



DEPARTMENT OF THE NAVY  
CRANE DIVISION  
NAVAL SURFACE WARFARE CENTER  
300 HIGHWAY 361  
CRANE INDIANA 47522-5001

N00164.AR.000928  
NSWC CRANE  
5090.3a

IN REPLY REFER TO:  
5090/S4.7  
Ser RP3/5057

14 FEB 2005

Indiana Department of Environmental Management  
Corrective Action Section  
Office Of Land Quality  
Hazardous Waste Permits  
100 N Senate Ave  
PO Box 6015  
Indianapolis, In 46206-6015

Dear Mr. Workman:

Crane Division, Naval Surface Warfare Center requests that the Indiana Department of Environmental Management (IDEM) approve two Class 1 modifications to its October 18, 2001 Resource Conservation and Recovery Act Hazardous Waste Management Permit. The first modification is to terminate the Corrective Action tasks at the Landfarm, Solid Waste Management Unit (SWMU) 30 and the second is to add a former munitions testing area as an Area of Concern (AOC).

A No Further Action determination was granted by the U. S. EPA on October 20, 2004 for SWMU 30. The Statement of Basis, prepared by the U. S. EPA, has been posted on the NSWC Crane RAB website:

([www.crane.navy.mil/newscommunity/Envir\\_RAB\\_default.asp?bhcp=1](http://www.crane.navy.mil/newscommunity/Envir_RAB_default.asp?bhcp=1)). The Statement of Basis is also attached as enclosure (1).

Mr. Doug Griffin of IDEM requested that NSWC Crane add Area of Concern (AOC) 02/00 to the NSWC Crane Hazardous Waste Management Permit. AOC 02/00 is the Building 2044 Drop Tower and Test Rail. Testing operations were conducted from 1951 through 1973 and consisted of drop testing 20-mm cartridges as well as functional testing of cartridge actuated devices (CADs) and propellant actuated devices (PADs) that were used in ejection seats. The site consists of a drop tower that is approximately 100 feet tall and a 97 foot long test rail. The 20-mm cartridges were dropped from the tower onto a concrete pad. The CADs and PADs were tested on the test rail. An RFI will investigate impacts to all media and the need for remedial action.

The proposed text revisions for Section J of the permit and a revised Exhibit J-1 are submitted as enclosure (2). The permit required Certification Statement is provided as enclosure (3).

5090/S4.7  
Ser RP3/5057

If you require any further information, my point of contact is Mr. Thomas J. Brent, Code RP3-TB, at 812-854-6160, email thomas.brent@navy.mil.

Sincerely,



JAMES M. HUNSICKER  
Manager, Environmental Protection  
By direction of the Commanding Officer

Enclosures: 1. Statement of Basis  
2. Revised Section J  
3. Certification Statement

Copy to:  
ADMINISTRATIVE RECORD  
SOUTHNAVFACENCOM (Code ES31)  
USEPA (Pete Ramanauskas)  
IDEM (Doug Griffin)

## **REVISED SECTION J**

Attachment 1  
Marked-up Change Pages

Attachment 2  
Change Pages for Insertion

Attachment 3  
Exhibit J-1  
SWMU and AOC Map

Attachment 1  
Marked-up Change Pages

**ATTACHMENT VIII**

**(SECTION J)**

**CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS**

**J-1. Solid Waste Management Units**

SWMU 01/12 Mustard Gas Burial Grounds (MGBG)  
SWMU 02/11 Dye Burial Grounds (DBG)  
SWMU 03/10 Ammunition Burning Grounds/Jeep Trail Area (ABG)  
SWMU 04/02 McComish Gorge (MCG)  
SWMU 05/03 Old Burn Pit (OBP)  
SWMU 06/09 Demolition Area (DEMO)  
SWMU 07/09 Old Rifle Range (ORR)  
SWMU 08/17 Load and Fill Area, B-106 Pond (B106P)  
SWMU 09/05 Pesticide Control Area/R-150 Tank (PCA)  
SWMU 10/15 Rokeye (RKI)  
SWMU 11/00 Old Storage Building, B-225 (B225)  
SWMU 12/14 Mine Fill A (MFA)  
SWMU 13/14 Mine Fill B (MFB)  
SWMU 14/00 Sanitary Landfill and Lithium Battery Burial (SLF&LB)  
SWMU 15/06 Roads and Grounds Area (R&GA)  
SWMU 16/16 Cast High Explosives Fill/B146 Incinerator (B146)  
SWMU 17/04 PCB Capacitor Burial & Pole Yard (PCB-PY)  
SWMU 18/13 Load and Fill Area Buildings (L&FAB)  
SWMU 19/00 Pyrotechnic Test Area/Annex/Rocket Range Impact Area (PTA)  
SWMU 20/00 CAAA QA/QC Test Area (CAAA)  
SWMU 21/00 DRMO Storage Lot (DRMO)  
SWMU 22/00 Lead Azide (PbA)  
SWMU 23/00 Battery Shop (BS)  
SWMU 24/00 Sludge Drying Beds A & B (SDBA&B)  
SWMU 25/07D Highway 58 Dump Site A (H58A)  
SWMU 26/08D Highway 58 Dump Site B (H58B)  
SWMU 27/00 Illuminant Building B-126 (B126)  
SWMU 28/00 Maintenance Shop, B-1820 (B1820)  
SWMU 29/07 PCP Dip Tank, B-56 (B56)  
SWMU 30/00 Land Farm (LF) Sludge Application Site  
SWMU 31/00 Compressed Gas Cylinder Site (CGC)  
SWMU 32/00 Tank Farm (TF)  
SWMU 33/00 Bioremediation Facility (BRF)

AOC 01/00 Grit Blast Site – B3220 (GBS)  
AOC 02/00 B-2044 Drop Tower/Test Rail (B2044)

Sludge bed A was considered not contaminated. A section of sludge bed B was contaminated with a slight amount of DDT. The entire sludge bed B area was excavated and removed including the chain link fence and concrete retaining walls. A request for a No Further Action determination has been approved by U.S.EPA.

Y. SWMU 25/07D HIGHWAY 58 DUMP SITE A (H58A)

Debris at this site consists of paper, cardboard containers, paints, thinners, lubrication and hydraulic fluids, scrap metal, concrete block, and pipe. This site has undergone a partial debris removal. The debris was contaminated with asbestos, so was disposed of as a special waste at an offsite permitted landfill. Site renovation included backfilling, seeding, and mulching to prevent soil erosion. An RFI will be conducted at this site to determine if further remedial action is needed.

Z. SWMU 26/08D HIGHWAY 58 DUMP SITE B (H58B)

This is a dump site at the base of a massive sandstone outcrop. The debris consisted of paper, cardboard containers, paints, thinners, lubrication and hydraulic fluids, scrap metal, containers and drums, corrugated pipe, and transite siding. Fifteen crushed and rusted drums (contents unknown) were seen at the site. All of the waste has been removed, and a request for a determination of No Further Action required for the soils has been approved by U.S.EPA. An RFI will investigate impacts to the ground water and the need for further remedial action.

AA. SWMU 27/00 ILLUMINANT BUILDING B-126 (B126)

Contamination at this site includes red phosphorous, chlorates, dyes, oxidizers, and fuels for flares and smoke munitions. The building used sump pits which were pumped out by trucks and taken to the burning grounds. All sump overflow drained into the Boggs Creek watershed. A metal plating shop utilizing metals, caustics, acids, and cyanides is also present. Significant heavy metal contamination (zinc and cadmium) has been experienced from wastewater being discharged into open ditches. There are also bum areas; one behind Building 126 and one across Highway 5. An RFI will investigate impacts to all media and the need for remedial action. This RFI is not yet scheduled.

BB. SWMU 28/00 MAINTENANCE SHOP, B-1820 (B1820)

This is an automotive repair shop. Adjacent to the building was a large metal drip pan on wooden posts, which drained into an underground waste oil storage tank. Waste oil from various drip pans and gallon jugs were emptied and washed in the metal drip pan. The ground beneath the unit was covered with oil stains. An RFI will investigate impacts to all media and the need for remedial action. This RFI is not yet scheduled.

CC. SWMU 29/00 PCP DIP TANK, B-56 (B56)

The PCP Dip Tank was used for dipping untreated wood into pentachlorophenol. The building also contains some solvent storage tanks. An RFI will investigate impacts to all media and the need for remedial action. This RFI is not yet scheduled.

DD. SWMU 30/00 LAND FARM (LF)

This SWMU consists of 18 miles of roadside where liquid sludge from the sewage treatment plant was land applied. Sludge that accumulated was spread along 18 miles of roadside by a vacuum truck. Currently, NSWC land applies sludge on a permitted 2.5 acre site. ~~An RFI Workplan to address the potential impact on the ground water has been approved by U.S.EPA.~~

Surface water impacts have not been addressed but will be in a future RFI if appropriate. The current work is in the 2.5 acre Land Farm area. The results of this work will be used to determine the need for activity along the 18 miles of roadside. Ground water and soil/sludge samples were collected leading to the conclusion that no excess risk existed from the previous application of sludges that were possibly contaminated with plating wastes. A request for a No Further Action determination has been approved by the U. S. EPA.

EE. SWMU 31/00 COMPRESSED GAS CYLINDER SITE (CGC)

This was an abandoned compressed gas cylinder disposal area adjacent to Building 64. An interim removal measure remediated the site in 1990. Based on the currently available information no further corrective measures are required at this site.

FF. SWMU 32/00 TANK FARM

This site has had at least one release. The tanks have been removed and an RFI to investigate all media is planned but not yet scheduled.

GG. SWMU 33/00 BIOREMEDIATION FACILITY (BRF)

This SWMU is an active treatment facility. Potential corrective measures will be determined when the site closes.

HH. AOC 01/00 GRIT BLAST SITE - B3220 (GBS)

The unenclosed building, 3220, was used for a grit blasting site for the removal of old paint off of railroad cars. Waste material was allowed to fall on the ground contaminating the area. The waste material that was generated from the grit blasting consisted of residual grit blast material and paint chips that contained regulated Chromium levels, and probably lead. A considerable amount of the waste material was placed together creating a non-permitted hazardous waste pile containing a DO07 waste. The waste pile has since been removed and a closure plan for the remaining area is currently under review by EPA.

II. AOC 02/00 B-2044 Drop Tower/Test Rail (B2044)

Used from 1951 through 1973 for the drop testing of 20-mm cartridges as well as functional testing of cartridge actuated devices (CADs) and propellant actuated devices (PADs) used in ejection seats. The site consists of a drop tower approximately 100 feet tall and a test rail approximately 97 feet in length. The 20-mm cartridges were dropped from the tower onto a concrete pad. The CADs and PADs were tested on the test rail. An RFI will investigate impacts to all media and the need for remedial action. This RFI is not yet scheduled.

Attachment 2  
Change Pages for Insertion

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AOC 01/00 Grit Blast Site – B3220 (GBS)  
AOC 02/00 B-2044 Drop Tower/Test Rail (B2044)

**J-1a            Characterize the Solid Waste Management Units and Areas of Concern**

Exhibit J-1, located at the end of this Attachment, is a drawing of the facility showing the location of all the SWMUs and AOCs.

**J-2. Releases**

**A.    SWMU 01/12 MUSTARD GAS BURIAL GROUNDS (MGBG)**

Two previous investigations have removed bomb casings from this site. A RCRA Facility Investigation (RFI) incorporating a baseline human health and a screening level ecological risk assessment (RA) is being prepared for all media to determine the need for further action. The RFI fieldwork and report have been funded for 2002.

**B.    SWMU 02/11 DYE BURIAL GROUNDS (DBG)**

An RFI incorporating a baseline human health and a screening level ecological RA is being prepared for all media to determine the need for future action. A RCRA cap has been placed as an Interim Measure (IM). A future Corrective Measures Study (CMS) will determine if the cap can be used as a final remedy. The proposed date for the RFI fieldwork is 2001.

**C.    SWMU 03/10 AMMUNITION BURNING GROUNDS (ABG)**

A Natural Attenuation Study of the ground water at this SWMU is ongoing. Expected completion date of field activities is 2001. A multimedia RFI incorporating a baseline human health and a screening level ecological RA/CMS is planned for the Little Sulfur Creek area associated with the ABG area and the Old Jeep Trail (OJT) area. The proposed date for fieldwork is 2001. A CMS for the ABG and OJT is planned for 2002. Ground water compliance monitoring is addressed under the Subpart X Permit. Work is ongoing to determine if composting will occur at this site.

**D.    SWMU 04/02 McCOMISH GORGE (MCG)**

Undefined amounts and types of garbage and trash were buried at this site. Burial debris could include wood, paper, construction material, plaster-filled warheads, metal shavings, and industrial wastes. Previous work has partially delineated the extent of the debris. The U.S.EPA has approved the Quality Assurance Project Plan (QAPP) and RFI/RA Workplan to do additional multimedia sampling, delineate the fill area, and determine the need for future action. The field work and report will be completed in 2002.

**E.    SWMU 05/03 OLD BURN PIT (OBP)**

The Old Burn Pit encompasses a narrow stream valley where material was burned in a depression or pit and the ash and metallic objects were buried in a gully to the north of the burning pit. The rubbish included wood, paper, building material and industrial wastes. Previous work has included soil and groundwater sampling and removal of some of the debris. The U.S.EPA has approved the QAPP and RFI/RA Workplan to do additional multimedia sampling and determine the need for further action. The fieldwork and report will be completed in 2002.

This was the site of explosives load and fill operations, and is currently used for renovation, rework, and loading of munitions items. Explosives and metals contamination exists in the soil, sediments, surface water, and possibly groundwater. An RFI is planned to address all media. The RFI investigation of this SWMU as well as SWMU 08/17 and S M W 11/00 may be included under one plan due to the close proximity of the units to one another. This RFI is not currently scheduled.

S. SWMU 19/00 PYROTECHNIC TEST AREA/ANNEX/ROCKET RANGE IMPACT AREA (PTA)

This site is also known as the Ordnance Test Area and consists of three physically separate areas that perform related functions. Each area consists of a large open field and a concrete building used for quality assurance test burning of pyrotechnic lots. Boggs Creek flows through the center of or nearby each area. Contamination from pyrotechnic testing includes chlorates, dyes, oxidizers, fuels, and other by-products of flares and smoke. An RFI Workplan for all media is planned for this site and has been scheduled for 2001.

T. SWMU 20/00 CAAA QA/OC TEST AREA (CAAA)

QA/QC testing of pyrotechnics devices is conducted at Building 2167. Lead chromate contamination has been identified on the surface of the ground from testing MARK1-3 flares. There is an indication of stressed vegetation from past operations. The potential for remediation of explosives contaminated soil from this site at the Bioremediation Facility (SWMU 33) is being investigated. An RFI for all media will be needed.

U. SWMU 21/00 DRMO STORAGE LOT (DRMO)

This SWMU is a level gravel pad which is approximately a 20 acre area. It is used as a scrap metal salvage area. Metal shavings containing cutting oil are placed on a pad, which collects the oil for recycling. Prior to the late 1960's the oil in metal shavings drained onto the ground in the area. An RFI for all media will be needed for this site. The RFI has not yet been scheduled.

V. SWMU 22/00 LEAD AZIDE (PbA)

This SWMU is an unlined pond that received wastewater containing lead salts. The pond was closed in 1981, and contaminated effluent and soil were removed. An RFI is planned to address all media. This RFI is not currently scheduled.

W. SWMU 23/00 BATTERY SHOP (BS)

Spent battery acid and waste oil from forklift servicing was disposed of by allowing it to flow down the hill onto a bank behind the Battery Shop, Building 36. Surface drainage from the bank flowed into a storm drain, which drains into Lake Greenwood. As an Interim Measure, superficial debris was removed and disposed of as trash. An RFI Workplan is planned to address all media.

X. SWMU 24/00 SLUDGE DRYING BEDS A & B (SDBA&B)

This SWMU consists of cells that were used for sewage sludge drying prior to land application of the sludge. The sludge applied was apparently produced prior to the treatment system that is currently in place, and may have contained certain hazardous constituents from industrial effluent. As an Interim Measure, the sludge/soils of sludge beds A and B were characterized.

Sludge bed A was considered not contaminated. A section of sludge bed B was contaminated with a slight amount of DDT. The entire sludge bed B area was excavated and removed including the chain link fence and concrete retaining walls. A request for a No Further Action determination has been approved by U.S.EPA.

Y. SWMU 25/07D HIGHWAY 58 DUMP SITE A (H58A)

Debris at this site consists of paper, cardboard containers, paints, thinners, lubrication and hydraulic fluids, scrap metal, concrete block, and pipe. This site has undergone a partial debris removal. The debris was contaminated with asbestos, so was disposed of as a special waste at an offsite permitted landfill. Site renovation included backfilling, seeding, and mulching to prevent soil erosion. An RFI will be conducted at this site to determine if further remedial action is needed.

Z. SWMU 26/08D HIGHWAY 58 DUMP SITE B (H58B)

This is a dump site at the base of a massive sandstone outcrop. The debris consisted of paper, cardboard containers, paints, thinners, lubrication and hydraulic fluids, scrap metal, containers and drums, corrugated pipe, and transite siding. Fifteen crushed and rusted drums (contents unknown) were seen at the site. All of the waste has been removed, and a request for a determination of No Further Action required for the soils has been approved by U.S.EPA. An RFI will investigate impacts to the ground water and the need for further remedial action.

AA. SWMU 27/00 ILLUMINANT BUILDING B-126 (B126)

Contamination at this site includes red phosphorous, chlorates, dyes, oxidizers, and fuels for flares and smoke munitions. The building used sump pits which were pumped out by trucks and taken to the burning grounds. All sump overflow drained into the Boggs Creek watershed. A metal plating shop utilizing metals, caustics, acids, and cyanides is also present. Significant heavy metal contamination (zinc and cadmium) has been experienced from wastewater being discharged into open ditches. There are also bum areas; one behind Building 126 and one across Highway 5. An RFI will investigate impacts to all media and the need for remedial action. This RFI is not yet scheduled.

BB. SWMU 28/00 MAINTENANCE SHOP, B-1820 (B1820)

This is an automotive repair shop. Adjacent to the building was a large metal drip pan on wooden posts, which drained into an underground waste oil storage tank. Waste oil from various drip pans and gallon jugs were emptied and washed in the metal drip pan. The ground beneath the unit was covered with oil stains. An RFI will investigate impacts to all media and the need for remedial action. This RFI is not yet scheduled.

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The PCP Dip Tank was used for dipping untreated wood into pentachlorophenol. The building also contains some solvent storage tanks. An RFI will investigate impacts to all media and the need for remedial action. This RFI is not yet scheduled.

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This SWMU consists of 18 miles of roadside where liquid sludge from the sewage treatment plant was land applied. Sludge that accumulated was spread along 18 miles of roadside by a vacuum truck. Currently, NSWC land applies sludge on a permitted 2.5 acre site. Ground water and soil/sludge samples were collected leading to the conclusion that no excess risk existed from

the previous application of sludges that were possibly contaminated with plating wastes. A request for a No Further Action determination has been approved by the U. S. EPA.

EE. SWMU 31/00 COMPRESSED GAS CYLINDER SITE (CGC)

This was an abandoned compressed gas cylinder disposal area adjacent to Building 64. An interim removal measure remediated the site in 1990. Based on the currently available information no further corrective measures are required at this site.

FF. SWMU 32/00 TANK FARM

This site has had at least one release. The tanks have been removed and an RFI to investigate all media is planned but not yet scheduled.

GG. SWMU 33/00 BIOREMEDIATION FACILITY (BRF')

This SWMU is an active treatment facility. Potential corrective measures will be determined when the site closes.

HH. AOC 01/00 GRIT BLAST SITE - B3220 (GBS)

The unenclosed building, 3220, was used for a grit blasting site for the removal of old paint off of railroad cars. Waste material was allowed to fall on the ground contaminating the area. The waste material that was generated from the grit blasting consisted of residual grit blast material and paint chips that contained regulated Chromium levels, and probably lead. A considerable amount of the waste material was placed together creating a non-permitted hazardous waste pile containing a DO07 waste. The waste pile has since been removed and a closure plan for the remaining area is currently under review by EPA.

II. AOC 02/00 B-2044 Drop Tower/Test Rail (B2044)

Used from 1951 through 1973 for the drop testing of 20-mm cartridges as well as functional testing of cartridge actuated devices (CADs) and propellant actuated devices (PADs) used in ejection seats. The site consists of a drop tower approximately 100 feet tall and a test rail approximately 97 feet in length. The 20-mm cartridges were dropped from the tower onto a concrete pad. The CADs and PADs were tested on the test rail. An RFI will investigate impacts to all media and the need for remedial action. This RFI is not yet scheduled.

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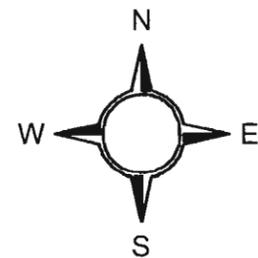
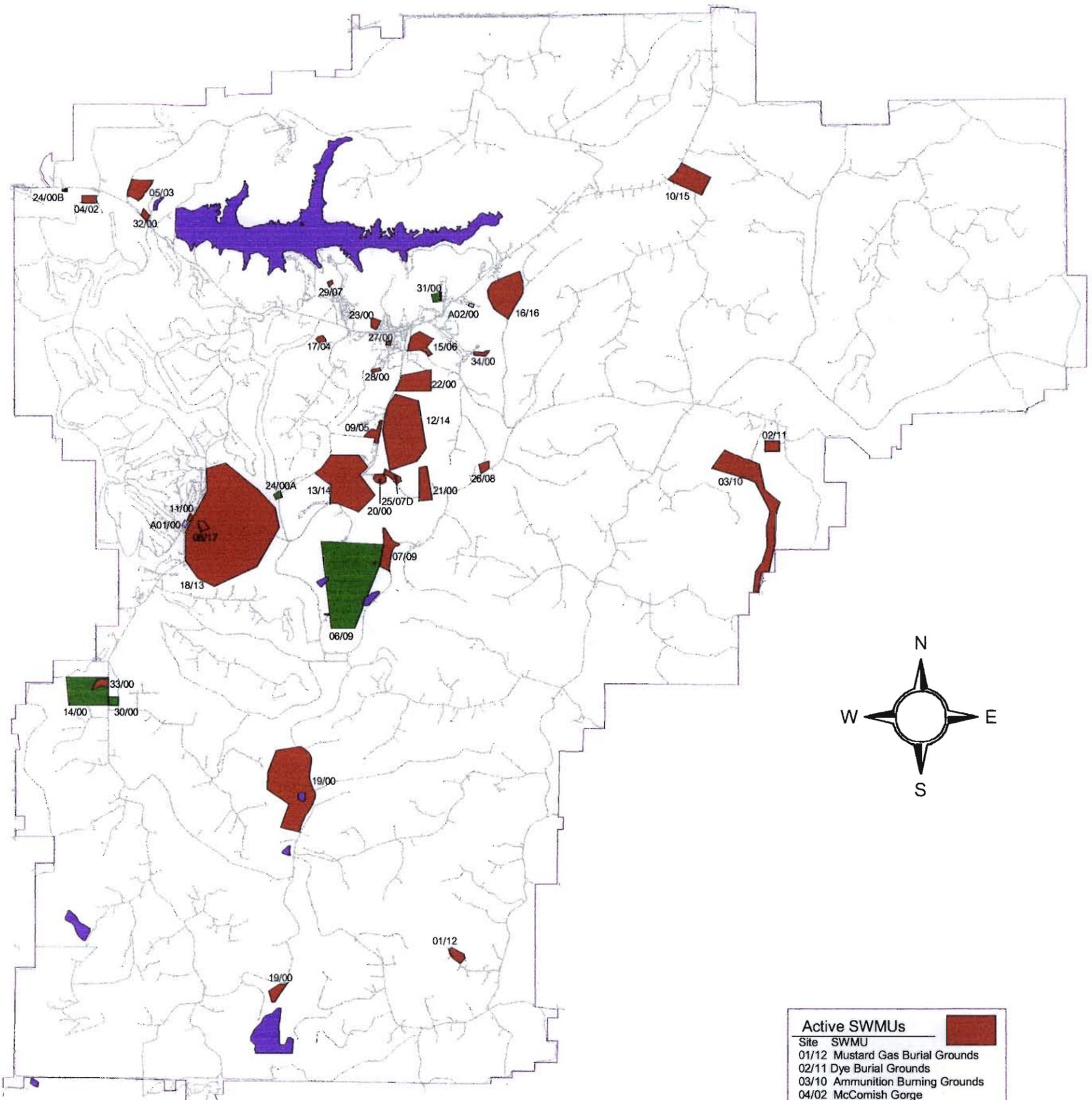
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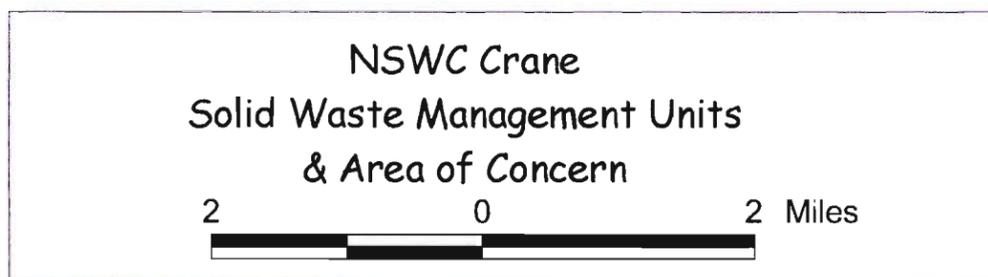
Attachment 3  
Exhibit J-1  
SWMU and AOC Map



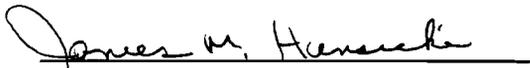
SWMUs Requiring No Further Action	
Site	SWMU
06/09	Demolition Range
14/00	SLF - Li-Battery Burial
24/00	Sludge Drying Beds A&B
31/00	Comp. Gas Cylinder Site

Area of Concern	
Site	AOC
A01/00	Grit Blast Site
A02/00	B-2044 Drop Tower/Test Rail

Active SWMUs	
Site	SWMU
01/12	Mustard Gas Burial Grounds
02/11	Dye Burial Grounds
03/10	Ammunition Burning Grounds
04/02	McComish Gorge
05/03	Old Burn Pit
07/09	Old Rifle Range
08/17	Building 106 Pond
09/05	Pesticide Area/R150 Tank
10/15	Rockeye
11/00	Old Storage B225
12/14	Mine Fill A
13/14	Mine Fill B
15/06	Roads & Grounds Area
16/16	Cast Hi-Ex Fill/B146 Incin.
17/04	PCB Cap. Burial/Pole Yard
18/13	Load & Fill Area Buildings
19/00	Rocket Range
20/00	CAAA QA/QC Test Area
21/00	DRMO Storage Lot
22/00	Lead Azide
23/00	Battery Shop
25/07	Highway 58 Dumpsite A
26/08	Highway 58 Dumpsite B
27/00	Illuminant Building, B126
28/00	Maint. Shop, B1820
29/07	PCP Dip Tank, B56
30/00	Land Farm
32/00	Tank Farm
33/00	Bioremediation Facility
34/00	Old Gun Tub Storage Lot



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

  
SIGNATURE

Manager, Environmental Protection  
TITLE

2/14/05  
DATE

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
STATEMENT OF BASIS FOR NO FURTHER ACTION DETERMINATION  
AT SOLID WASTE MANAGEMENT UNIT #30/00 (LANDFARM)  
NAVAL SURFACE WARFARE CENTER  
CRANE, INDIANA**

**Introduction**

On July 31, 1995, the United States Environmental Protection Agency (U.S. EPA) renewed a Resource Conservation and Recovery Act (RCRA) hazardous waste management permit for the U.S. Navy's Naval Surface Warfare Center - Crane Division (NSWC) located in Crane, Indiana. The permit became effective on September 14, 1995 for a duration of 5 years and contained both federal and state conditions. In 2001, the Indiana Department of Environmental Management (IDEM) renewed the entire RCRA Permit for NSWC as the State of Indiana has been authorized to administer the RCRA program in lieu of U.S. EPA. The permit establishes the Hazardous and Solid Waste Amendment (HSWA) Corrective Action Requirements and Compliance Schedules obligating the U.S. Navy to perform RCRA Facility Investigations (RFIs) at 33 Solid Waste Management Units (SWMUs), to conduct Corrective Measures Studies, and to implement corrective measures if needed. As part of a December 2001 Work Sharing Agreement between U.S. EPA and IDEM, the U.S. EPA retained oversight of work conducted at SWMU #30/00 (Landfarm). IDEM retains final decision making authority under the RCRA Permit and has classified this No Further Action (NFA) determination to be a Class 1 modification to the permit.

This Statement of Basis explains the reasons for a determination of NFA at SWMU #30/00. This document summarizes information that can be found in greater detail in the RCRA Facility Investigation (RFI) reports and other documents contained in the administrative record for this SWMU.

**Background**

NSWC operates a wastewater treatment plant that generates sludges. NSWC historically used land application for the disposal of sludge from its main on-site sewage treatment plant. These sludges are from the processing of domestic and process wastewater sources. Process sources include wastewater from metal finishing operations; surface coating operations; the loading, assembly, and packing of ordnance; water treatment plant backwash; boiler blowdowns; and industrial laundry.

In October 1980, NSWC filed a RCRA Section 3010 Notification and a Part A (interim status) permit application to operate as a treatment, storage, or disposal facility. The application for the Part A permit was approved and the facility was allowed to operate as though it had a permit. In December 1983, NSWC

applied for and obtained a sludge application permit to spray sludges from its wastewater treatment plant along approximately 18 miles of roadside near the western boundary of the facility. On April 13, 1988, NSWC was issued a permit (effective May 6, 1988) to apply sludge to a 2.5-acre site (Landfarm) located near an existing sanitary landfill. Sludges from the on-site wastewater treatment facility were applied to this site from November 16, 1988 through March 1995. In June of 1994, NSWC began applying sludges to eight new land-application-permitted sites located south and southeast of the Landfarm.

In 1992, the U.S. EPA became concerned that the sludges from the on-site treatment plant should be characterized as F006 waste (i.e., wastewater treatment sludges from electroplating operations). U.S. EPA contended that the wastewaters discharging from the electroplating shop pretreatment plants were mixing with other wastewaters in the sewer system prior to arrival at the main sewage treatment plant. In response to U.S. EPA concerns, NSWC implemented measures to prevent the discharge of wastes from the plating shops and the resulting mixing with other wastewaters. In 1995, U.S. EPA renewed and modified the NSWC permit to include the Landfarm as SWMU #30/00 to settle the enforcement issue concerning F006 and to modify the HSWA corrective action requirements and schedule. U.S. EPA had already required NSWC to conduct an RFI at the Landfarm as part of the 1989 permit to determine if the previous application of sludges possibly contaminated with plating wastes had adversely affected the shallow groundwater regime. The results of the RFI investigations at the Landfarm would be used to determine the need for activity along the 18 miles of roadside.

### **Investigations Conducted**

NSWC submitted a RCRA Facility Investigation Report for this SWMU in May 2001. The purpose of the investigation was to determine if the previous application of sludges possibly contaminated with plating wastes had impacted the shallow groundwater regime. From October 1999 to October 2000, NSWC conducted five rounds of groundwater sampling from seven wells at the Landfarm. Samples were collected quarterly to examine the variability of the analytical data versus time and seasonal changes. Groundwater samples were analyzed for a list of parameters associated with sludge application operations. The parameters for the first two rounds of sampling included volatile organic compounds (VOCs), metals, explosives, cyanide, nitrate/nitrite, ammonia, and phosphorous. Data from the initial two rounds were used to focus the subsequent three sampling rounds on a list of potential contaminants of concern. Since metals were the primary contaminants of concern associated with this SWMU, metals analysis was conducted on all five sampling rounds.

VOCs and explosives were not detected in any of the wells during sampling rounds 1 and 2 and were eliminated from analysis for the remaining three rounds. Four metals exceeded their respective Risk Based

Target Levels (RBTLs) in at least one sample. RBTLs are used as conservative screening values to identify potential constituents of concern. Chemical concentrations above a RBTL would not automatically designate a site as "dirty" or trigger a response action. However, exceeding a RBTL suggests that further evaluation of the potential risks that may be posed by site contaminants is appropriate. The RFI RBTLs values were based on Drinking Water Standards, EPA's Region 9 Preliminary Remedial Goals (PRG), or other human health based criteria and are presented in Table 1 below along with the maximum detected value and the frequency of detection.

**Table 1 - Metals exceeding RBTLs in Groundwater**

Element	Number of Detections Over RBTLs in One Year	Maximum Detected Value (ug/L)	RFI RBTL (ug/L)	Drinking Water Standards (ug/L)	Lifetime HA <sup>1</sup> (ug/L)	State of Indiana Residential Groundwater Level <sup>2</sup> (ug/L)
Arsenic	15	6.8	2	10	NA	50
Cadmium	1	5.3	5	5	5	5
Nickel	1	108	100	NA	100	730
Thallium	2	2.8	2.4	2	0.5	2

1) Lifetime HA - The concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects for a lifetime of exposure.

2) Indiana Department of Environmental Management Risk Integrated System of Closure (RISC) February 15, 2001 Table A: The default closure level for residential settings is the MCL, if the MCL has been established; if not, the default closure level is the lowest of either the ground water pathway or the solubility limit.

Arsenic was detected above its RBTL fifteen times throughout the sampling period, but the maximum detected value is below drinking water standards. Cadmium, Nickel, and Thallium were detected above their RBTLs very infrequently throughout the sampling period. As an additional check, a statistical test was performed to determine if parameter concentrations detected in downgradient wells were significantly different from those detected in samples from the upgradient wells. The Analysis of Variance (ANOVA) technique was the basic approach used to compare data from upgradient and downgradient monitoring well locations. The ANOVA technique was used to test whether there was statistically significant evidence of contamination associated with SWMU #30/00. The test was performed on all parameters detected at least once in the five downgradient wells during the five sampling rounds. The results of the ANOVA showed that none of the parameters had downgradient concentrations that were higher than their respective

upgradient concentrations at a statistical significance of 5% (i.e., 95% confidence). This supports the hypothesis that there is no significant impact on groundwater at the site due to activities at the SWMU.

Because of no impact to groundwater, NSWC requested No Further Action at this SWMU for all media. The U.S. EPA recommended that NSWC collect and analyze soil/sludge samples from the Landfarm in order to identify any potential risks that may be present in the soil/sludge exposure pathway. In March 2002, NSWC collected 18 surface and subsurface soil samples. Samples were collected from a grid encompassing the SWMU proper as well as perimeter samples. The samples were analyzed for metals as these were the primary constituents of concern at the Landfarm. Sample results were compared to RBTLs (based on human health and ecological risk screening levels) as well as background metals soil values obtained from NSWC's Basewide Background Soil Investigation (January 2001).

The RBTLs used in the soils investigation included the lowest value taken from U.S. EPA Region 9 Preliminary Remediation Goals for exposure to soils (residential land use), IDEM Tier I Default Closure Levels for soils for residential land use, U.S. EPA Soil Screening Levels for Soil Ingestion, Transfer from Soils to Air, Migration from Soils to Groundwater, or U.S. EPA Region 5 Ecological Data Quality Levels (EDQLs). Soils were screened against the lowest human health or ecological risk based criteria. Metals which exceeded the RBTLs are listed in Table 2 below.

**Table 2 - Metals exceeding RBTLs in Soil**

Element	Maximum Detected Surface Soil Value (0 - 2 ft) (mg/kg)	Maximum Detected Subsurface Soil Value (2 - 4 ft) (mg/kg)	RFI RBTL <sup>1</sup> (mg/kg)	State of Indiana Residential Soil Level <sup>2</sup> (mg/kg)	Region 9 Residential Soil Direct Contact PRG (mg/kg)	Maximum Basewide Background Concentration Surface Soil <sup>3</sup> (mg/kg)	Maximum Basewide Background Concentration Subsurface Soil <sup>3</sup> (mg/kg)
Antimony	6	6U	0.1423	5.4	31	0.23U <sup>4</sup>	10.8
Arsenic	22.4	12.9	0.39	3.9	0.39	6.8	6.0
Barium	181	161	1.04	1,600	5,400	155	94.4
Beryllium	1.5	1.4	0.1	63	150	0.74	0.69
Cadmium	1.6	0.72	0.00222	7.5	37	0.05U <sup>4</sup>	0.05U <sup>4</sup>
Chromium (hexavalent)	No Data	4	0.4	38	30	Not Analyzed	Not Analyzed
Chromium (total)	39.3	30.7	2.0	No Value	21	15.1	25.5
Cobalt	16.9	26.2	0.14033	No Value	900	17.1	9.2
Copper	38.7	20.2	2.06	500	2,100	11.0	16.4
Iron	42,500	35,800	23,000	No Value	23,000	17,400	27,700
Lead	30.7	35.0	0.05373	81	400	17.1	11.7
Manganese	2,890	4,690	1,800	No Value	1,800	1,960	376
Mercury	0.41	0.048	0.073	2.1	23	0.06	0.07
Nickel	20.6	17.7	7.0	950	1,600	17.4	13.1
Selenium	0.85	0.58	0.02765	5.2	390	0.33U <sup>4</sup>	0.16U <sup>4</sup>
Silver	19.7	0.14	2.0	31	390	0.05	0.05
Thallium	0.37	0.34	0.04	2.8	5.2	0.31	0.27
Vanadium	60.9	55.9	1.59	No Value	550	32.2	42.4
Zinc	115	68.8	6.62	10,000	23,000	49.6	35.3

- 1) Value is based on the lowest human health or ecological risk-based criteria.
  - 2) Indiana Department of Environmental Management Risk Integrated System of Closure (RISC) February 15, 2001 Table A: Residential Soil Closure Level.
  - 3) NSWC Basewide Background Soil Investigation Report (January 2001).
  - 4) This value is the average of all non-detected values. Non-detected values were represented by using one-half the detection limit.
- U – Not detected at Reporting Limit.

Antimony, arsenic, chromium, iron, manganese, and vanadium were the only inorganics detected at concentrations exceeding risk-based human health screening levels. All other inorganics noted in Table 2 exceeded ecological risk screening values. U.S. EPA Region 5 typically utilizes screening levels based on the U.S. EPA Region 9 PRGs. The screening value used for non-carcinogenic chemicals is one-tenth of the Region 9 PRG to account for the potential cumulative effects of multiple compounds affecting the same target organ. When chemical constituents are found to exceed screening levels, the U.S. EPA also requires an evaluation of cumulative cancer risk and non-cancer (Hazard Index (HI)) risk from the potential exposure to the presence of multiple chemicals. Two human receptors (the hypothetical future resident and typical industrial worker) were evaluated for health risks potentially resulting from exposure to these metals. The results of the cumulative risk evaluations are shown in Table 3. These risk estimates were calculated using a 95% Upper Confidence Limit value on sample results as the exposure point concentration of the chemical for human receptors.

**Table 3 – Cancer and non-cancer risk estimates for Landfarm soils (95% UCL EPC)**

	Grid Surface Soil	erimeter Surface Soil	rid Subsurface Soil	erimeter Subsurface Soil
Hazard Index (Residential)	2.1	1.5	2.2	2.5
Cancer Risk (Residential)	3.1E-05	2.0E-5	2.5E-05	2.7E-05
Hazard Index (Industrial)	0.17	0.11	0.19	0.24
Cancer Risk (Industrial)	7.6E-06	5.0E-06	6.2E-06	6.6E-06

U.S. EPA typically considers sites with a calculated HI value below 1 and a cancer risk estimate range between  $10^{-4}$  and  $10^{-6}$  as generally not requiring additional remediation. The calculated cumulative cancer risk for both receptors falls within U.S. EPA's acceptable risk range. The metal driving the cancer risk above the low end of the acceptable risk range ( $10^{-6}$ ) is arsenic. Although the arsenic concentrations found in the soils at the Landfarm exceed basewide background concentrations, arsenic is a naturally occurring metal.

The Hazard Index was calculated above 1 for all Landfarm soils. This Hazard Index value was determined by adding the individual Hazard Quotients (HQ) calculated for non-carcinogenic chemicals to determine their cumulative effects. The non-carcinogenic risk driver (HQ) found to be pushing the HI over 1 was Iron. For the purposes of a human health risk assessment, EPA recognizes that Iron is a naturally occurring constituent and an essential nutrient. For the soil data at the Landfarm, the 95% UCL concentration of 34,800 mg/kg Iron corresponds to an estimated HQ of 1.5 after comparison to the residential PRG value. This result can be interpreted to mean that chronic ingestion of this soil would add approximately 0.45 mg/kg-day to an individual's diet. This is not significantly higher than the provisional EPA No Observed Adverse Effect Level of 0.3 mg/kg-day and would correspond to an approximate doubling or tripling of the

National Academy of Science Recommended Daily Allowance (RDA) for Iron. This increase would not be expected to result in the onset of chronic adverse effects in typical individuals who display normal homeostatic control over iron accumulation and protein binding. Based on EPA's human health risk assessment guidance, the observations that Iron is a naturally occurring constituent, an essential nutrient, and that the highest HQ of 1.5 should not be associated with chronic adverse health effects, the total HIs accounting for all other metals present in Landfarm soils fall below 1.

Antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, silver, vanadium, and zinc were detected at concentrations exceeding the U.S. EPA Region 5 EDQLs for ecological receptors and basewide background soil concentrations. Similar to human health risk based values, chemical concentrations above an EDQL would not automatically designate a site as "dirty" or trigger a response action. However, exceeding an EDQL suggests that further evaluation of the potential ecological risks that may be posed by site contaminants is appropriate. Because EDQLs represent the lowest screening levels found in the literature for any receptor, they are not always applicable to site-specific receptors and conditions. As a next step, NSWC evaluated these chemicals against alternative ecological screening levels which may be more applicable (e.g., Canadian Soil Quality Guidelines). A comparison of the sampling concentrations to the various applicable screening levels as well as soil background concentrations indicates that there is a low probability of unacceptable ecological risk.

#### **Determination of No Further Action**

Based on this information and the information contained in the administrative record, there are no unacceptable present or potential future human health or ecological risks at SWMU #30/00.

There is no further action required at SWMU #30/00. Please note, however, that this does not preclude U.S. EPA or IDEM from requiring further action in the future if we obtain any information indicating that such action is needed to protect human health or the environment. Nothing in this Statement of Basis should be interpreted as prohibiting U.S. EPA or IDEM from taking any actions necessary to protect human health and the environment, including ordering additional corrective action if necessary.

The administrative record is available at the following location:

United States Environmental Protection Agency - Region 5  
77 West Jackson Boulevard (DW-8J)  
Chicago, IL 60604  
(312) 886-7890  
Between 8:00 a.m. and 4:00 p.m. (Monday - Friday excluding Federal holidays)