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LETTER DISCUSSING SOLID WASTE MANAGEMENT UNIT 25 MANHOLE CONFINED
SPACE STUDY CNC CHARLESTON SC
8/13/1998
ENSAFE INC.



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ENVIRONMENTAL AND MANAGEMENT CONSULTANTS

935 Houston Northcutt Blvd., Suite 113 • Mt. Pleasant, SC 92464 • Telephone 843-884-0029 • Facsimile 843-856-0107 • www.ensafe.com

13 August, 1998

Commanding Officer
ATTN: Mr. Tony Hunt
SOUTHNAVFACENGCOM
2155 Eagle Drive
North Charleston, South Carolina 29410-9010

Subject: SWMU Manhole / Confined Space Study

Dear Mr. Hunt:

In support of Southern Division, NAVFACENGCOM, EnSafe performed a study of the Manholes 7, 7A, and 7B located adjacent to, and under the former plating shop now referred to as SWMU 25. The purpose of the limited study was to determine the types of chemical contaminants which may be encountered by personnel entering the manholes, and to provide NAVFACENGCOM guidance regarding appropriate safety systems and procedures for compliance with appropriate occupational safety and health standards and for safe entry into the manholes. EnSafe met with representatives from the South Carolina Electric and Gas (SCE&G), Environmental Detachment, Charleston, and NAVFACENGCOM, on July 8, 1998, to view the manholes and identify and evaluate potential chemical hazards within the manholes.

Hazard Evaluation

The SWMU 25 Manholes 7, 7A, and 7B serve primarily as electric utility vaults and were formerly located under a plating facility, which is now demolished. According to SCE&G and Navy representatives familiar with the former site operations, there was reason to believe that significant chemical and physical hazards exist in the manholes. Based on that information, and on the configuration of the vaults, EnSafe agreed with Navy and SCE&G personnel that entry into the space was not appropriate until a hazard evaluation was complete according to the requirements of the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.146, Permit-Required Confined Spaces. The general requirements of the standard require the identification and evaluation of hazards and development and implementation of means, procedures, and practices for safe entry operations, prior to entry by any personnel.

Based visual observations, and on discussions with Navy and SCE&G personnel, it was apparent that in addition to potential for hazardous energy sources and oxygen deficient and/or

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explosive gases, chemical contamination of the surfaces within the respective vaults was likely and therefore identification and evaluation of the chemical hazards was appropriate. To identify and evaluate the specific chemical species which formed the hazard, EnSafe collected wipe samples for poly-chlorinated biphenyls (SW846 Method 8082) and metals (SW846,6010/7000) from various surfaces within each respective manhole/vault. Since entry was not possible until appropriate hazard evaluation was performed, EnSafe used non-conductive tool extension devices to collect the samples from surfaces within each respective manhole. Those surfaces sampled are as follows:

- ▶ Vertical surfaces including walls and cables (Samples 025MW0701, 025MW07A04, 025MW07B07).
- ▶ Horizontal surfaces including brackets, cables, and hangers (Samples 025MW0701, 025MW07A04, 025MW07B07)
- ▶ Miscellaneous surfaces including cables with obvious discoloration and or apparently contaminated coatings (Samples 025MW0701, 025MW07A04, 025MW07B07)

Findings

Based on visual observation, discussions with local technical representatives, review of applicable OSHA standards (hazardous waste site operations (29 CFR 1910.120), permit-required confined spaces (29 CFR 1910.146) and control of hazardous energy (29 CFR 1910.147), and on analytical data from manhole surface wipe samples (see Attachment), EnSafe presents the following findings:

- ▶ As defined by the OSHA standard, the SWMU 25 manhole/utility vaults 7, 7A, and 7B, configuration, access limitations, and design determine that these manholes meet the definition of a *Confined Space*.
- ▶ The analytical results from wipe samples (Tables 1 and 2) collected from various surfaces in the respective manhole/vaults, indicate that chemical hazards exist on all accessible surfaces within the respective manholes, and therefore represent significant dermal and inhalation hazards, depending on the activities planned. These chemical hazards exist as metal salt deposits, specifically lead, arsenic, chromium, and nickel,
- ▶ The analytical results from wipe samples (Tables 1 and 2) collected from various surfaces in the respective manhole/vaults indicate that poly-chlorinated biphenyls do not exist within the respective manhole/utility vaults.
- ▶ The manhole/utility vaults potentially contain oxygen deficient and/or explosive atmospheres and have potentially hazardous energy sources because of high voltage cables submerged in standing water.

- ▶ Based on the manhole/utility vault configuration and presence of significant chemical and physical hazards within those spaces, the spaces are defined as *Permit-Required Confined Spaces*, and thus entry of personnel into those spaces requires the following:
 - Specification of Acceptable Entry Conditions
 - Specification and provisioning of appropriate testing and monitoring, ventilation, communication, rescue, ingress and egress, and personal protective equipment.
 - Development and implementation of appropriate testing and monitoring protocols for oxygen combustible gases and vapors, and toxic gases and vapors.
 - Trained Attendant(s).
 - Development and implementation of rescue procedures.
 - Training of personnel performing confined space entry to establish proficiency in the duties required by the standard.
 - Development of a Hazard Communication Program that addresses the specific chemicals that were identified in the manholes.

- ▶ OSHA's Hazardous Waste Operations and Emergency Response regulation (29 CFR 1910.120) covers the following operations:
 - Required and voluntary clean-up operations at uncontrolled hazardous waste sites that have been identified for clean-up by a governmental health or environmental agency;
 - Corrective actions involving clean-up operations at RCRA sites;
 - Operations involving hazardous waste that are conducted at treatment, storage and disposal (TSD) facilities; and
 - Emergency response operations for releases of, or substantial threats of releases of, hazardous substances.

Because the proposed utility work in the manholes / vaults at SWMU 25 do not include any of the previous operations, workers entering the manholes to perform these operations are not required to be trained in accordance with 29 CFR 1910.120.

- ▶ Because chemical and physical hazards have been identified in the manholes / vaults, any work performed in them must be done by a crew specifically trained and equipped to perform confined space entries. A carefully prepared confined space permit must also be prepared for each entry.

- ▶ EnSafe does not claim to be knowledgeable of appropriate procedures for electrical isolation of the cables within the manholes/utility vaults; however, we are confident that SCE&G technicians can be trained and equipped to safely enter the manhole/utility vaults given the condition that they assume responsibility for all aspects of hazardous energy source safety.

Recommendations

The following recommendations are based on the findings discussed above and are intended to provide guidance to Southern Division NAVFACENGCOC contractors and service providers who are required to enter the SWMU 25 manhole/utility vaults.

- ▶ All personnel contractors and/or service providers tasked to enter the manhole/utility vaults will be required to have a written and fully implemented Confined Space Entry Program. All personnel performing entry activities should be trained and equipped pursuant to 29 CFR 1910.146. The contractors and/or service provider management should be able to demonstrate compliance with the standard via written certifications of employee competence.
- ▶ A confined space entry permit should be prepared for each contractors and service provider entry and should include the following:
 - A description of the permit space to be entered
 - The purpose of the entry
 - ▶ *Identify whether the operations will be disruptive or non-disruptive to the material in the manhole.*
 - ▶ *Disruptive operations will require a greater level of protection for workers.*
 - The date and authorized duration of the entry permit
 - The authorized entrants within the space
 - The names of the attendants
 - The name of the entry supervisor
 - The hazards of the permit space
 - ▶ *Hazardous energy*
 - ▶ *Water / submersion, entrapment*
 - ▶ *Chemical hazards from dermal or inhalation routes as identified above*
 - The measures used to isolate the space to eliminate or control hazards
 - ▶ *Pump water from the space*
 - ▶ *Implement SCE&G procedures for identification and control of hazardous energy sources.*

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- ▶ *Establish barriers around space*
- ▶ *Ventilate the space as needed*

- The acceptable entry conditions
 - ▶ *O₂ greater than or equal to 19.5% and less than 23.5%*
 - ▶ *Atmosphere less than 10% of the lower explosive limit*
 - ▶ *No contaminants above the permissible exposure limit*

- The results of initial and periodic monitoring

- The emergency and rescue services to be used
 - ▶ *In-house or contracted emergency services may be used*
 - ▶ *Local fire and EMS teams may be used*
 - ▶ *Identify method of summoning the rescue team*

- The safety equipment to be used
 - ▶ *Tyvek coveralls*
 - ▶ *Half mask, air purifying respirator with P100 filters*
 - ▶ *Hard hat*
 - ▶ *Steel-toe boots*
 - ▶ *Nitrile gloves*
 - ▶ *Safety glasses*
 - ▶ *Ventilation equipment*

Should you have any additional questions or comments, please do not hesitate to call me at (843)884-0029.

Sincerely,
EnSafe Inc.



Robert W. Batts, CIH
Senior Industrial Hygienist

Attachments

Attachment

**Table 1
Wipe Sample Data**

and

**Table 2
Metals Detections in Wipe Samples**

TABLE 1
SWMU 25 – MANHOLE SAMPLING
WIPE SAMPLE DATA
7/8/98

Field ID#	Location/Activity	Analyte	µg/wipe
025MW00701	Manhole 7 South Wall	Aluminum	4,900
		Antimony	10.6
		Arsenic	4.6 B
		Barium	63.3
		Beryllium	0.16 B
		Cadmium	21
		Calcium	6,500
		Chromium	5,110
		Cobalt	3.3 B
		Copper	441
		Iron	5,120
		Lead	556
		Magnesium	752
		Manganese	163
		Nickel	60.5
		Potassium	1,060
		Silver	9
		Sodium	905
		Vanadium	16.1
		Zinc	1,310
PCB	ND		
025MW00702	Manhole 7 Bracket and Cable	Aluminum	12,800
		Antimony	26.2
		Arsenic	40.8
		Barium	71.6
		Beryllium	0.44 B
		Cadmium	7.2
		Calcium	21,600
		Chromium	665
		Cobalt	3.1 B
		Copper	318
		Iron	20,800
		Lead	5,120
		Magnesium	1,440
		Manganese	142
		Nickel	35.1
		Potassium	1,100
		Silver	0.91 B
		Sodium	728
		Vanadium	32.6
		Zinc	26,400
PCB	ND		

TABLE 1
SWMU 25 - MANHOLE SAMPLING
WIPE SAMPLE DATA
7/8/98

Field ID#	Location/Activity	Analyte	µg/wipe
025MW00703	Manhole 7 Lead-Covered Cable — Yellow Coating	Aluminum	10,300
		Antimony	10.9
		Arsenic	63.2
		Barium	68.6
		Beryllium	0.32 B
		Cadmium	8.4
		Calcium	7,210
		Chromium	7,050
		Cobalt	4.2 B
		Copper	335
		Iron	13,600
		Lead	26,500
		Magnesium	1,200
		Manganese	128
		Nickel	34.2
		Potassium	980
		Silver	3.2
		Sodium	800
		Vanadium	32.5
		Zinc	824
PCB	ND		
025MW07A04	Manhole 7A South Wall — deteriorating delaminating	Aluminum	1,350
		Antimony	14.9
		Arsenic	5.1 B
		Barium	182
		Beryllium	0.05 B
		Cadmium	2.6
		Calcium	2,930
		Chromium	8,110
		Cobalt	1.5 B
		Copper	93.6
		Iron	13,000
		Lead	235
		Magnesium	130 B
		Manganese	24
		Nickel	5.1
		Potassium	1,920
		Silver	2.9
		Sodium	648
		Vanadium	11.5
		Zinc	150
PCB	ND		

TABLE 1
SWMU 25 - MANHOLE SAMPLING
WIPE SAMPLE DATA
7/8/98

Field ID#	Location/Activity	Analyte	µg/wipe
025MW07A05	Manhole 7A Cable in Middle of Vault	Aluminum	27,300
		Antimony	25.6
		Arsenic	25.7
		Barium	267
		Beryllium	1.1
		Cadmium	20.9
		Calcium	8,730
		Chromium	14,800
		Cobalt	9.1
		Copper	837
		Iron	36,200
		Lead	2,880
		Magnesium	1,800
		Manganese	437
		Nickel	130
		Potassium	1,660
		Silver	18.7
		Sodium	758
		Thallium	6.6 B
		Vanadium	56.2
		Zinc	1,580
PCB	ND		
025MW07A06	Manhole 7A Lead Covered Cable — Near top of Vault (Yellow coating)	Aluminum	729
		Antimony	10.4
		Arsenic	3.1 B
		Barium	113
		Beryllium	0.03 B
		Cadmium	13.6
		Calcium	987
		Chromium	5,220
		Cobalt	1 B
		Copper	169
		Iron	3,250
		Lead	19,200
		Magnesium	99 B
		Manganese	12.3
		Nickel	12.6
		Potassium	130 B
		Selenium	3.2 B
		Silver	6
		Sodium	744
		Vanadium	5.8
		Zinc	139
PCB	ND		

TABLE 1
SWMU 25 - MANHOLE SAMPLING
WIPE SAMPLE DATA
7/8/98

Field ID#	Location/Activity	Analyte	µg/wipe
025MW07B07	Manhole 7B Cable	Aluminum	1,260
		Antimony	126
		Arsenic	35.4
		Barium	60.2
		Beryllium	0.14 B
		Cadmium	14.9
		Calcium	3,150
		Chromium	3,850
		Cobalt	8.4
		Copper	377
		Iron	21,500
		Lead	13,600
		Magnesium	292 B
		Manganese	274
		Nickel	81.2
		Potassium	309 B
		Silver	6
		Sodium	637
		Thallium	2.6 B
		Vanadium	10
		Zinc	834
PCB	ND		
025MW07B08	Manhole 7B Hanger (Yellow)	Aluminum	634
		Antimony	27.6
		Barium	32
		Beryllium	0.03 B
		Cadmium	53.4
		Calcium	3,280
		Chromium	13,600
		Cobalt	0.95 B
		Copper	240
		Iron	1,600
		Lead	878
		Magnesium	136 B
		Manganese	68.9
		Nickel	28.9
		Potassium	1,030
		Silver	7.2
		Sodium	984
		Vanadium	6.8
		Zinc	49400
		PCB	ND
		025MW07B09	Manhole 7B Blank
Barium	1.1 B		
Beryllium	0.04 B		
Calcium	599		
Chromium	2.8		
Copper	3.3		
Iron	13.9		
Magnesium	59.7 B		
Manganese	0.85 B		
Nickel	0.87 B		
Potassium	69.3 B		
Silver	0.52 B		
Sodium	592		
Zinc	15.1		
PCB	ND		

Note:
The lead standard is 200µg/ft² (Housing and Urban Development, 1990).

Table 2
Metals Detections in Wipe Samples

Element	Freq. Of Detection	Range of Detected Conc. (µg/wipe^a)	Mean of Detected Conc. (µg/wipe)	Airborne PELs (µg/m³)
Aluminum	8/8	634 - 27,300	7,409	5,000 ^b
Antimony	8/8	10.9 - 126	31.5	500
Arsenic	7/8	4.6 - 63.2	25.4	10
Barium	8/8	32 - 267	107	500
Beryllium	8/8	0.03 - 1.1	0.28	2
Cadmium	8/8	2.6 - 53.4	11.9	5
Calcium	8/8	987 - 21,600	6,798	5,000 ^b
Chromium	8/8	665 - 14,800	7,301	500
Cobalt	8/8	0.95 - 9.1	3.94	100
Copper	8/8	93.6 - 837	351	100
Iron	8/8	1,600 - 36,200	14,384	10,000
Lead	8/8	235 - 26,500	8,621	50
Magnesium	8/8	99 - 1,800	731	15,000
Manganese	8/8	12.3 - 437	156	5,000
Nickel	8/8	5.1 - 130	48.5	1,000
Potassium	8/8	130 - 1,920	1,024	NA ^c
Selenium	1/8	3.2	3.2	200
Silver	8/8	0.91 - 18.7	6.7	10
Sodium	8/8	637 - 984	776	NA
Thallium	2/8	2.6 - 6.6	4.6	100
Vanadium	8/8	5.8 - 56.2	21.4	500 ^b
Zinc	8/8	139 - 49,400	10,080	500 ^b

Note:

- a = micrograms per wipe sample
- b = respirable fraction
- c = not applicable