	Waste Oil	No	No	5,000 gallons	-	Estimate 4,000-6,000 gallons/year	Waste oil is either sol or used for boiler fuel
Storage Tank (underground) Bldg. 1818	Waste Oil	No	No	(2) 500 gallon	-	Used for temporary storage of waste oil prior to moving it to underground tank Bldg. 2801 or to boilers for use as fue	

SOLID WASTE MANAGEMENT UNIT	DATE OF RELEASE	TYPE OF WASTE RELEASED	QUANITY/VOLUME OF WASTE RELEASED	DESCRIBE NATURE OF RELEASE	COMMENTS
Waste Treatment Unit Demolition Range (2)	Continuous	Residue from detonation - heavy metal/ possible explosive	Unknown	No surface runon/runoff controls - Any runoff could carry contamination.	
Land Farm	Each time it rains.	Sludge	Unknown	The aerobic digested sludge is applied along 18 miles of highways. If a hard rain occurs right after application some could be carried by surface water runoff. To date analysis has indicated it is non-hazardous.	

* See Appendix A of Section 3 for past history and see Site 10 Groundwater Analyses in Appendix E

NOTES: (1) An instream sampling point has been established downstream in Little Sulphur Creek from Ammunition Burning Grounds. This sampling point is covered by NPDES Permit# IN0021539.

(2) Runoff from the Demolition Range is collected by 3 soil sedimentation ponds. The discharge points from these 3 ponds are covered by NPDES Permit# IN0021539.

LOCATION MAP

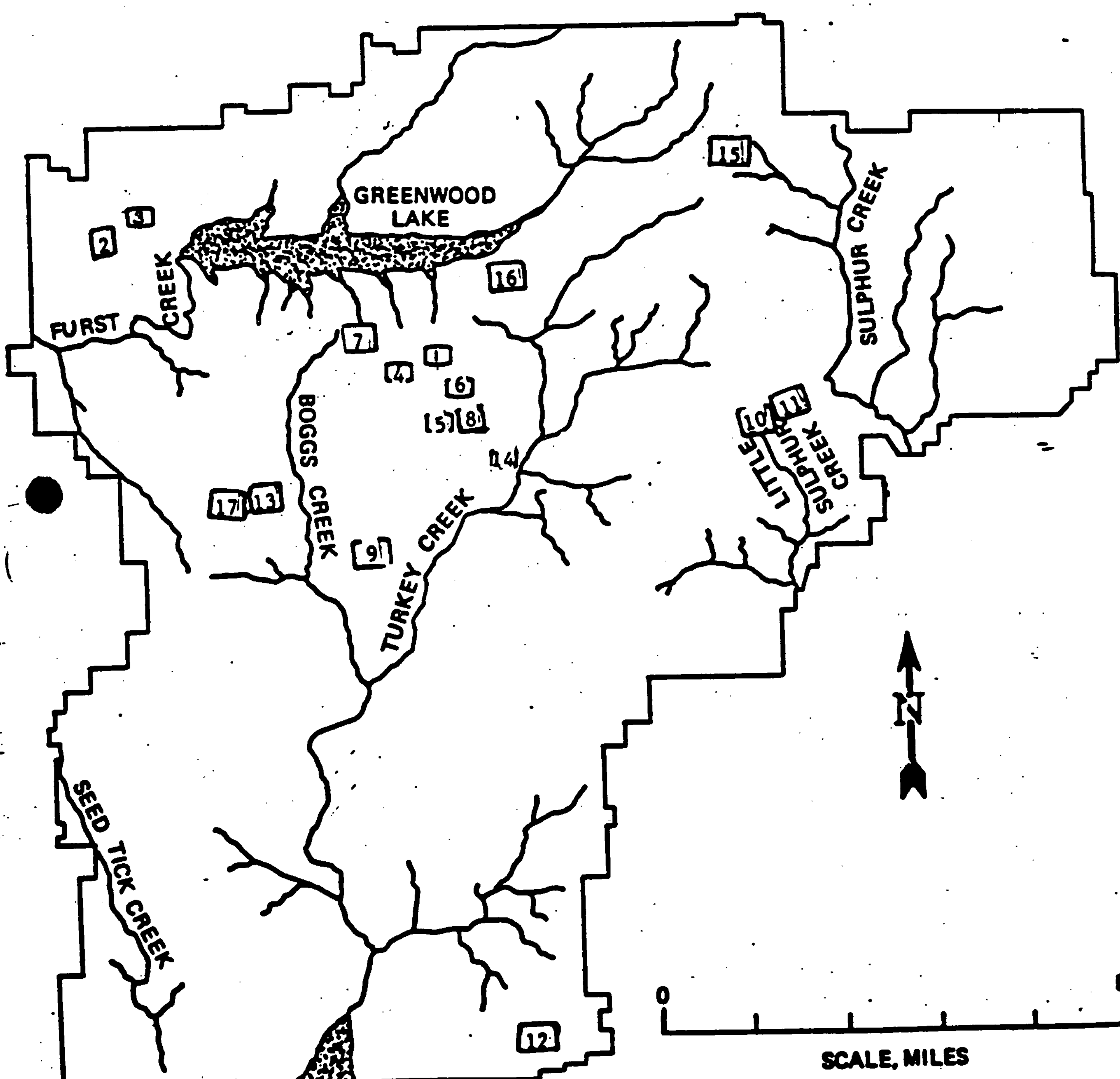
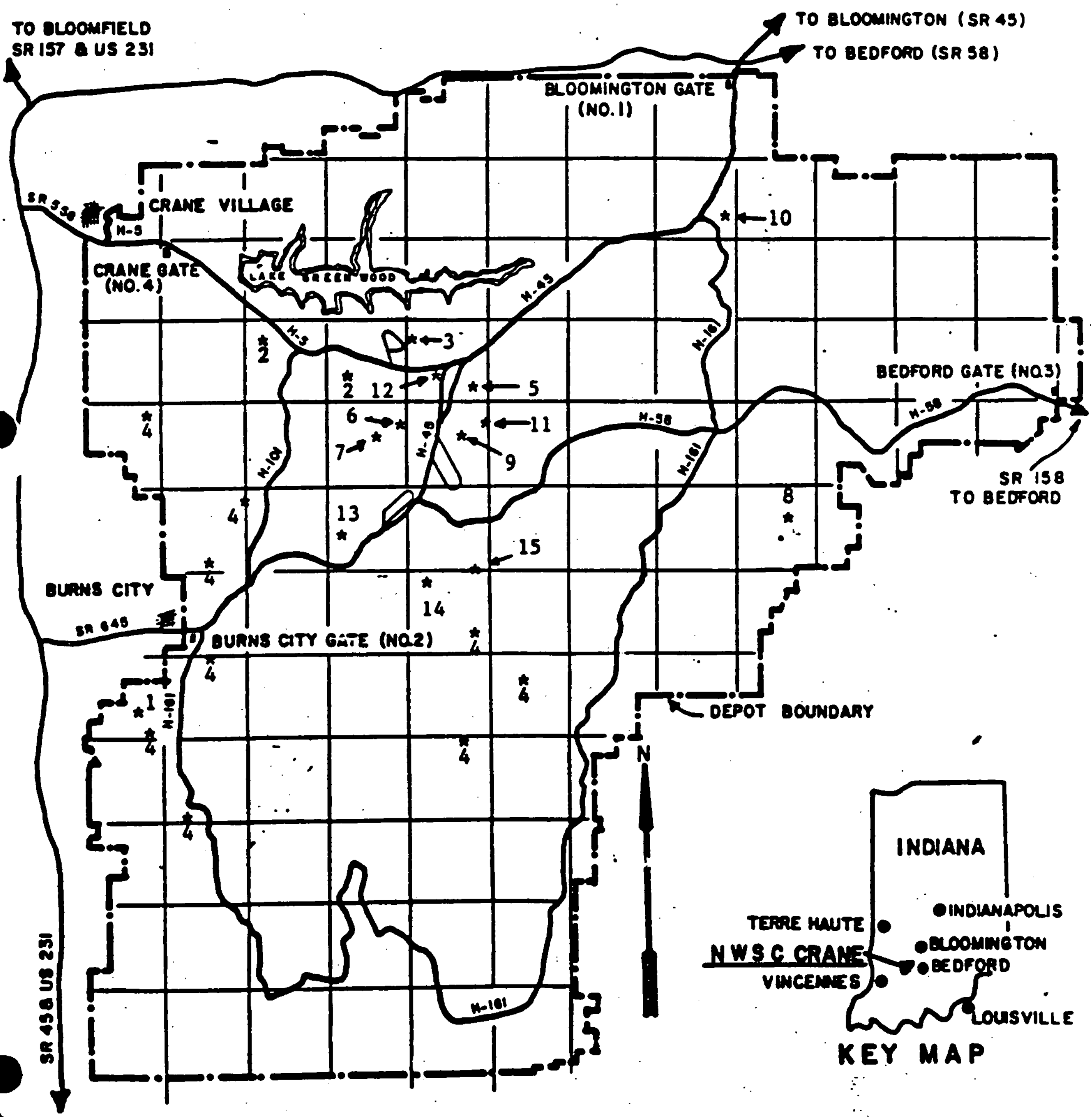


Figure 2.1-1 Locations of Suspected Contamination Sites at NWSC. Site numbers are identified in table 4.1-1 and described in the text.

2.0 LOCATION MAP EXISTING SOLID WASTE MANAGEMENT UNITS AT NAVAL WEAPONS SUPPORT CENTER CRANE

Sites:

1. Sanitary Landfill - Leachate Collection Ponds
2. Solidfill Sites
3. Classified Material Incinerator
4. Land Farm Areas
5. Building 2801 Aboveground Storage Tank
6. Building 1818 Underground Storage Tank
7. Building 1820 Underground Storage Tank
8. Ammunition Burning Ground:
   a. Two Underground Storage Tanks
   b. Waste Treatment Unit - Open Burning
9. Building 160 - Wastewater Treatment Unit
10. Building 3044 - Wastewater Treatment Unit
11. Building 136 - Wastewater Treatment Unit
12. Building 3064 - Wastewater Treatment Unit
13. Building 3049 - Wastewater Treatment Unit
14. Demolition Range - Waste Treatment Unit - Open Detonation
15. Rifle Range - Waste Treatment Unit - Open Burning



LOCATION PLAN

SCALE = GRID LINES FORM MILE SQUARES

SECTION 4. RECOMMENDATIONS

4.1 GENERAL

Based upon the findings and conclusions of this report, the NACIP team recommended a Confirmation Study be conducted at 14 sites located at NWSC and a general monitoring of surface waters at base boundaries. The team judged these 14 sites met the criteria to warrant a Confirmation Study. The evidence at sites 4, 7, and 8 did not warrant a Confirmation Study, therefore, no follow-up action is recommended at these sites. In addition, the NACIP team recommended a general monitoring program be established to monitor surface water flowing off the Center. The Confirmation Study, Phase II of the NACIP Program, is designed to confirm or deny the presence of contaminants at the 14 sites identified by the team. The suspected contaminated sites and recommendations are summarized in table 4.1-1. The general monitoring recommendation is discussed in section 4.2.1.

The recommendations presented in this section are intended to be used as a guide to develop and implement the confirmation study phase. Wherever possible, the recommendations include approximate number of samples to be taken, types of samples to be taken such as soil, water, or sediment, number of wells to be drilled, and specific pollutants to be analyzed. Individual tests could not characterize the suspected contaminants because of the variety of materials dumped at certain locations. Therefore, a screening procedure is recommended at these sites to determine the specific pollutant.

Screening may be accomplished by sampling and analyzing the four general categories of groundwater contamination established by EPA in the Hazardous Waste Regulations (40 CFR 265). The four tests are pH, specific conductance, total organic carbon, and total organic halogen. Well-water samples collected upgradient and downgradient from the dump site will be tested for these four general categories. The results of the comparison of these tests will lead to other specific analytical tests, if groundwater contamination is shown.

Several sites were recommended for testing according to the Environmental Protection Agency extraction procedure toxicity test. This test indicates the potential leachability of a hazardous material to the environment. The test and test procedures are listed in 40 CFR 260 and 261. The test parameters are arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, endrin, lindane, methoxychlor, toxaphene, 2,4-D, and 2,4,5-TP silvex.

As indicated in section 1.7, NWSC Crane reports that a Confirmation Study is underway at sites 1, 2, 3, 5, 8, 9, 10, 11, 12, 15, and 17 and that over eighty groundwater monitoring wells have been installed at sites 2, 3, 9, 10, 11, and 12.

4.2 SURFACE WATERS DRAINAGE WAYS

4.2.1 General

Five major creeks drain the surface water from NWSC to the surrounding community. These creeks are Furst Creek, Boggs Creek, Little Sulfur Creek, Sulfur Creek, and Seedtick Creek. The NACIP team concluded that any pollutant

Table 4.1-1 Summary of Recommendations

No.	Site	Map Coordinates	Drill Wells	Sample: Water	Sediment	Soil	Test*	Remarks	CSRM** Score
1	Battery Shop (Bldg. 36)	T-24			X	X	Lead		26
2	McComish Gorge Dump	M-6	X	X			pH, spec. Cond. TOC, TOH	Test for groundwater contamination indicators, further analysis may be necessary.	3
3	Burning Pit Dump	L-9	X	X			pH, spec. Cond. TOC, TOH	Test for groundwater contamination indicators.	12
4	PCB Burial (Pole Yard)							No further action at this site.	0
5	Pesticide Shop (Bldg. 2189)	Y-24				X	Endrin, Lindane, Methoxychlor, Toxaphone, 2,4-D, Silvex		4
6	Roads and Grounds Dump and Washrack	W-26			X	X	EP Toxcity Test		4
7	PCP Dip Tank	R-21						No further action at this site.	0
8	Loading (Bldg. 136)	W-26						No further action at this site.	0
9	High Explosive Demolition Area	MM-22	X	X			pH, Spec. Cond. TOC TOH, RDX, HMX, Ammonium picrate	Test for groundwater contamination indicator and ordnance materials.	19
10	Ordnance Burning Ground	BB-45	X	X			pH, spec. Cond. TOC, TOH, TNT, RDX, HMX, Ammonium picrate	Test for groundwater contamination indicator and ordnance materials.	21

*Test methods selected from EPA-approved test methods (EPA methods, ASTM methods, and Standard methods).
Test for groundwater contamination indicators listed in 40CFR265.
**Confirmation Study Ranking Model (CSRM)--see section 1.5 for explanation.

Table 4.1-1 Summary of Recommendations (Contd.)

No.	Site	Map Coordinates	Drill Wells	Sample Water	Sample Sediment	Sample Soil	Test*	Remarks	CSRM** Score
11	Dye Burial Ground	Z-47	X				pH, spec. Cond. TOC, TOH, color		15
12	Chemical Burial Ground	FFF-29	X	X			mustard agent thorium		13
13	Load and fill area (Bldg. 104)	EE-17				X	mercury, cadium, chromium, RDX, TNT		13
14	Mine fill A Mine fill B	Z-25 BB-22				X	RDX TNT		9
15	ROCKEYE	K-42	X	X			RDX, TNT		
16	Cast and fill pond (Bldg. 146)	Q-31			X		RDX, TNT, chromium, cadmium, ammonium picrate, lead, and mercury		12
17	Load and fill pond (B-106)	EE-13			X		mercury chromium phosphorus TCE		14

*Test methods selected from EPA-approved test methods (EPA methods, ASTM methods, and Standard methods).
Test for groundwater contamination indicators listed in 40CFR265.
**Confirmation Study Ranking Model (CSRM)--see section 1.5 for explanation.

exiting the base boundaries through surface waters would follow one of these major drainage ways. It is recommended that the established monitoring program be continued at these locations.

4.3 NON-ORDNANCE SITES

4.3.1 Site 1, Battery Shop, Building 36

Test for: lead

Sample locations: at the discharge site at the bank top, on the bank below discharge site, and in the drainageway.

Type of Sample: surface soil sample and soil sample collected at 1/2-meter depth at each location.

Number of Samples: approximately 6.

Frequency: One time only.

Remarks: The sampling and analysis should determine if lead salts are migrating toward Lake Greenwood, the source of drinking water for NWSC. If results of sampling and analysis are negative, no further action is required.

4.3.2 Site 2, McComish Gorge

Monitoring Wells: Drill five wells around the dump site. Locations of the wells will be determined by a hydrogeologist.

Test for: pH, specific conductance, total organic carbon, and total organic halogen.

Type of Samples: groundwater.

Number of Samples: 12 samples from each well.

Frequency: monthly from each well for one year or quarterly for three years.

Remarks: Compare the upgradient test results to downgradient test results for well-water analysis to determine if contamination exists. Results from the screening test may indicate further analysis is necessary.

4.3.3 Site 3, Burning Pit

Monitoring Wells: Drill five groundwater-monitoring wells around the dump site. Locations of the wells will be determined by a hydrogeologist.

Test for: the groundwater contamination indicators: pH, specific conductance, total organic carbon, and total organic halogen.

Type of Samples: groundwater.

Number of Samples: 12 samples from each well.

Frequency of Sampling: monthly from each well for one year or quarterly for three years.

Remarks: Compare the upgradient and downgradient groundwater contamination indicators to determine if contamination exists. Results from the screening test may indicate further testing is required.

4.3.4 Site 4, PCB Burial Site (Pole Yard)

Remarks: Properly mark site on general development map. No other action recommended for this site.

4.3.5 Site 5, Pesticide Shop, Building 2189

Test for: pesticides: Endrin, Lindane, Methoxychlor, Toxaphene, 2,4-D and Silvex.

Sample locations: downgradient from washrack at four locations.

Type of Samples: surface soil sample and soil sample collected at 1/2-meter depth at each location.

Number of Samples: 8

Frequency: one-time sampling.

Remarks: The sampling and analysis at this location is designed to determine if pesticides are present because pesticide tanks were rinsed at this location.

4.3.6 Site 6, Roads and Grounds Area

Test for EP toxicity test, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, endrin, lindane, methoxychlor, toxaphene, 2,4-D, Silvex.

Sample locations: bottom of hill (downside of dump) and 100 yards downstream from dump.

Type of Samples: soil and sediment.

Number of Samples: one sample at each location (4).

Frequency: one-time sampling.

Remarks: Sampling and analysis may indicate further investigation is required.

4.3.7 Site 7, PCP Dip Tank

Remarks: No further action required at this site.

4.4 ORDNANCE SITES

4.4.1 Site 8, Loading EAD Area, Building 136

Remarks: No further action required at this site.

4.4.2 Site 9, Demolition Area (High Explosives)

Monitoring Wells: Drill 7 to 10 monitoring wells about 50 feet deep downslope on the Turkey Creek side and on the Boggs Creek side of the demolition area. The exact locations of the wells will be determined by a hydrogeologist.

Test for: (1) ordnance compounds: TNT, RDX, HMX, and ammonium picrate and (2) groundwater contamination indicators, pH, specific conductance, TOC, and TOH.

Sample locations: test wells, pond 333, and drainageways from demo area.

Type of Samples: grab groundwater and surface water samples.

Number of Samples: 4 from each well, 4 from the pond, and 4 from each drainageway.

Frequency of Sampling: one sample from each location quarterly for one year.

Remarks: Compare upgradient and downgradient groundwater contamination indicators to determine if contamination exist. Further testing may be required.

4.4.3 Site 10, Ordnance Burning Grounds

Monitoring Wells: Drill five wells to 50 feet deep. Place two wells on either side of the creek that runs through the burning grounds. Locate the fifth well upslope of the area. The exact locations of the wells will be determined by a hydrogeologist.

Test for: (1) the groundwater contaminations indicators: pH, specific conductance, total organic carbon, and total organic halogen and (2) ordnance compounds: TNT, RDX, HMX, and ammonium picrate.

Sample Type: groundwater.

Sample Locations: monitoring wells.

Number of Samples: twelve samples from each well.

Sample Frequency: one sample from each well monthly for one year or quarterly for three years.

Remarks: Compare groundwater contamination indicators for contamination. Results from the screening test may indicate further testing is required.

4.4.4 Site 11, Dye Burial Grounds

Monitoring Wells: Drill six monitoring wells. Two of the wells should be in bedrock (about 100 feet). The exact locations and depths of the wells will be determined by a hydrogeologist.

Test for: (1) the groundwater contamination indicators: pH, specific conductance, total organic carbor, and total organic halogen and (2) color (see remarks).

Type of Samples: groundwater, grab.

Number of Samples: 12 samples from each well.

Frequency: one sample from each well monthly for one year or quarterly for three years.

Remarks: Compare the upgradient and downgradient groundwater contaminant indicator to determine if contamination exists. Results from the screening test may indicate further testing is necessary. Contact the Ordnance Environmental Support Office (OESO) for sampling and analysis procedures, concerning color. The color test may be a good screening method to determine if dyes are migrating from the site.

4.4.5 Site 12, Chemical Burial Grounds

Monitoring Wells: Drill six monitoring wells. The exact locations and depth of the wells will be determined by a hydrogeologist.

Test for: mustard agent and thorium.

Type of Samples: groundwater, grab samples.

Number of Samples: 4 samples from each well.

Frequency: one sample from each well quarterly for one year.

Remarks: The Radiological Affairs Support Office (RASO) of NEESA (113) will provide guidance, review, and instructions for sampling thorium. The Ordnance Environmental Support Office (OESO) at NOS Indian Head can provide mustard agent sampling and testing procedures.

4.4.6 Site 13, Load and Fill Area, Buildings 104, 105, 198, and 200

Test for: mercury, cadmium, chromium, RDX, and TNT.

Sample locations: Collect samples around Building 104.

Type of Samples: soil core down to 1/2-meter depth.

Number of Samples: up to 40 total.

Frequency: one-time only.

Remarks: Building 104 was selected as the most likely of the four buildings to have significant pollutants in the drainageway. If the test results show that significant pollutants are not migrating from this site, do not sample other buildings. If results of analysis show significant migration, sample and analyze discharges from Buildings 105, 198, and 200.

4.4.7 Site 14, Mine Fill A, Buildings 153 and 158, and Mine Fill B, Buildings 167 and 172

Test for: RDX and TNT.

Sample locations: Collect 4 samples around each building.

Type Sample: core soil sample down to 1/2-meter depth.

Number of Samples: 16.

Frequency: one-time sampling.

Remarks: One-time sampling and analysis should show if contamination exists.

4.4.8 Site 15, ROCKEYE

Monitoring Wells: Drill two shallow monitoring wells (less than 50 feet) downstream for the ROCKEYE north discharge, near Building 1569, where the discharge sometimes enters the ground. The exact locations and depths of the wells will be determined by a hydrogeologist.

Test for: RDX and TNT.

Type of Samples: groundwater and surface water.

Sample locations: monitoring wells and downstream from discharge site and at Sulfur Creek.

Number of Samples: Groundwater: 24. Surface water: 24.

Frequency: Sample each well quarterly for three years. Sample the surface water quarter for three years.

4.4.9 Site 16, Cast High Explosives Fill, Building 146

Test for: RDX, ammonium picrate, chromium, cadmium, TNT, lead, and mercury.

Type of Samples: surface soil and surface water samples.

Sample locations: in drainageway and at discharge site.

Number of Samples: 2 soil samples, and 8 surface water.

Frequency: Collect surface water samples at each location quarterly for one year. Soil samples taken one-time only.

Remarks: Analysis should reveal if contamination exists.

4.4.10 Site 17, Load and Fill Area, Building 106

Test for: mercury, chromium, phosphorus, and trichloroethylene.

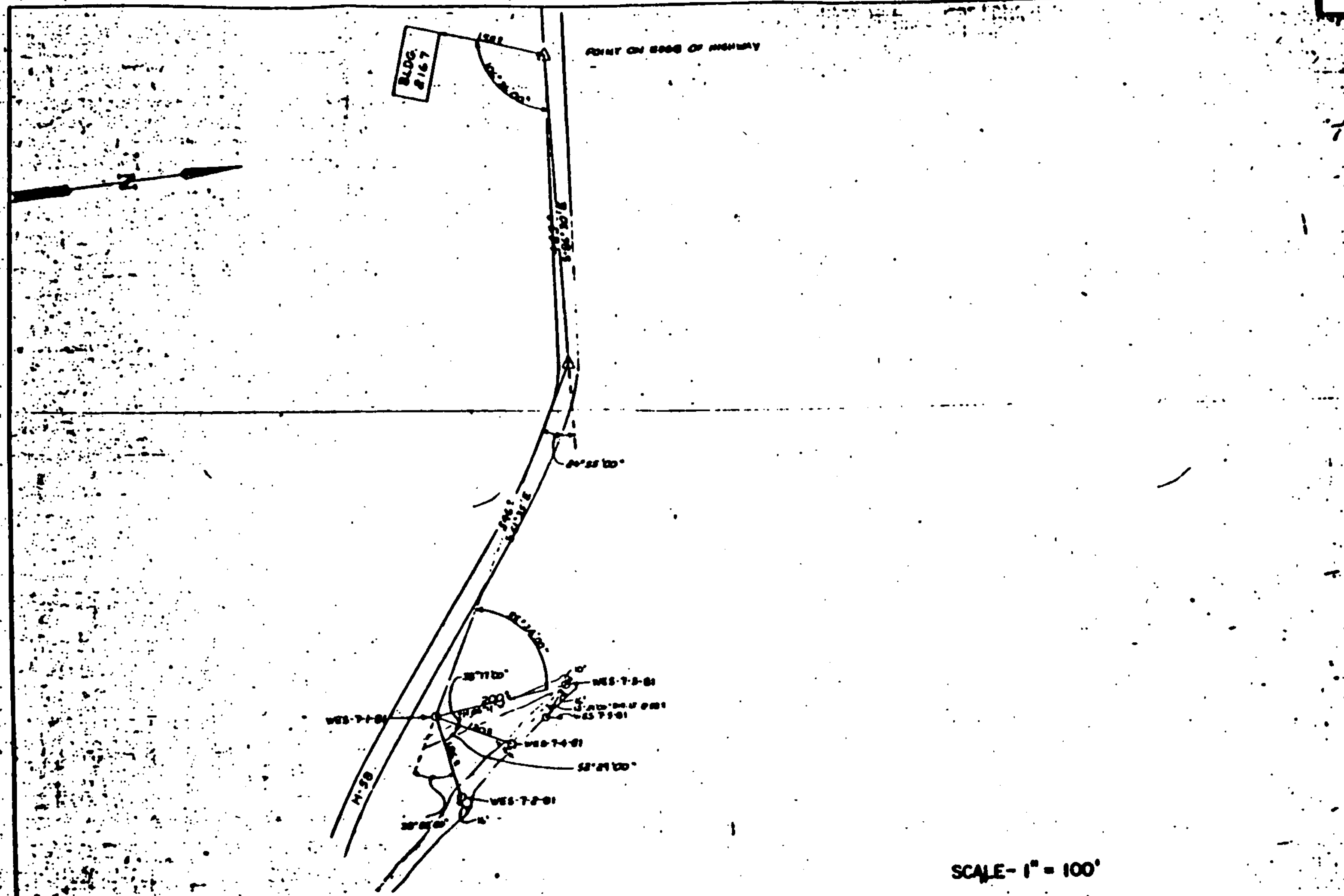
Type of Sample: sediment (on pond bottom).

Sample location: At bottom of pond (sediment), collect two samples—one at top 3 to 4 inches and one at 1/2-meter depth.

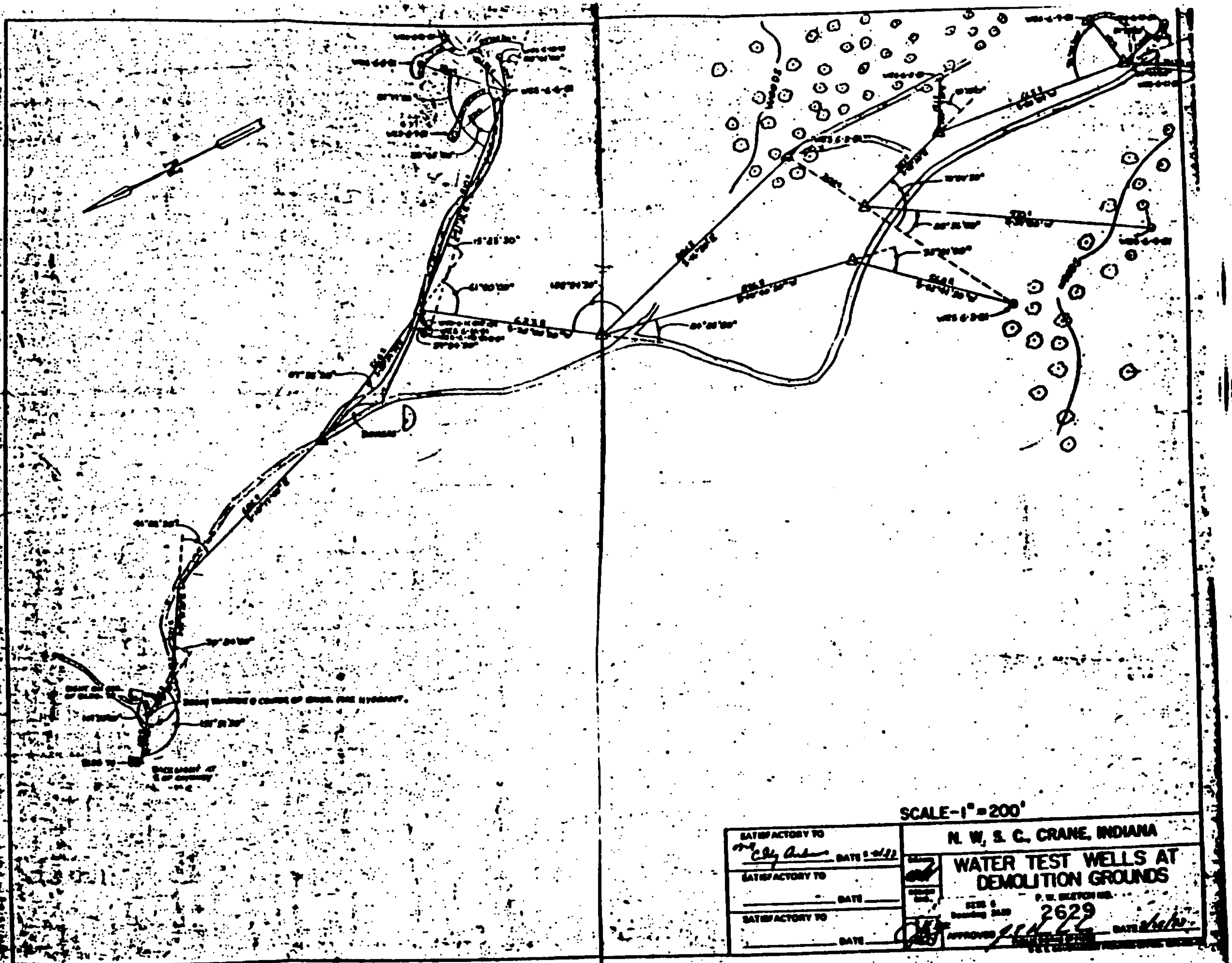
Number of Samples: 2.

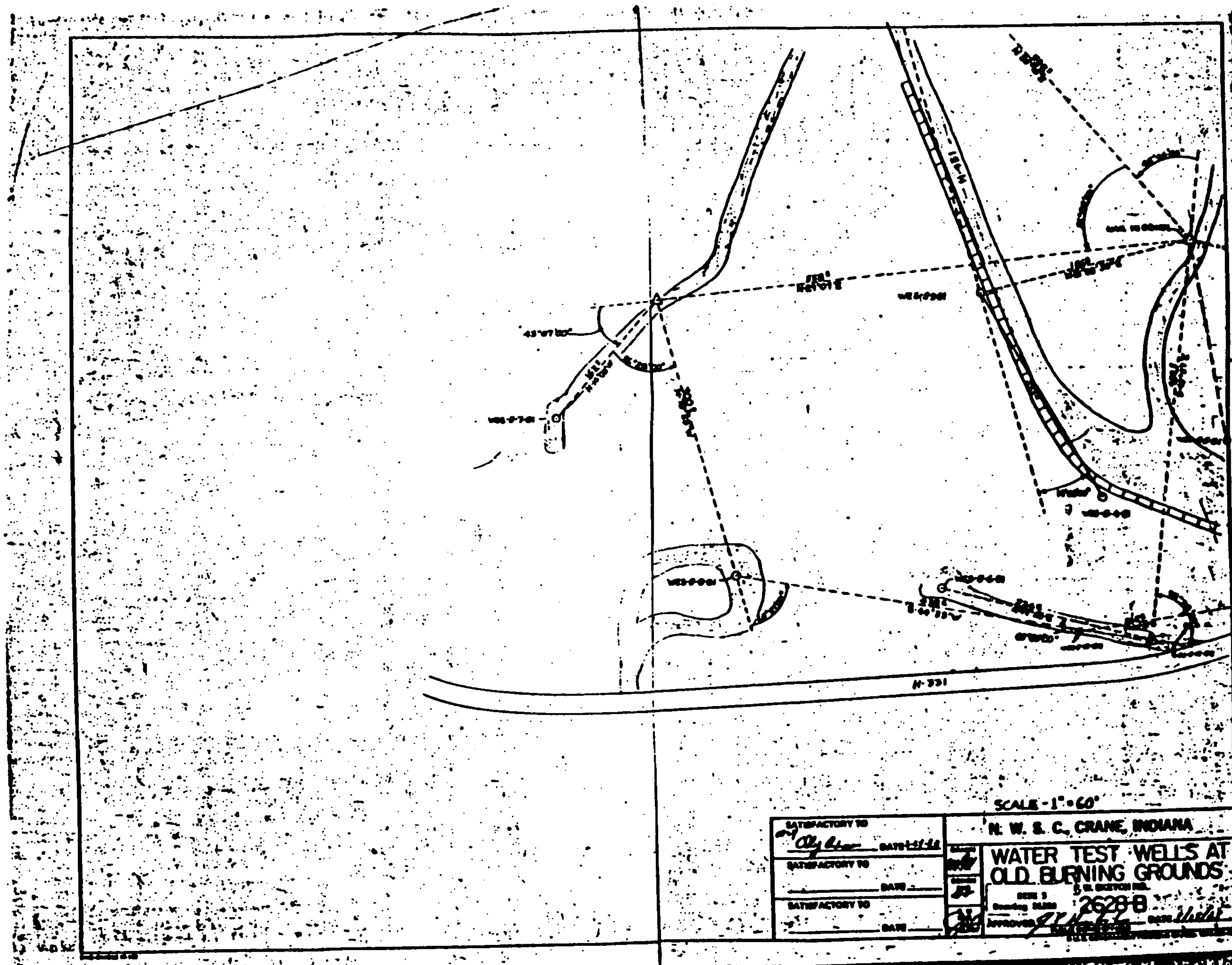
Frequency: one-time sampling.

SWMU MONITORING WELL LOCATIONS

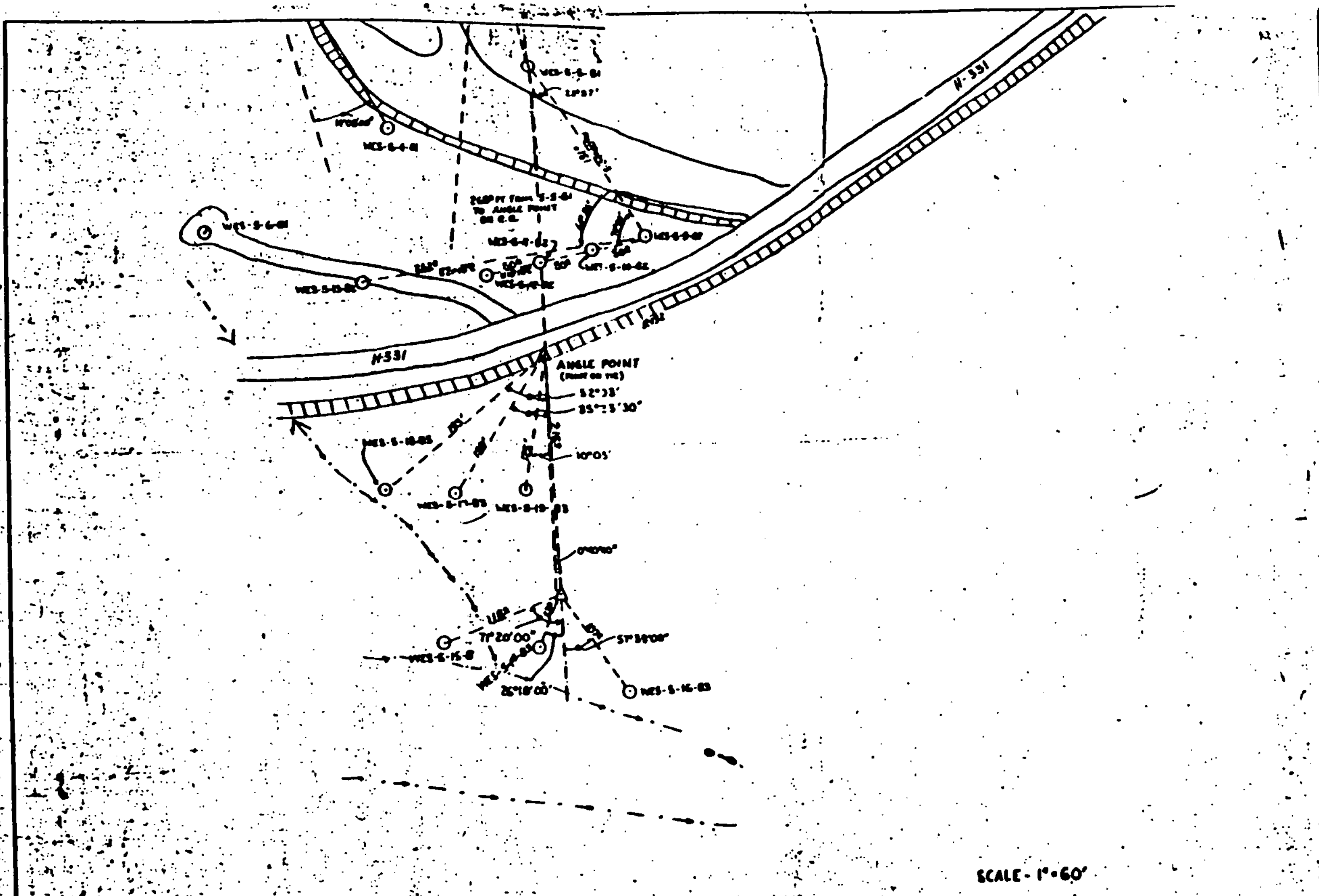


SATISFACTORY TO	N. W. S. C., CRANE, INDIANA
SATISFACTORY TO ______ DATE ______	WATER TEST WELLS ON H-58, SOUTH OF BLDG 2167
SATISFACTORY TO ______ DATE ______	P. W. SKETCH NO. 2630
	APPROVED ______ DATE ______


SCALE-1" = 200'
N. W. S. C., CRANE, INDIANA
WATER TEST WELLS AT DEMOLITION GROUNDS
P. W. SKETCH NO.
2629
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
APPROVED
DATE

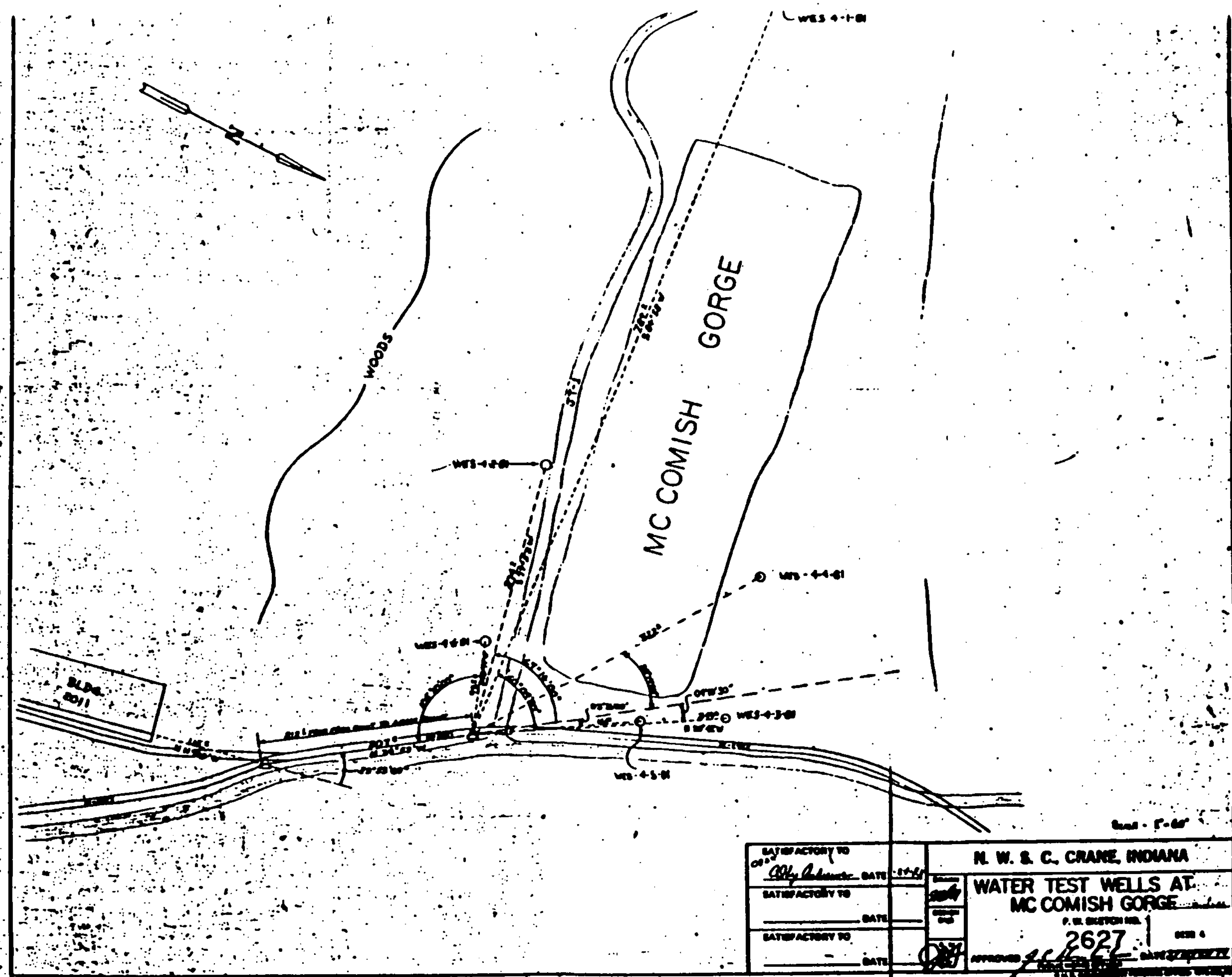


H-331
SCALE - 1" = 60'
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
N. W. S. C., CRANE, INDIANA
WATER TEST WELLS AT
OLD BURNING GROUNDS
2628-B
APPROVED
DATE

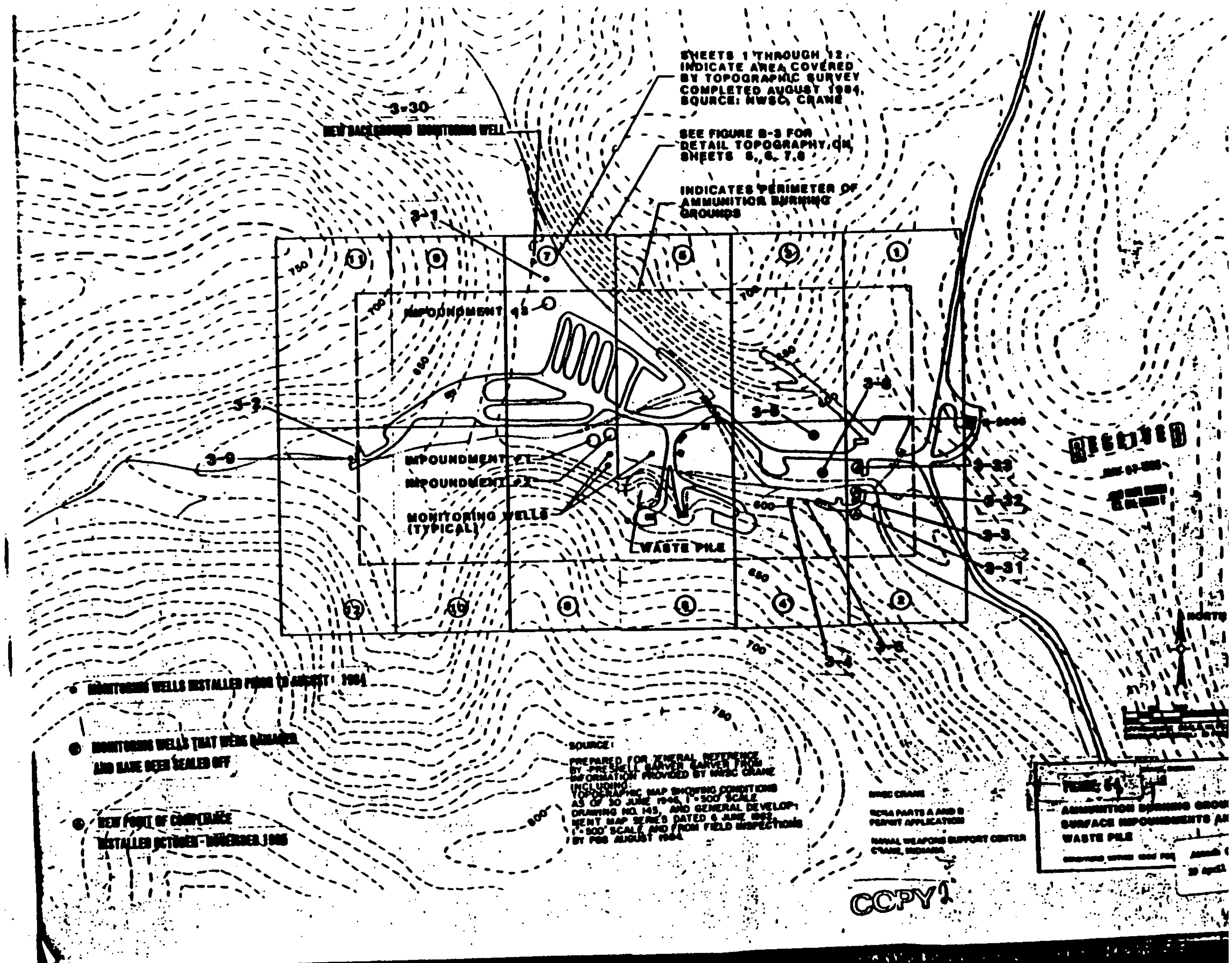


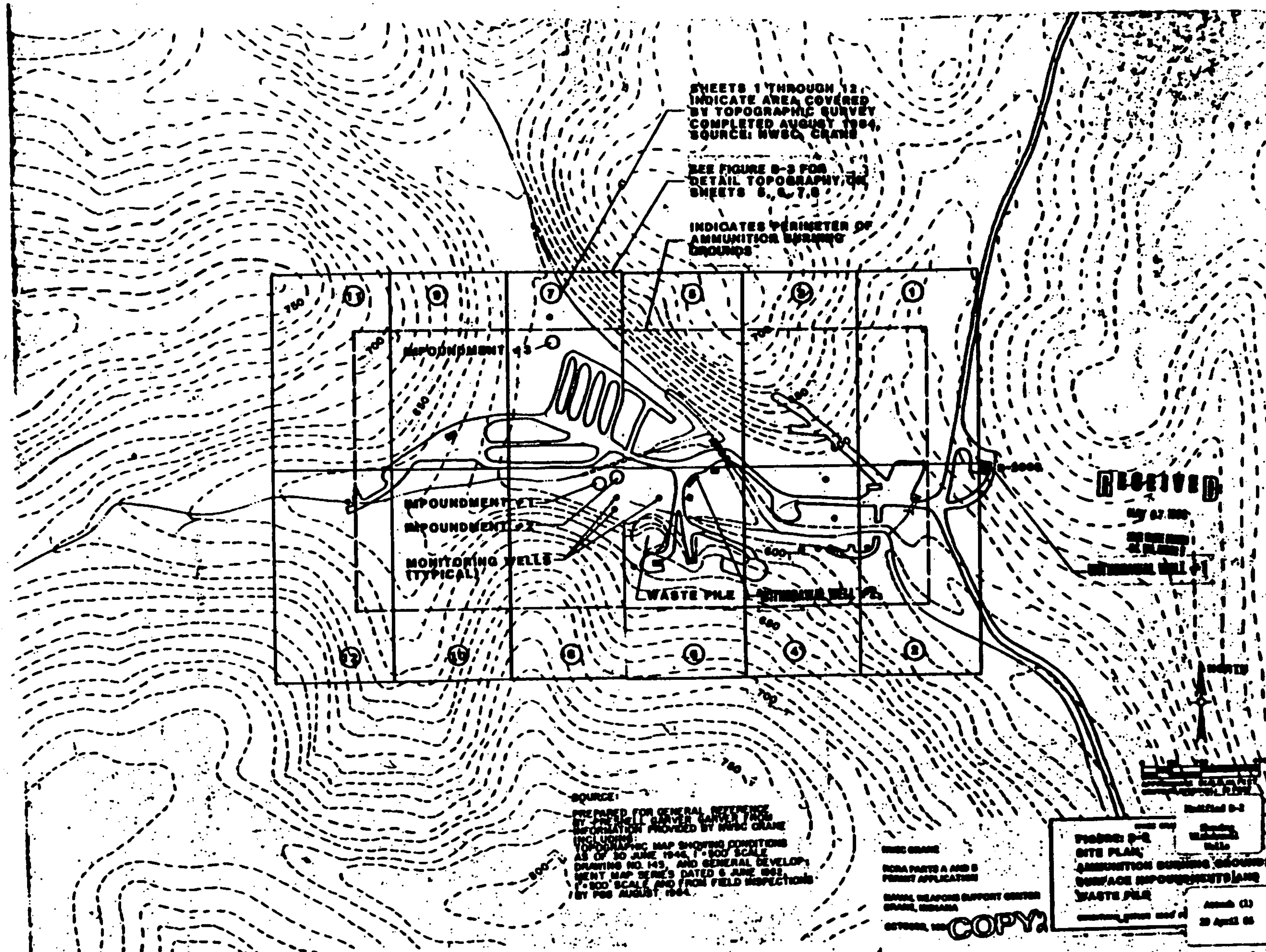
SCALE - 1" = 60'

SATISFACTORY TO ________ DATE ________	N. W. S. C., CRANE, INDIANA
SATISFACTORY TO ________ DATE ________	WATER TEST WELLS AT OLD BURNING GROUNDS
SATISFACTORY TO ________ DATE ________	P. W. SKETCH NO. 2628-C
	APPROVED ________ DATE ________

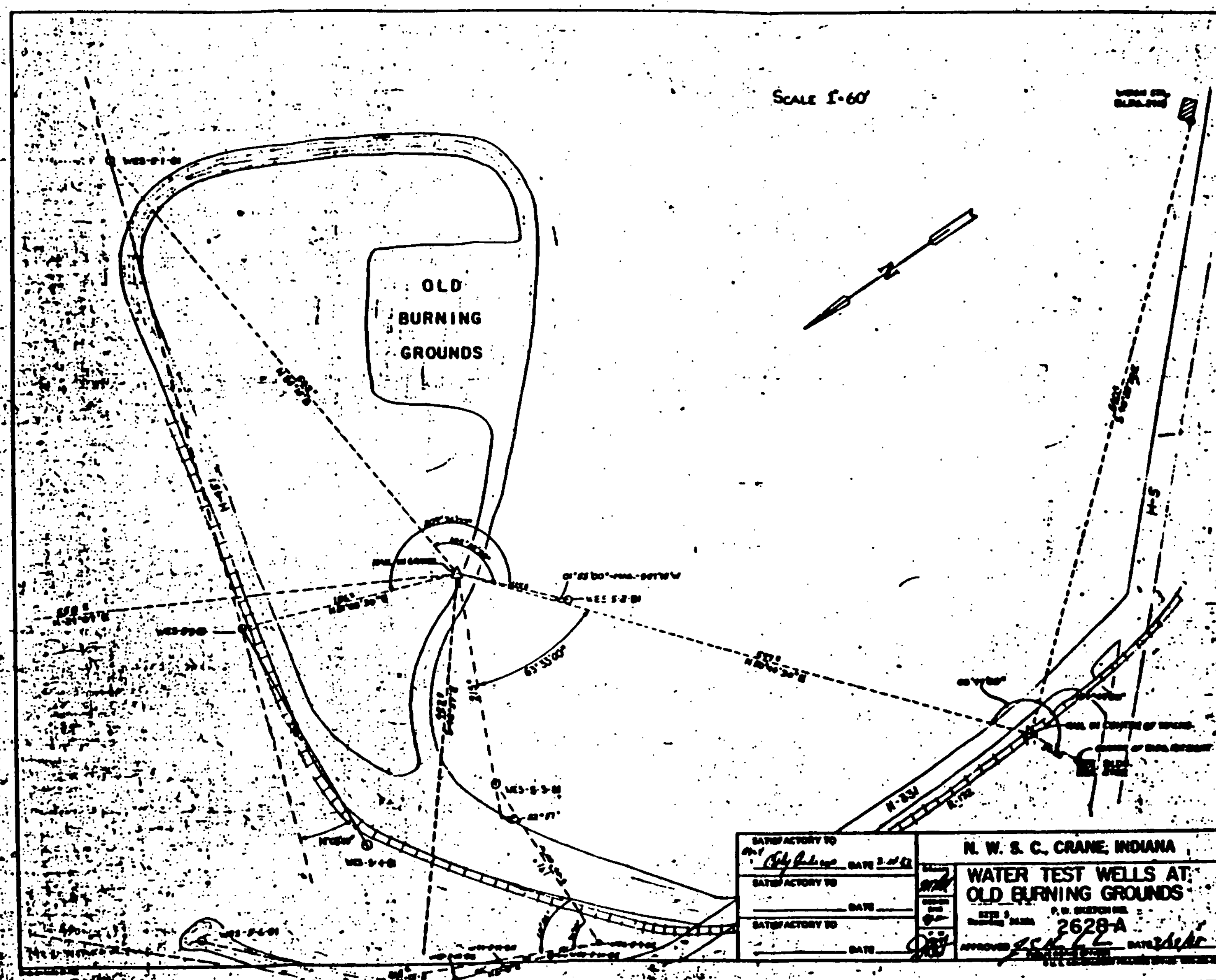


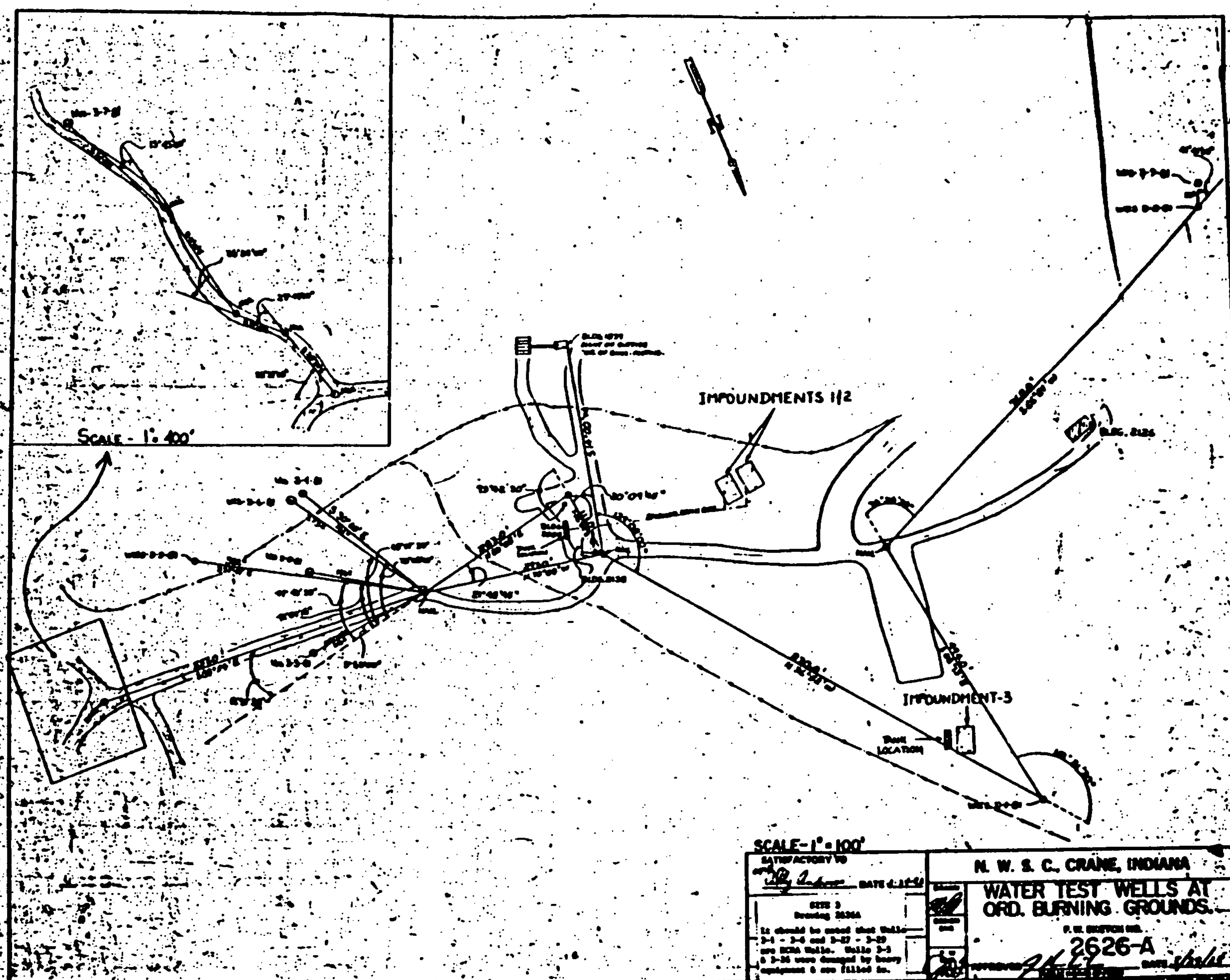
WOODS
MC COMISH GORGE
BLDG. 2011
WES-4-2-81
N. W. S. C., CRANE, INDIANA
WATER TEST WELLS AT MC COMISH GORGE
2627
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
APPROVED

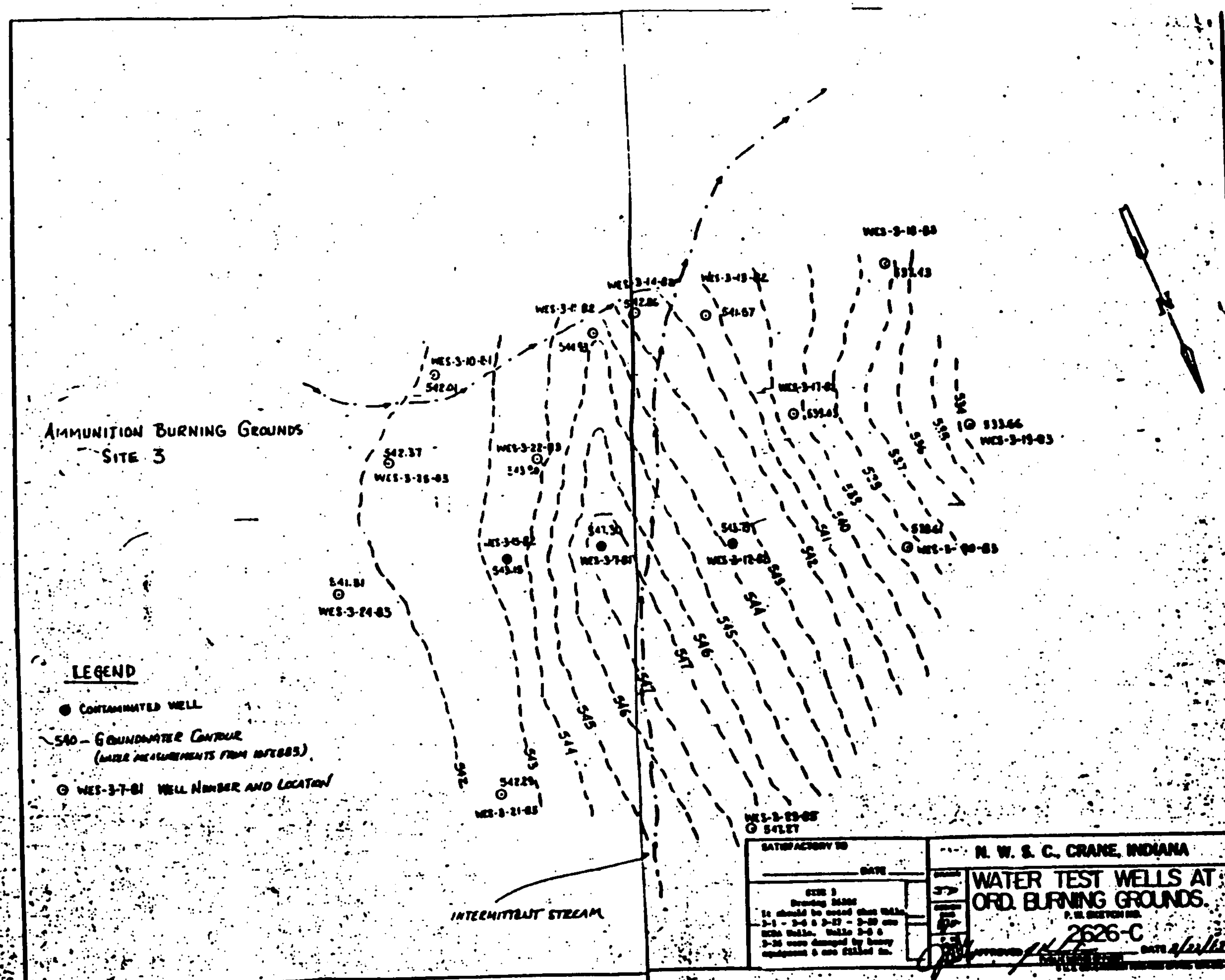

3-30
NEW BACKGROUND MONITORING WELL
SHEETS 1 THROUGH 12 INDICATE AREA COVERED BY TOPOGRAPHIC SURVEY COMPLETED AUGUST 1984. SOURCE: NWSC, CRANE
SEE FIGURE B-3 FOR DETAIL TOPOGRAPHY ON SHEETS 5, 6, 7, 8
INDICATES PERIMETER OF AMMUNITION BURNING GROUNDS
3-1
IMPOUNDMENT #3
3-2
3-9
IMPOUNDMENT #1
IMPOUNDMENT #2
MONITORING WELLS (TYPICAL)
WASTE PILE
3-6
3-8
3-33
3-32
3-5
3-31
3-4
3-5
MONITORING WELLS INSTALLED PRIOR TO AUGUST 1984
MONITORING WELLS THAT WERE DAMAGED AND HAVE BEEN SEALED OFF
NEW POINT OF COMPLIANCE INSTALLED OCTOBER - NOVEMBER 1985
SOURCE:
PREPARED FOR GENERAL REFERENCE BY PRESNELL GARVER GARVER FROM INFORMATION PROVIDED BY NWSC CRANE INCLUDING:
TOPOGRAPHIC MAP SHOWING CONDITIONS AS OF 30 JUNE 1946, 1"=500' SCALE AND GENERAL DEVELOPMENT MAP SERIES DATED 6 JUNE 1962, 1"=500' SCALE AND FROM FIELD INSPECTIONS BY PGG AUGUST 1984.
NWSC CRANE
RCRA PARTS A AND B PERMIT APPLICATION
NAVAL WEAPONS SUPPORT CENTER CRANE, INDIANA
AMMUNITION BURNING GROUNDS
SURFACE IMPOUNDMENTS
WASTE PILE
COPY

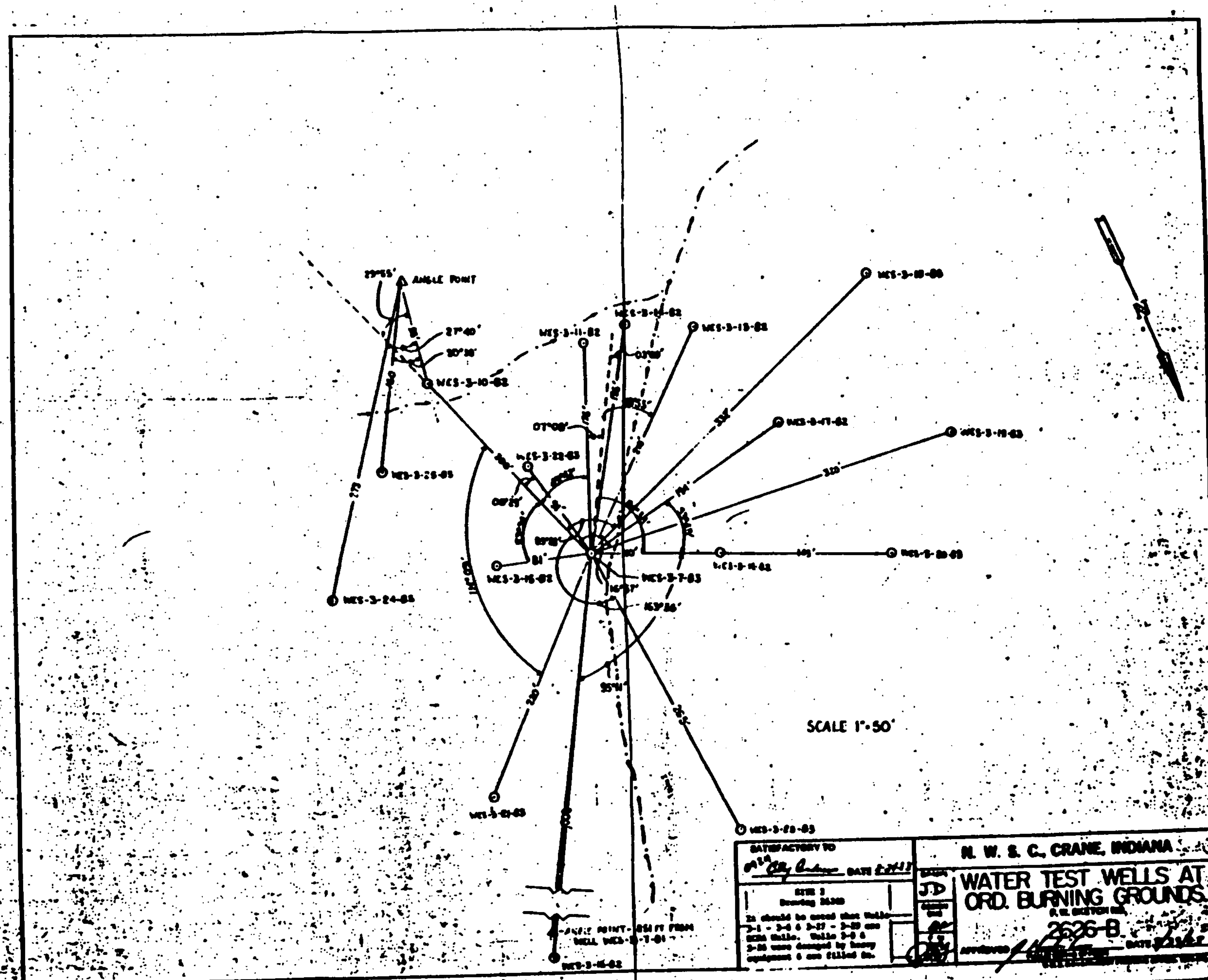


SHEETS 1 THROUGH 12 INDICATE AREA COVERED BY TOPOGRAPHIC SURVEY COMPLETED AUGUST 1984. SOURCE: NWSC CRANE
SEE FIGURE B-3 FOR DETAIL TOPOGRAPHY ON SHEETS 5, 6, 7, 8
INDICATES PERIMETER OF AMMUNITION BURNING GROUNDS
IMPOUNDMENT #3
IMPOUNDMENT #1
IMPOUNDMENT #2
MONITORING WELLS (TYPICAL)
WASTE PILE
RECEIVED
NORTH
SOURCE:
COPY

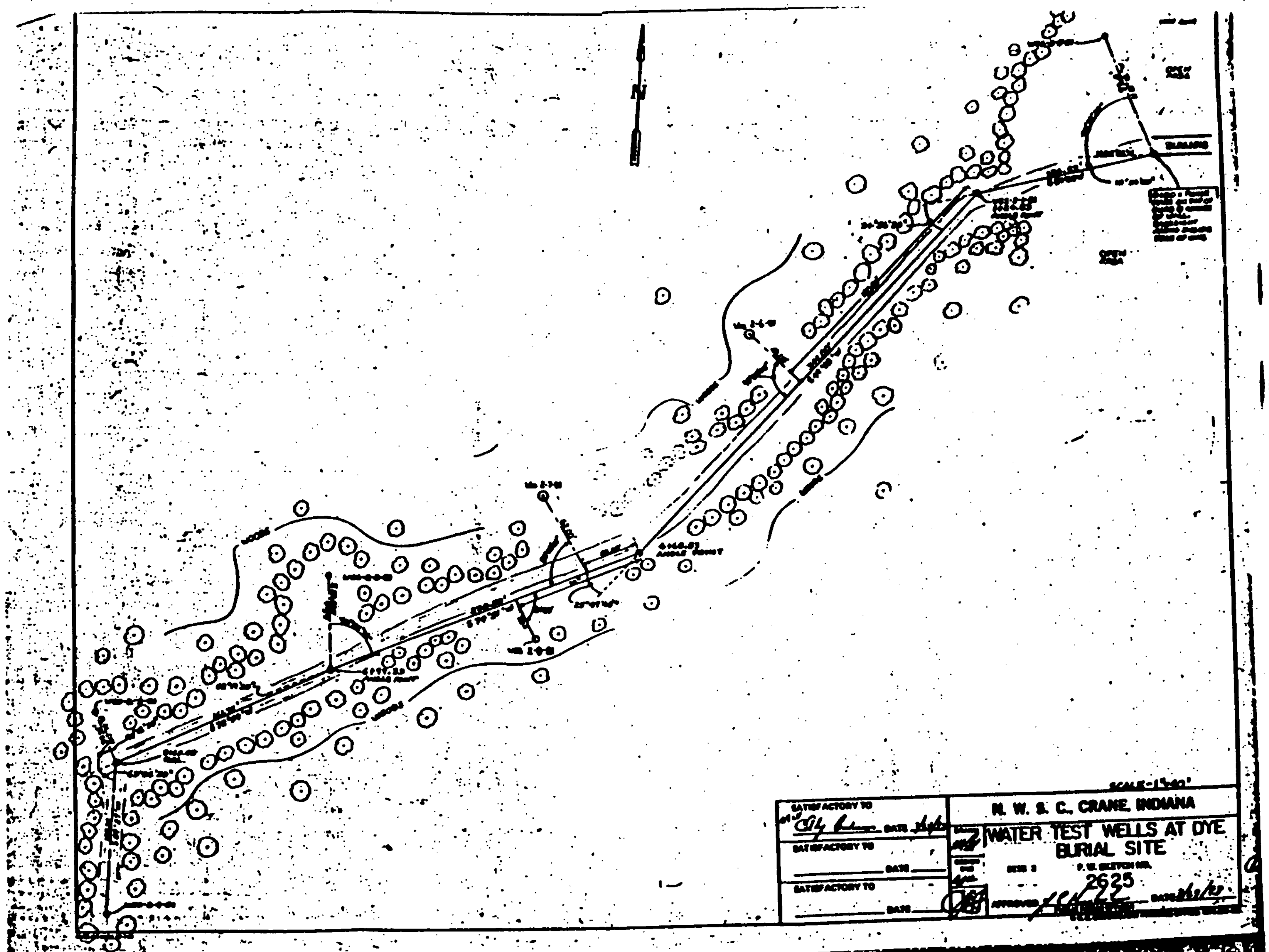

SCALE 1"=60'
OLD BURNING GROUNDS
N
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
N. W. S. C., CRANE, INDIANA
WATER TEST WELLS AT OLD BURNING GROUNDS
P. W. SKETCH NO.
2628-A
APPROVED
DATE

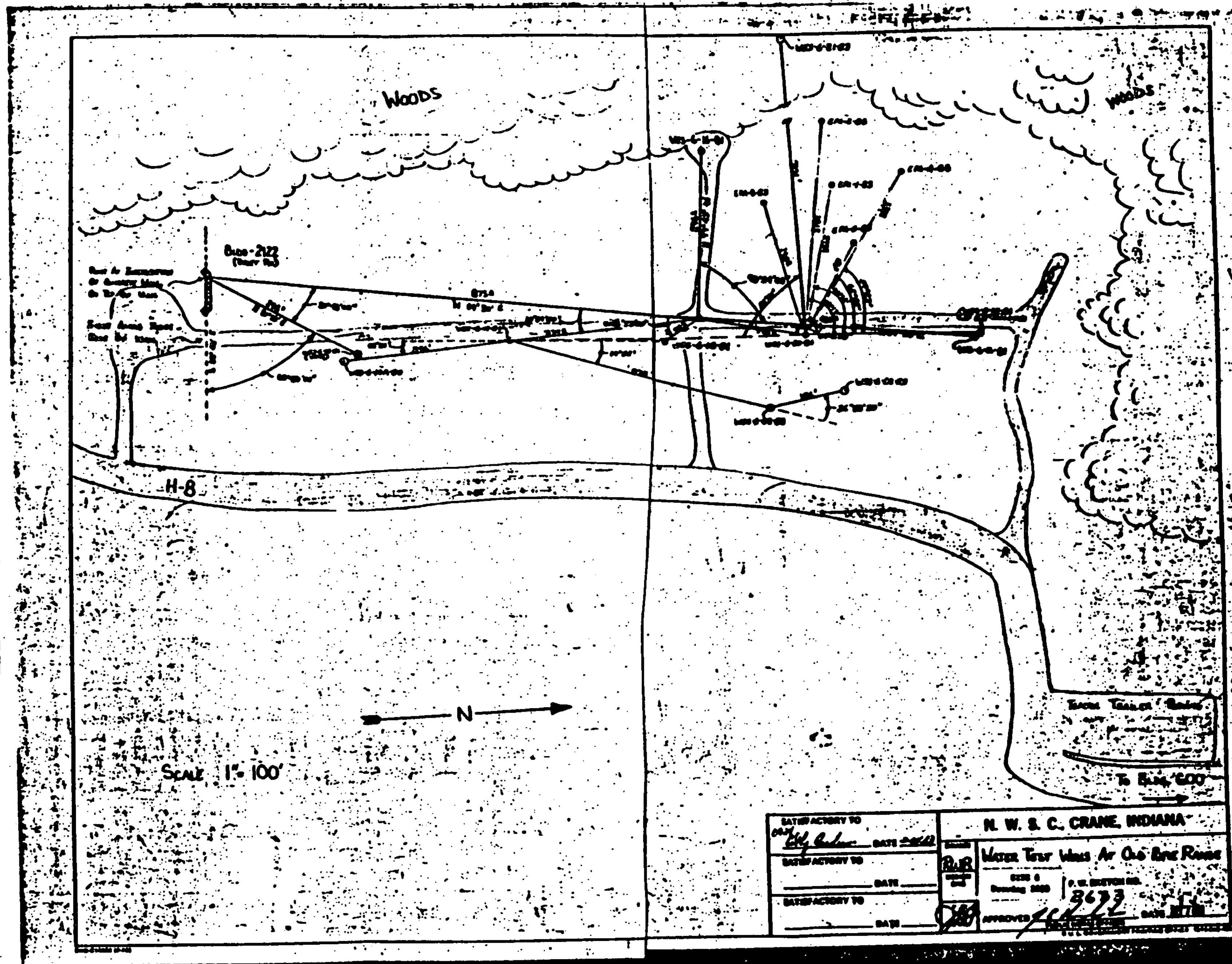

SCALE - 1" = 400'
IMPOUNDMENTS 1/2
IMPOUNDMENT-3
BLDG. 2126
SCALE-1" = 100'
N. W. S. C., CRANE, INDIANA
WATER TEST WELLS AT
ORD. BURNING GROUNDS.
2626-A


AMMUNITION BURNING GROUNDS
SITE 3
LEGEND
CONTAMINATED WELL
540 – GROUNDWATER CONTOUR
WES-3-7-81 WELL NUMBER AND LOCATION
541.81
WES-3-24-83
WES-3-21-83
INTERMITTENT STREAM
N
SATISFACTORY TO
DATE
N. W. S. C., CRANE, INDIANA
WATER TEST WELLS AT ORD. BURNING GROUNDS.
2626-C



29°55'
ANGLE POINT
27°40'
30°30'
SCALE 1"=50'
SATISFACTORY TO
DATE
JD
N. W. S. C., CRANE, INDIANA
WATER TEST WELLS AT ORD. BURNING GROUNDS
2626-B
APPROVED
DATE


N
WOODS
SCALE-1"=40'
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
N. W. S. C., CRANE, INDIANA
WATER TEST WELLS AT DYE BURIAL SITE
P. W. SKETCH NO.
2625
APPROVED
DATE


WOODS
WOODS
BLDG-2122
H-8
N
SCALE 1" = 100'
To BLDG 600
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
SATISFACTORY TO
DATE
N. W. S. C. CRANE, INDIANA
WATER TEST WELLS AT OLD BURN RANGE
APPROVED
8673
DATE