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September 28, 2023

Mr. Michael Sollecito, EIT NYS Department of Environmental Conservation Division of Environmental Remediation 625 Broadway, 12th Floor Albany, New York, 12233-7016

Re: Interim Remedial Measures Work Plan Former T&J Salvage – NYSDEC BCP Site No. C224362 2647 Stillwell Avenue, Brooklyn, NY

Dear Mr. Sollecito,

This Interim Remedial Measure (IRM) Work Plan (IRMWP) has been prepared by AKRF, Inc. (AKRF) on behalf of 2647 Stillwell Avenue Property LLC (the "Volunteer") in connection with the former T&J Salvage site, located in Brooklyn, New York, hereafter referred to as the "Site." The purpose of this IRMWP is to present a summary of the catch basin sediment sample results collected during the Remedial Investigation (RI) and propose a remedial strategy to the New York State Department of Environmental Conservation (NYSDEC) to clean the drainage system. The Site location is shown on Figure 1.

SUMMARY OF THE CURRENT SITUATION

During implementation of the RI, a geophysical survey was conducted to identify and trace the approximate location of drainage lines associated with five on-site stormwater catch basins and one off-site catch basin. The survey identified a subgrade piping network leading to Coney Island Creek. An inspection of the shoreline was conducted via kayak and a stormwater outfall was identified along the Site's southwestern boundary with Coney Island Creek. A Site plan showing the drainage system configuration is included on Figure 2. Photographs of the outfall are included in Appendix A.

As part of the RI, the five on-site catch basins were inspected and sediment samples were collected from the bottom of three catch basins identified as RI-CB-03, RI-CB-04, and RI-CB-05. The other two on-site catch basins (RI-CB-01 and RI-CB-02) contained very little sediment and the off-site drain was not inspected as part of the RI. The RI test results revealed the presence of petroleum-related volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and select metals above the NYSDEC Unrestricted Use Soil Cleanup Objectives (UUSCOs) and/or Commercial Use Soil Cleanup Objectives (CUSCOs) in one or more of the structures. The results for the catch basin samples are summarized on Tables 1 through 3.

As the Site is no longer utilized as a junkyard and the catch basins contain sediments with contaminants associated with the Site's former use, the scope of work detailed below includes removal of accumulated sediment to ensure any discharges from the drains do not contain residual contamination associated with the Site's prior use.

SCOPE OF WORK

Waste Characterization

Prior to conducting the remedial activities, AKRF will visit the Site to collect additional sediment samples from the bottom of any of the six catch basins that contain sediment to profile the material for disposal. Based on the Site history, the results of the RI sediment samples, and discussions with potential disposal facilities, the following samples will be collected and analyzed to profile the sediment for off-site disposal.

- One grab sample will be collected from the drain exhibiting the highest reading on a photoionization detector (PID) and analyzed for VOCs by Environmental Protection Agency (EPA) Method 8260 and Gasoline Range Organics by EPA Method 8015;
- One five-point composite sample will be collected from all catch basins containing sediment and analyzed for SVOCs by EPA Method 8270, polychlorinated biphenyls (PCBs) by EPA Method 8082, the Resource Conservation and Recovery Act (RCRA) list of total and leachable metals via EPA Methods 6010, 7471, and 1311, diesel range organics, via EPA Method 8015, and ignitability, reactivity and corrosivity via Method SW846 Chapter 7.3; and
- One five-point composite sample will be collected from all catch basins containing sediment and analyzed for total cyanide by EPA Method 9012B, as requested by NYSDEC.

Sediment samples slated for laboratory analysis will be labeled and placed in laboratory-supplied containers and shipped via courier with chain-of-custody (COC) documentation in accordance with appropriate EPA protocols to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. The above testing suite is designed to meet the acceptance criteria for the Posillico Wash Plant located in Farmingdale, New York, and the Clean Earth of Carteret facility in Carteret, New Jersey.

Upon receipt of the results, AKRF will coordinate with a disposal contractor to obtain acceptance of the material at one of the above-referenced facilities specialized in handling petroleum-contaminated material. A copy of the approval letter and permit for the selected disposal facility will be provided to NYSDEC for approval prior to any shipments.

Drainage System Remediation

- 1. The NYSDEC will be notified at least seven days prior to the sediment removal to coordinate oversight, if required.
- 2. AKRF will initiate work zone monitoring in accordance with the Health and Safety Plan (HASP) included in Appendix B.
- 3. AKRF will mobilize a pump truck to remove any standing liquids from each of the catch basins prior to commencing sediment removal activities.
- 4. A high-powered vacuum truck "guzzler" will be mobilized to remove any sediments contained with the catch basins. The concrete walls and bottom of the catch basins will be power washed to eliminate any residual contamination from the concrete structures. The wash water will be collected by the pump truck for off-site disposal.
- 5. Contaminated sediment will be transported off-site to a properly permitted facility for disposal by an industrial waste hauler in accordance with all local, state, and federal laws.
- 6. Based on the sediment results, the stormwater and wash water will be carted directly to the Clear Flo Technologies facility in Lindenhurst New York via the pump truck for disposal as petroleumcontaminated water. A copy of the operating permit for Clear Flo Technologies is included in Attachment B.

- 7. A daily report will be prepared and submitted to NYSDEC for each day of field activities.
- 8. Upon completion of the remedial activities and receipt of final disposal manifests, AKRF will prepare a report for submittal to NYSDEC. The report will document the field activities, analytical results and waste disposal activities. In addition, the report will include a site diagram depicting the sampling locations, photographs and copies of waste manifests.

We look forward to your approval of this IRMWP. If you have any questions regarding the information presented herein, please contact Steve at (631) 574-3724 or Adrianna at (646) 388-9576.

Sincerely, AKRF, Inc.

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Stephen Malinowski, QEP Senior Vice President

Idmanina Bosco

Adrianna Bosco Technical Director

cc (electronic copy only):

S. Quandt – NYSDEC J. Robinson, S. McLaughlin – NYSDOH R. Nelson, L. Peterson – 2647 Stillwell Avenue Property LLC S. Furman, M. Holden – Sive, Paget & Riesel, PC M. Lapin, J. Holm – AKRF

Enc.

FIGURES

Figure 1 – Brownfield Cleanup Program Site Location Figure 2 – BCP Site and Sample Location Plan

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Table 1 - Sediment Analytical Results for Volatile Organic Compounds

Table 2 - Sediment Analytical Results for Semivolatile Organic Compounds

Table 3 - Sediment Analytical Results for Metals

APPENDICES

- Appendix A Photographs of Outfall
- Appendix B Health and Safety Plan

Appendix C – Permit for Clear Flo Technologies

W:\Projects\220241 - TBE RE 2647 STILLWELL\SAR\BCP\IRM\IRMWP\IRMWorkPlan.C224362.2023-09-28.docx

FIGURES



_ocation.mxd9/5/2022 9:38:35 AM STILLWELL/Technical/GIS and Graphics/SAR/220241 Fig 1 Subject Property 2647 AKRF 2022



LEGEND





TABLES

Table 1				
Sediment Analytical Results for Volatile organic Compounds				
Remedial Investigation				
Former T and J Salvage				
2647 Stillwell Ave, Brooklyn, NY				

	AKRF Sample ID	RI-CB-03_20230504	RI-CB-04_20230504	RI-CB-05_20230504	
	Lab	Data Sample ID	460-279573-9	400-279573-10	400-279573-11
		Date Sampled	5/04/2023	5/04/2023	5/04/2023
		Unit	500 ma/ka	n ma/ka	n ma/ka
Compound	NYSDEC CSCO				
1 1 1-Trichloroethane	500	0.68	1311	0.0021 11	
1 1 2 2-Tetrachloroethane	NS	NS	13 U	0.0021 U	0.0014 U
1 1 2-Trichloro-1 2 2-Trifluoroethane (Freon TE)	NS	NS	13 U	0.0021 U	0.0014 U
1 1 2-Trichloroethane	NS	NS	13 U	0.0021 U	0.0014 U
1.1-Dichloroethane	240	0.27	1.3 U	0.0021 U	0.0014 U
1,1-Dichloroethene	500	0.33	1.3 U	0.0021 U	0.0014 U
1,2,3-Trichlorobenzene	NS	NS	1.3 U	0.0021 U	0.0014 U
1,2,4-Trichlorobenzene	NS	NS	1.3 U	0.0021 U	0.0014 U
1,2,4-Trimethylbenzene	190	3.6	160	0.0021 U	0.0014 U
1,2-Dibromo-3-Chloropropane	NS	NS	1.3 U	0.0021 U	0.0014 U
1,2-Dibromoethane (Ethylene Dibromide)	NS	NS	1.3 U	0.0021 U	0.0014 U
1,2-Dichlorobenzene	500	1.1	1.3 U	0.0021 U	0.0014 U
1,2-Dichloroethane	30	0.02	1.3 U	0.0021 U	0.0014 U
1,2-Dichloropropane	NS	NS	1.3 U	0.0021 U	0.0014 U
1,3,5-Trimethylbenzene (Mesitylene)	190	8.4	72	0.0021 U	0.0014 U
1,3-Dichlorobenzene	280	2.4	1.3 U	0.0021 U	0.0014 U
1,4-Dichlorobenzene	130	1.8	1.3 U	0.0021 U	0.0014 U
2-Hexanone	NS	NS	6.7 U	0.011 U	0.0072 U
Acetone	500	0.05	6.7 UI	0.067	0.0087 U
Benzene	44	0.06	1.1 J	0.0021 U	0.0014 U
Bromochloromethane	NS NC	NS NC	1.3 U	0.0021 0	0.0014 U
Bromodicniorometnane	NS NS	NS NS	1.3 U	0.0021 0	0.0014 U
Bromomothana	NS NS	NS NS	1.3 U	0.0021 0	0.0014 0
Carbon Disulfide	NS	NS	1.3 U	0.0043 0	0.0029 0
Carbon Tetrachloride	22	0.76	1311	0.0021 U	0.0014 U
Chlorobenzene	500	1 1	13 U	0.0021 U	0.0014 U
Chloroethane	NS	NS	1.3 U	0.0021 U	0.0014 U
Chloroform	350	0.37	1.3 U	0.0021 U	0.0014 U
Chloromethane	NS	NS	1.3 U	0.0021 U	0.0014 U
Cis-1,2-Dichloroethylene	500	0.25	1.3 U	0.0021 U	0.0014 U
Cis-1,3-Dichloropropene	NS	NS	1.3 U	0.0021 U	0.0014 U
Cyclohexane	NS	NS	24	0.0021 U	0.0014 U
Dibromochloromethane	NS	NS	1.3 U	0.0021 U	0.0014 U
Dichlorodifluoromethane	NS	NS	1.3 U	0.0021 U	0.0014 U
Ethylbenzene	390	1	31	0.0021 U	0.0014 U
Isopropylbenzene (Cumene)	NS	NS	4.4	0.0021 U	0.0014 U
M,P-Xylenes	NS	NS	230	0.0021 U	0.0014 U
Methyl Acetate	NS	NS	6.7 U	0.011 U	0.0072 U
Methyl Ethyl Ketone (2-Butanone)	500	0.12	6.7 U	0.014	0.0072 U
Ivietnyi Isobutyi Ketone (4-Methyl-2-Pentanone)	NS NO	NS	6.7 U	<u>0.011 U</u>	0.0072 U
Methylcyclohexane	NS FOO	NS	82	0.0021 U	0.0014 U
	500	0.05	1.3 U	0.0043 U	0.0029 0
N-Butylbenzene	500	12	1.3 U	0.0021 U	0.0014 U
N-Propyidenzene	500	3.9 NG	14	0.0021 0	0.0014 U
See Butulbenzene	500	11		0.0021 0	0.0014 U
Styrene	NS	NS	1311	0.0021 0	0.0014 U
T-Butylbenzene	500	50	13 11	0.0021 U	0.0014 11
Tert-Butyl Methyl Ether	500	0.93	13 U	0.0021 U	0.0014 U
Tetrachloroethylene (PCF)	150	1.3	1.3 U	0.0021 U	0.0014 U
Toluene	500	0.7	3.5	0.0021 U	0.0014 U
Trans-1.2-Dichloroethene	500	0,19	1.3 U	0.0021 U	0.0014 U
Trans-1.3-Dichloropropene	NS	NS	1.3 U	0.0021 U	0.0014 U
Trichloroethylene (TCE)	200	0.47	1.3 U	0.0021 U	0.0014 U
Trichlorofluoromethane	NS	NS	1.3 UT	0.0021 U	0.0014 U
Vinyl Chloride	13	0.02	1.3 U	0.0021 U	0.0014 U
Xylenes, Total	500	0.26	320	0.0043 U	0.0029 U

Table 2 Sediment Analytical Results for Semivolatile organic Compounds

Remedial Investigtaion Former T and J Salvage 2647 Stillwell Ave, Brooklyn, NY

		AKRF Sample ID	RI-CB-03 20230504	RI-CB-04 20230504	RI-CB-05 20230504
	Lab	oratory Sample ID	460-279573-9	460-279573-10	460-279573-11
		Date Sampled	5/04/2023	5/04/2023	5/04/2023
		Dilution Factor	5	5	1
		Unit	mg/kg	mg/kg	mg/kg
Compound	NYSDEC CSCO	NYSDEC UUSCO	CONC Q	CONC Q	CONC Q
1.2.4.5-Tetrachlorobenzene	NS	NS	2.1 U	2.9 U	0.46 U
1,4-Dioxane (P-Dioxane)	130	0.1	0.21 U	0.29 U	0.046 U
2,3,4,6-Tetrachlorophenol	NS	NS	2.1 U	2.9 U	0.46 U
2,4,5-Trichlorophenol	NS	NS	2.1 U	2.9 U	0.46 U
2,4,6-Trichlorophenol	NS	NS	0.87 U	1.2 U	0.19 U
2,4-Dichlorophenol	NS	NS	0.87 U	1.2 U	0.19 U
2,4-Dimethylphenol	NS	NS	2.1 U	2.9 U	0.46 U
2,4-Dinitrophenol	NS	NS	1.7 U	2.3 U	0.37 U
2,4-Dinitrotoluene	NS	NS	0.44 U	0.59 U	0.094 U
2,6-Dinitrotoluene	NS	NS	0.44 U	0.59 U	0.094 U
2-Chloronaphthalene	NS	NS	2.1 U	2.9 U	0.46 U
2-Chlorophenol	NS	NS	2.1 U	2.9 U	0.46 U
2-Methylnaphthalene	NS	NS	8.1	2.2 J	0.46 U
2-Methylphenol (O-Cresol)	500	0.33	2.1 U	2.9 U	
2-Nitroaniine	NS	NS NC	2.1 UI	2.9 01	0.46 UI
2 And 4 Mothylphonol (Total)	500	NS NS	2.1 U	2.9 0	0.46 U
3 3' Dichlorobenzidine	NS	NS	0.87 11	1.2 11	0.40 0
3-Nitroaniline	NS	NS	21	2911	0.19 0
4 6-Dinitro-2-Methylphenol	NS	NS	17	2311	0.40 0
4-Bromophenyl Phenyl Ether	NS	NS	21.U	2911	0.67.0
4-Chloro-3-Methylphenol	NS	NS	2.1 U	2.9 U	0.46 U
4-Chloroaniline	NS	NS	2.1 U	2.9 U	0.46 U
4-Chlorophenyl Phenyl Ether	NS	NS	2.1 U	2.9 U	0.46 U
4-Methylphenol (P-Cresol)	500	0.33	2.1 U	2.9 U	0.46 U
4-Nitroaniline	NS	NS	2.1 U	2.9 U	0.46 U
4-Nitrophenol	NS	NS	4.4 U	5.9 U	0.94 U
Acenaphthene	500	20	2.1 U	2.9 U	0.46 U
Acenaphthylene	500	100	2.1 U	2.9 U	0.46 U
Acetophenone	NS	NS	2.1 U	2.9 U	0.028 J
Anthracene	500	100	2.1 U	2.9 U	0.46 U
Atrazine	NS	NS	0.87 U	1.2 U	0.19 U
Benzaldehyde	NS	NS	2.1 U	2.9 U	0.46 U
Benzo(a)Anthracene	5.6	1	0.21 U	0.29 0	0.037 J
Benzo(a)Pyrene	5.6	1	0.21 0	0.14 J	0.035 J
Benzo(b)Fluorantnene	5.0	100	0.14 J	0.12	0.004
Benzo(k)Eluoranthene	56	0.8	0.000 J	0.12 J	0.032 J
Benzyl Butyl Phthalate	NS	NS	2111	2911	0.083 1
Biphenyl (Diphenyl)	NS	NS	21 U	2911	0.46 U
Bis(2-Chloroethoxy) Methane	NS	NS	21 U	2911	0.46 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	NS	0.21 U	0.29 U	0.046 U
Bis(2-Chloroisopropyl) Ether	NS	NS	2.1 U	2.9 U	0.46 U
Bis(2-Ethylhexyl) Phthalate	NS	NS	16	18	0.39 J
Caprolactam	NS	NS	2.1 U	2.9 U	0.46 U
Carbazole	NS	NS	2.1 U	2.9 U	0.46 U
Chrysene	56	1	2.1 U	0.18 J	0.036 J
Dibenz(a,h)Anthracene	0.56	0.33	0.21 U	0.29 U	0.046 U
Dibenzofuran	350	7	2.1 U	2.9 U	0.46 U
Diethyl Phthalate	NS	NS	2.1 U	2.9 U	0.46 U
Dimethyl Phthalate	NS	NS	2.1 U	2.9 U	0.46 U
DI-N-Butyl Phthalate	NS	NS	2.1 U	2.9 U	0.024 J
Di-N-Octylphthalate	NS 500	NS 100	2.1 U	2.9 U	0.46 0
	500	100	0.15 J	0.14 J	0.057 J
Hoveshlersbenzone	500	0.22	0.06 J	0.29 U	0.46 0
Hexachlorobutadiana	NS	0.33 NS	0.21 0	0.29 0	0.040 0
Hexachlorocyclopentadiene	NS	NS	2111	2911	0.034 0
Hexachloroethane	NS	NS	0.21 11	0.29.11	0.046 U
Indeno(1,2,3-c,d)Pyrene	56	0.5	0.21 U	0.29 11	0.04 .1
Isophorone	NS	NS	0.87 U	1.2 U	0.19 U
Naphthalene	500	12	9.1	2.6 J	0.46 U
Nitrobenzene	NS	NS	0.21 U	0.29 U	0.046 U
N-Nitrosodi-N-Propylamine	NS	NS	0.21 U	0.29 U	0.046 U
N-Nitrosodiphenylamine	NS	NS	2.1 U	2.9 U	0.46 U
Pentachlorophenol	6.7	0.8	1.7 U	2.3 U	0.37 U
Phenanthrene	500	100	0.12 J	2.9 U	0.041 J
Phenol	500	0.33	2.1 U	2.9 U	0.46 U
Pyrene	500	100	0.31 J	0.67 J	0.079.1

Table 3 Sediment Analytical Results for Metals Remedial Investigation Former T and I Salvage

Former T and J Salvage 2647 Stillwell Ave, Brooklyn, NY

		AKRF Sample ID	RI-CB-03_20230504	RI-CB-04_20230504	RI-CB-04_20230504	RI-CB-05_20230504
	Lab	oratory Sample ID	460-279573-9	460-279573-10	460-279573-10	460-279573-11
		Date Sampled	5/04/2023	5/04/2023	5/04/2023	5/04/2023
		Dilution Factor	1	1	5	1
		Unit	mg/kg	mg/kg	mg/kg	mg/kg
Compound	NYSDEC CSCO	NYSDEC UUSCO	CONC Q	CONC Q	CONC Q	CONC Q
Aluminum	NS	NS	6,480	7,770	NR	6,830
Antimony	NS	NS	3.5	4.1	NR	1.4
Arsenic	16	13	6	24.8	NR	6.7
Barium	400	350	113	217	NR	154
Beryllium	590	7.2	0.46	0.65	NR	0.59
Cadmium	9.3	2.5	0.71 J	1.9	NR	2.7
Calcium	NS	NS	13,200	12,300	NR	18,700
Chromium, Total	NS	NS	121	131	NR	54.1
Cobalt	NS	NS	6.4	7.5	NR	5.6
Copper	270	50	172	249	NR	102
Iron	NS	NS	68.1 U	57,400	NR	34,800
Lead	1,000	63	90.7	NR	145	148
Magnesium	NS	NS	3,800	5,640	NR	4,710
Manganese	10,000	1,600	531	400	NR	319
Mercury	2.8	0.18	0.019 J	0.094	NR	0.055
Nickel	310	30	46.4	101	NR	34.9
Potassium	NS	NS	479	912	NR	708
Selenium	1,500	3.9	0.16 J	0.28 J	NR	0.22 J
Silver	1,500	2	2.2	3.5	NR	2.2
Sodium	NS	NS	167	241	NR	215
Thallium	NS	NS	0.051 J	NR	3.3 U	0.093 J
Vanadium	NS	NS	30.7	28.3	NR	19.5
Zinc	10,000	109	974	1,340	NR	1,060

2647 Stillwell Ave, Brooklyn, NY

DEFINITIONS

- **B**: The analyte was found in an associated blank, as well as in the sample.
- **D**: Indicates an identified compound in an analysis that has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.
- J: The concentration given is an estimated value.
- ND : The standard is a non-detectable concentration by the approved analytical method.
- **NR** : Not reported.
- **NS**: No standard.
- **P**: Indicates a pesticide/aroclor target analyte had a percent difference greater than 25% between the two gc columns. The lower of the two results is reported.
- T: Indicates that a quality control parameter has exceeded laboratory limits.
- U: The analyte was not detected at the indicated concentration.
- **mg/kg**: milligrams per kilogram
 - ppb: parts per billion
 - **ppt**: parts per trillion
 - µg/L : micrograms per liter
- µg/m³: micrograms per cubic meter of air

STANDARDS

 Part 375 Soil
 Soil Cleanup

 Cleanup
 Soil Cleanup Objectives listed in New York State Department of Environmental Conservation

 Objectives
 : (NYSDEC) "Part 375" Regulations [6 New York Codes, Rules and Regulations (NYCRR) Part 375].

Note: Endosulfans ABS represents the detected sum of Endosulfan I, Endosulfan II, and Endosulfan Sulfate.

Exceedances of Part 375 Commercial Soil Cleanup Objectives (CSCOs) are highlighted in bold font. Exceedances of Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) are highlighted in gray shading.

APPENDIX A Photographs of Outfall





Photograph 1: Stormwater outfall, as seen from Coney Island Creek; view facing north.



Photograph 3: Close-up view of outfall.



Photograph 2: Stormwater outfall; view facing northwest.



Photograph 4: Stormwater outfall and surrounding debris.

APPENDIX B HASP

FORMER T&J SALVAGE 2647 STILLWELL AVENUE BROOKLYN, NEW YORK HEALTH AND SAFETY PLAN

NYSDEC BCP Site No: C224362 AKRF Project Number: 220241

Prepared For:

New York State Department of Environmental Conservation Division of Environmental Remediation, Remedial Bureau B 625 Broadway, 12th Floor Albany, New York 12233

Prepared On Behalf Of:

2647 Stillwell Avenue Property LLC % Turnbridge Equities 4 Bryant Park, Suite 200 New York, NY 10018



AKRF, Inc. 440 Park Avenue South, 7th Floor New York, New York 10016 212-696-0670

SEPTEMBER 2023

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ATTACHMENTS

Attachment A – Potential Health Effects from On-Site Contaminants

Attachment B – Report Forms

Attachment C – Emergency Hand Signals Attachment D – Special Requirements for COVID-19

1.0 INTRODUCTION

This environmental Health and Safety Plan (HASP) has been developed for the implementation of an Interim Remedial Measure Work Plan (IRMWP) by AKRF, Inc. (AKRF) personnel and its subcontractors at the Former T&J Salvage Site located at 2647 Stillwell Avenue in the Coney Island section of Brooklyn, New York, hereafter referred to as the "Site." The IRM includes the cleaning of five on-site stormwater catch basin, one off-site catch basin, and the associated outfall pipe with a high-powered vacuum truck.

Currently, the approximately 1.87-acre Site consists of a concrete-paved yard with empty metal storage containers and a former office. The Site was most recently operated by T&J Auto Salvage, an auto salvage yard, and Stillwell Ready-Mix and Building Materials, LLC, a concrete and building material supply company, up until April 14, 2023. A concrete-paved roadway is located along the southern boundary of the Site adjacent to Coney Island Creek, and a portion of the roadway is encroaching approximately 22 feet onto Block 7247, Lot 1 (Coney Island Creek). Approximately 55 feet of the northern portion of the former salvage yard encroaches into an easement for the adjacent Belt Parkway.

The Site is bounded to the north by as easement area that appears to be associated with the Belt Parkway, followed by the Belt Parkway (a.k.a. Shore Parkway), followed by parking lots; to the east by the Metropolitan Transit Authority (MTA) D, F, N, and Q train lines, followed by vacant land and MTA's Coney Island Yard; to the south by Coney Island Creek; and to the west by Stillwell Avenue, followed by Coney Island Creek. The surrounding area comprises predominantly industrial and commercial uses. A Site Location Map is provided as Figure 1.

Based on available data collected to date, the primary contaminants of concern for the Site are petroleumrelated volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) [a class of semivolatile organic compounds (SVOCs) commonly found in historic fill], and metals in soil, and petroleumrelated VOCs, SVOCs, and metals in groundwater. The results for sediment sample collected from stormwater catch basins also contained elevated levels of VOCs, SVOCs, and metals, (see Tables 1 through 3 in the IRM Work Plan).

This HASP does not discuss routine health and safety issues common to general construction and excavation, including, but not, limited to slips, trips, falls, shoring, and other physical hazards. All AKRF employees are directed that all work must be performed in accordance with the AKRF's Generic HASP and all Occupation Safety and Health Administration (OSHA)-applicable regulations for the work activities required for the project. This HASP also includes supplemental requirements to minimize potential exposure related to COVID-19 (see Attachment D). All project personnel are furthermore directed that they are not permitted to enter Permit Required Confined Spaces (as defined by OSHA). For issues unrelated to contaminated materials, all non-AKRF employees are to be bound by all applicable OSHA regulations as well as any more stringent requirements specified by their employer in their corporate HASP or otherwise. AKRF is not responsible for providing oversight for issues unrelated to contaminated materials by that employees. This oversight shall be the responsibility of the employer of that worker or other official designated by that employer.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

2.1 Hazard Evaluation

2.1.1 Hazards of Concern

Hazards of concern include: organic and inorganic chemicals, and heat and/or cold stress.

2.1.2 Physical Characteristics

Physical characteristics of the hazards of concern include solid, aqueous, and vapor states.

2.1.3 Hazardous Materials

The Site-specific hazardous materials that may be encountered during IRM implementation include: historical fill material, solvent-related VOCs, SVOCs, petroleum, polychlorinated biphenyls (PCBs), and/or metals.

Chemical	REL/PEL/STEL	Health Hazards
Arsenic	REL C: 0.002 mg/m ³ PEL: 0.010 mg/m ³	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen].
Barium	REL/PEL: 0.5 mg/m ³	Irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia
Benzene	REL: 0.1 ppm N STEL: 1 ppm PEL: 1 ppm O STEL: 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen].
Bis(2-ethylhexyl)phthalate Di(2-ethylhexyl)phthalate	REL: 5 mg/m ³ N STEL: 10 mg/m ³ PEL: 5 mg/m ³	Irritation eyes, mucous membrane; In Animals: liver damage; teratogenic effects; [potential occupational carcinogen].
Cadmium	PEL: 0.005 mg/m ³	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen].
DDD, DDE, & DDT	REL: 0.5 mg/m ³ PEL: 1 mg/m ³	Irritation eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen].

2.1.4 Chemicals of Concern

Chemical	REL/PEL/STEL	Health Hazards
Ethylbenzene	REL: 100 ppm N STEL: 125 ppm PEL: 100 ppm	Irritation eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; possible liver injury; reproductive effects.
Fuel Oils	REL: 100 mg/m ³	Irritation eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid).
Isopropyl benzene	REL/PEL: 50 ppm	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma
Lead	REL: 0.050 mg/m ³ PEL:0.050 mg/m ³	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension.
Mercury	REL: 0.05 mg/m ³ REL C: 0.1 mg/m ³ PEL: 0.1 mg/m ³	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria.
Methyl Tert-Butyl Ether	PEL: 50 ppm	Drowsiness, dizziness, headache, weakness, unconsciousness; redness of skin and eyes; Acute ingestion: Nausea, vomiting, abdominal pain; chemical pneumonitis (by aspiration).
Naphthalene	REL: 10 ppm N STEL: 15 ppm PEL: 10 ppm	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage.

Chemical	REL/PEL/STEL	Health Hazards
PAHs	REL: 0.1 mg/m ³ PEL: 0.2 mg/m ³	Effects reported from occupational exposure to PAHs include chronic bronchitis, chronic cough irritation, bronchogenic cancer, dermatitis, cutaneous photosensitization, and pilosebaceous reactions. Reported health effects associated with chronic exposure to coal tar and its by- products (e.g., PAHs): Skin: erythema, burns, and warts on sun-exposed areas with progression to cancer. The toxic effects of coal tar are enhanced by exposure to ultraviolet light. Eyes: irritation and photosensitivity. Respiratory system: cough, bronchitis, and bronchogenic cancer. Gastrointestinal system: leukoplakia, buccal-pharyngeal cancer, and cancer of the lip. Hematopoietic system: leukemia (inconclusive) and lymphoma. Genitourinary system: hematuria and kidney and bladder cancers.
PCBs	REL: 0.001 mg/m ³ PEL: 0.5 mg/m ³	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen].
Tetrachloroethylene	PEL: 100 ppm PEL C: 200 ppm; max peak: 300 ppm	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen].
Trichloroethylene	PEL: 100 ppm PEL C: 200 ppm; 5-min max peak: 300 ppm	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen].
Trimethylbenzene	REL: 25 ppm	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)
Toluene	REL: 100 ppm N STEL: 150 ppm PEL: 200 ppm PEL C: 300 ppm; 10-min max peak: 500 ppm	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.
Xylene	REL: 100 ppm N STEL: 150 ppm PEL: 100 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.

Chemical	REL/PEL/STEL	Health Hazards			
Zinc	REL: 5 mg/m ³ REL C: 15 mg/m ³ N STEL: 10 mg/m ³ PEL: 5 mg/m ³ (ZnO fume); 15 mg/m ³ (ZnO dust)	Chills, elevated body temperature, myalgia, cough, fatigue, chest pain, stomach cramps, nausea, anemia, changes in cholesterol levels, and vomiting.			
Notes:	Notes:				
REL: Recommended exposure	limit (NIOSH)				
PEL: Permissable exposure lim	nits (OSHA)				
STEL: Short-term exposure limit					
N: NIOSH					
O: OSHA					
C: Ceiling					

The potential health effects from these known and suspected on-site contaminants are provided in Attachment A.

2.2 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Officer (SSO). This individual will be responsible for the implementation of the HASP. The SSO will work under the direction of a Qualified Environmental Professional (QEP) and will be experienced in the implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel are outlined in Section 2.3 of this HASP.

2.3 Training

All personnel who enter the work area while intrusive activities are being performed will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. In addition, all personnel will have up-to-date 8-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety. All field personnel must attend a training program, whose purpose is to:

- Make them aware of the potential hazards they may encounter;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- Make them aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Each member of the field crew will be instructed in these objectives before work begins. A Site safety meeting will be conducted at the start of the project work. Additional meetings shall be conducted, as necessary, for new personnel working at the Site.

2.4 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the Site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin Site activities. The medical release shall consider the type of work to be performed and the required personal protective equipment (PPE). The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste Site work.

2.5 Site Work Zones

During any activities involving subsurface disturbance, the work area must be divided into various zones to prevent the spread of any contamination, ensure that proper PPE is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. The Support is the zone area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. A summary of these areas is provided below. These zones may be changed by the SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins. The exclusion zone and CRZ are 10 and 25 feet from the vacuum and pump trucks during the IRM, respectively. Control measures such as caution tape and/or traffic cones will be placed around the perimeter of the work area when needed.

2.6 **Personal Protection Equipment (PPE)**

The PPE required for the IRM tasks are based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, Appendix B, "General Description and Discussion of the Levels of Protection and Protective Gear."

AKRF field personnel and other site personnel shall wear, at a minimum, Level D PPE. The protection will be based on the air monitoring described in Section 2.6.

Level D PPE includes donning of the following during drilling and sampling:

- Ear Plugs
- Steel Toed Boots
- Hard Hat
- Work Gloves
- Safety Glasses
- Nitrile Gloves
- Tyvek Suit [if non-aqueous phase liquid (NAPL) is present]

If photoionization detector (PID) readings exceed 5 parts per million (ppm) in the breathing zone, personnel will don Level C PPE, which includes Level D PPE and a half- or full-face respirator with a dual organic and particulate cartridge.

2.7 General Work Practices

To protect the health and safety of the field personnel, field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the Site. These areas will be designated by the SSO.
- Workers must wash their hands thoroughly on leaving the work area and before eating, drinking, or any other such activity.
- The workers should shower as soon as possible after leaving the Site. Contact with contaminated or suspected surfaces should be avoided.

• The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

3.0 WORK ZONE AIR MONITORING

3.1 Work Zone/On-Site Worker Air Monitoring

3.1.1 Volatile Organic Compound (VOC) Monitoring

Continuous monitoring for VOCs will be conducted using roving hand-held equipment to monitor worker air levels during all ground-intrusive activities, which include the removal or sediments from six catch basins with a high-power vacuum truck. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the exclusion zone. Monitoring will be conducted with a photoionization detector (PID) equipped with a 10.6 electron Volt (eV) lamp capable of calculating 15-minute running average concentrations. More frequent intervals of monitoring will be conducted if required as determined by the SSO. All PID readings will be recorded and available for the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) personnel to review. Instantaneous readings will also be recorded.

3.1.2 Airborne Particulate Monitoring

A DustTrak[®] or equivalent would be used to measure real-time concentrations of total particulates 10 micrometers or less (PM10). Measurements for particulates will be taken prior to commencement of the work and during the work in areas and near the breathing zone of workers, where contaminated soil would be disturbed. The action levels listed in Table 1 are based on 15-minute averages of the monitoring data. The measurements will be made at the breathing height of the workers and as close to their location as practicable. The SSO will set up the equipment and confirm that it is working properly. His/her qualified designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish background levels. The final measurement for the day will be performed after the end of work. The action levels for particulates and VOCs and required responses are listed in Table 1 and are applicable for on-site workers only, who are directly involved with the IRM scope.

Monitoring	Action Level ¹	Response Action
	Less than 0.125 mg/m ³ above background	Level D or D-Modified (Requires coveralls and steel toe boots) (As applicable: Chemical resistant gloves, chemical resistant boot covers, hard hat, safety glasses, face shield, or escape mask)
Particulate	Between 0.125 mg/m ³ and 0.150 mg/m ³ above background	Level C (Requires full face or half face respirator, hooded chemical resistant two-piece Tyvek suit or overalls, chemical resistant inner and outer gloves, chemical resistant boot covers, steel toe and shank boots) (As applicable: hard hat, face shield, or escape mask) Apply dust suppression measures. Resume work or upgrade.
	Greater than 0.150 mg/m ³ above background	Stop work. Apply additional dust suppression measures. Resume work when less than 0.150 mg/m ³ and maintain Level C.
Volatile	Less than 5 ppm in breathing zone	Level D or D-Modified
Organic	Between 5 and 50 ppm	Level C
(VOC)	More than 50 ppm	Stop work. Resume work when source of vapors is abated and readings are less than 50 ppm above background.
Notes: ¹ - 15-minute t parts per millio milligrams per	ime-weighted average on = ppm cubic meter = mg/m ³	

 Table 1

 Work Zone Action Levels and Required Responses

4.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSO will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be taken to a hospital by on-site personnel. Directions to the hospital are provided below, and a Hospital Location Map showing the more direct route to the hospital is included as Figure 2.

Hospital Name:	NYC Health and Hospitals/Coney Island
Phone Number:	(718) 960-9000
Address:	4422 3 rd Avenue, Bronx, NY 10457
Directions:	 Turn LEFT onto Stillwell Avenue from site entrance/exist Turn LEFT onto Neptune Avenue. Turn LEFT onto Shell Road Keep RIGHT on Shell Road as it becomes Shore Parkway Turn LEFT onto Ocean Parkway The emergency room will be on the RIGHT on Ocean Parkway. The entrance is the driveway just before the building.

4.1 Hospital Information

4.2 Emergency Contacts

Company	Individual Name	Title	Contact Number
	Stephen Malinowski	Project Director, QEP	(631) 574-3724
AKDE	Adrianna Bosco	Project Manager	(646) 388-9576
AKRF	Marcela Sanchez	Field Team Leader/Site Safety Officer (SSO)	(646) 388-9748
	Jessica Holm	Alternate Field Team Leader/SSO	(646) 388-9784
2647 Stillwell Avenue	Duan Nalson	BCP Applicant's	(917) 346-5942
Property LLC	Kyan Neison	Representative	(office)
Ambulance, Fire Department & Police Department	_	_	911
NYSDEC Spill Hotline	-	-	800-457-7362

5.0 APPROVAL & ACKNOWLEDGMENTS OF HASP

5.1 Approval

Signed:		Date:	
	AKRF Project Manager		
Signed:		Date:	

AKRF Health and Safety Officer

Below is an affidavit that must be signed by all workers who enter the site. A copy of the HASP must be on-site at all times and will be kept by the SSO.

5.2 Affidavit

I have read the Health and Safety Plan (HASP) for the project located at the 2647 Stillwell Avenue site located at 2647 Stillwell Avenue in Brooklyn, New York. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signed:	Company:	Date:
Signed:	Company:	Date:

FIGURES





ATTACHMENT A

POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

ARSENIC CAS # 7440-38-2

Division of Toxicology ToxFAQsTM

This fact sheet answers the most frequently asked health questions (FAQs) about arsenic. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to higher than average levels of arsenic occurs mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found at 1,014 of the 1,598 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Organic arsenic compounds are used as pesticides, primarily on cotton plants.

What happens to arsenic when it enters the environment?

 \Box Arsenic cannot be destroyed in the environment. It can only change its form.

 \Box Arsenic in air will settle to the ground or is washed out of the air by rain.

□ Many arsenic compounds can dissolve in water.

 \Box Fish and shellfish can accumulate arsenic, but the arsenic in fish is mostly in a form that is not harmful.

How might I be exposed to arsenic?

□ Eating food, drinking water, or breathing air containing arsenic.

Breathing contaminated workplace air.

□ Breathing sawdust or burning smoke from wood treated with arsenic.

Living near uncontrolled hazardous waste sites containing arsenic.

Living in areas with unusually high natural levels of arsenic in rock.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service Agency for Toxic Substances and Disease Registry



December 2003

ToxFAQs[™] Internet address is http://www.atsdr.cdc.gov/toxfaq.html

appearance of small "corns" or "warts" on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Organic arsenic compounds are less toxic than inorganic arsenic compounds. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

How likely is arsenic to cause cancer?

Several studies have shown that inorganic arsenic can increase the risk of lung cancer, skin cancer, bladder cancer, liver cancer, kidney cancer, and prostate cancer. The World Health Organization (WHO), the Department of Health and Human Services (DHHS), and the EPA have determined that inorganic arsenic is a human carcinogen.

How can arsenic affect children?

We do not know if exposure to arsenic will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to inorganic arsenic.

It is likely that health effects seen in children exposed to high amounts of arsenic will be similar to the effects seen in adults.

How can families reduce the risk of exposure to arsenic?

□ If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective clothing to decrease exposure to sawdust.

□ If you live in an area with high levels of arsenic in water or soil, you should use cleaner sources of water and limit contact with soil.

Is there a medical test to show whether I've been exposed to arsenic?

There are tests to measure the level of arsenic in blood, urine, hair, or fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels or arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict how the arsenic levels in your body will affect your health.

Has the federal government made recommendations to protect human health?

EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or canceled many uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration has set limits of 10 μ g arsenic per cubic meter of workplace air (10 μ g/m³) for 8 hour shifts and 40 hour work weeks.

Source of Information

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Arsenic. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQsTM Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

Federal Recycling Program





BARIUM AND COMPOUNDS CAS # 7440-39-3

Division of Toxicology and Environmental Medicine ToxFAQsTM

This fact sheet answers the most frequently asked health questions (FAQs) about barium and barium compounds. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because these substances may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to barium occurs mostly in the workplace or from drinking contaminated water. Ingesting drinking water containing levels of barium above the EPA drinking water guidelines for relatively short periods of time can cause gastrointestinal disturbances and muscle weakness. Ingesting high levels for a long time can damage the kidneys. Barium and barium compounds have been found in at least 798 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is barium?

Barium is a silvery-white metal which exists in nature only in ores containing mixtures of elements. It combines with other chemicals such as sulfur or carbon and oxygen to form barium compounds.

Barium compounds are used by the oil and gas industries to make drilling muds. Drilling muds make it easier to drill through rock by keeping the drill bit lubricated. They are also used to make paint, bricks, ceramics, glass, and rubber.

Barium sulfate is sometimes used by doctors to perform medical tests and to take x-rays of the gastrointestinal tract.

What happens to barium when it enters the environment?

□ Barium gets into the air during the mining, refining, and production of barium compounds, and from the burning of coal and oil.

□ The length of time that barium will last in air, land, water, or sediments depends on the form of barium released.

□ Barium compounds, such as barium sulfate and barium carbonate, which do not dissolve well in water, can last a long time in the environment.

□ Barium compounds, such as barium chloride, barium nitrate, or barium hydroxide, that dissolve easily in water usually do not last in these forms for a long time in the environment. The barium in these compounds that is dissolved in water quickly combines with sulfate or carbonate that are naturally found in water and become the longer lasting forms (barium sulfate and barium carbonate).

□ Fish and aquatic organisms can accumulate barium.

How might I be exposed to barium?

□ Ingesting small amounts present in your food and water or breathing air containing very low levels of barium.

Living in areas with unusually high natural levels of barium in the drinking water.

 \Box Working in a job that involves barium production or use.

Living or working near waste sites where barium has been disposed of.

How can barium affect my health?

The health effects of the different barium compounds depend on how well the compound dissolves in water or in the stomach contents. Barium compounds that do not dissolve well, such as barium sulfate, are not generally harmful.

August 2007

BARIUM AND COMPOUNDS CAS # 7440-39-3

ToxFAQs[™] Internet address is http://www.atsdr.cdc.gov/toxfaq.html

Barium has been found to potentially cause gastrointestinal disturbances and muscular weakness when people are exposed to it at levels above the EPA drinking water standards for relatively short periods of time. Some people who eat or drink amounts of barium above background levels found in food and water for a short period may experience vomiting, abdominal cramps, diarrhea, difficulties in breathing, increased or decreased blood pressure, numbness around the face, and muscle weakness. Eating or drinking very large amounts of barium compounds that easily dissolve can cause changes in heart rhythm or paralysis and possibly death. Animals that drank barium over long periods had damage to the kidneys, decreases in body weight, and some died.

How likely is barium to cause cancer?

The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have not classified barium as to its carcinogenicity. The EPA has determined that barium is not likely to be carcinogenic to humans following ingestion and that there is insufficient information to determine whether it will be carcinogenic to humans following inhalation exposure.

How can barium affect children?

We do not know whether children will be more or less sensitive than adults to barium toxicity. A study in rats that swallowed barium found a decrease in newborn body weight; we do not know if a similar effect would be seen in humans.

How can families reduce the risks of exposure to barium?

The greatest potential source of barium exposure is through food and drinking water. However, the amount of barium in foods and drinking water are typically too low to be of concern.

Is there a medical test to determine whether I've been exposed to barium?

There is no routine medical test to determine whether you have been exposed to barium. Doctors can measure barium in body tissues and fluids, such as bones, blood, urine, and feces, using very complex instruments. These tests cannot be used to predict the extent of the exposure or potential health effects.

The geometric mean barium level measured in the U.S. general population aged 6 and older is reported by the Centers for Disease Control and Prevention (CDC) as $1.44 \,\mu$ g/g creatinine (measured in urine).

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2.0 milligrams of barium per liter of drinking water (2.0 mg/L), which is the same as 2 ppm.

The Occupational Safety and Health Administration (OSHA) has set Permissible Exposure Limits (PELs) of 0.5 milligrams of soluble barium compounds per cubic meter of workplace air (0.5 mg/m³) for 8 hour shifts and 40 hour work weeks. The OSHA limits for barium sulfate dust are 15 mg/m³ of total dust and 5 mg/m³ for respirable fraction.

The National Institute for Occupational Safety and Health (NIOSH) has set Recommended Exposure Limits (RELs) of 0.5 mg/m³ for soluble barium compounds. The NIOSH has set RELs of 10 mg/m^3 (total dust) for barium sulfate and 5 mg/m^3 (respirable fraction).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Barium and Compounds (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

Federal Recycling Program



Agency for Toxic Substances and Disease Registry ToxFAQs

This fact sheet answers the most frequently asked health questions (FAQs) about benzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Benzene is a widely used chemical formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia. Benzene has been found in at least 813 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is benzene?

(Pronounced bĕn'zēn')

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

What happens to benzene when it enters the environment?

- □ Industrial processes are the main source of benzene in the environment.
- □ Benzene can pass into the air from water and soil.
- □ It reacts with other chemicals in the air and breaks down within a few days.
- □ Benzene in the air can attach to rain or snow and be carried back down to the ground.

- □ It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- Benzene does not build up in plants or animals.

How might I be exposed to benzene?

- Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- □ Indoor air generally contains higher levels of benzene from products that contain it such as glues, paints, furniture wax, and detergents.
- Air around hazardous waste sites or gas stations will contain higher levels of benzene.
- □ Leakage from underground storage tanks or from hazardous waste sites containing benzene can result in benzene contamination of well water.
- People working in industries that make or use benzene may be exposed to the highest levels of it.
- \Box A major source of benzene exposures is tobacco smoke.

How can benzene affect my health?

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

September 1997



BENZENE

CAS # 71-43-2
ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.

Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men.

Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

How likely is benzene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that benzene is a known human carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

Is there a medical test to show whether I've been exposed to benzene?

Several tests can show if you have been exposed to benzene. There is test for measuring benzene in the breath; this test must be done shortly after exposure. Benzene can also be measured in the blood, however, since benzene disappears rapidly from the blood, measurements are accurate only for recent exposures.

In the body, benzene is converted to products called metabolites. Certain metabolites can be measured in the urine. However, this test must be done shortly after exposure and is not a reliable indicator of how much benzene you have been exposed to, since the metabolites may be present in urine from other sources.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum permissible level of benzene in drinking water at 0.005 milligrams per liter (0.005 mgL). The EPA requires that spills or accidental releases into the environment of 10 pounds or more of benzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit of 1 part of benzene per million parts of air (1 ppm) in the workplace during an 8-hour workday, 40-hour workweek.

Glossary

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Chromosomes: Parts of the cells responsible for the development of hereditary characteristics.

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Benzene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



ETHYLBENZENE CAS # 100-41-4

Agency for Toxic Substances and Disease Registry ToxFAQs

This fact sheet answers the most frequently asked health questions (FAQs) about ethylbenzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Ethylbenzene is a colorless liquid found in a number of products including gasoline and paints. Breathing very high levels can cause dizziness and throat and eye irritation. Ethylbenzene has been found in at least 731 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is ethylbenzene?

(Pronounced ĕth' əl bĕn' zēn')

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum and is also found in manufactured products such as inks, insecticides, and paints.

Ethylbenzene is used primarily to make another chemical, styrene. Other uses include as a solvent, in fuels, and to make other chemicals.

What happens to ethylbenzene when it enters the environment?

- Ethylbenzene moves easily into the air from water and soil.
- □ It takes about 3 days for ethylbenzene to be broken down in air into other chemicals.
- Ethylbenzene may be released to water from industrial discharges or leaking underground storage tanks.
- □ In surface water, ethylbenzene breaks down by reacting with other chemicals found naturally in water.
- □ In soil, it is broken down by soil bacteria.

How might I be exposed to ethylbenzene?

- □ Breathing air containing ethylbenzene, particularly in areas near factories or highways.
- Drinking contaminated tap water.
- □ Working in an industry where ethylbenzene is used or made.
- Using products containing it, such as gasoline, carpet glues, varnishes, and paints.

How can ethylbenzene affect my health?

Limited information is available on the effects of ethylbenzene on people's health. The available information shows dizziness, throat and eye irritation, tightening of the chest, and a burning sensation in the eyes of people exposed to high levels of ethylbenzene in air.

Animals studies have shown effects on the nervous system, liver, kidneys, and eyes from breathing ethylbenzene in air.

How likely is ethylbenzene to cause cancer?

The EPA has determined that ethylbenzene is not classifiable as to human carcinogenicity.

June 1999

ETHYLBENZENE CAS # 100-41-4

ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

No studies in people have shown that ethylbenzene exposure can result in cancer. Two available animal studies suggest that ethylbenzene may cause tumors.

How can ethylbenzene affect children?

Children may be exposed to ethylbenzene through inhalation of consumer products, including gasoline, paints, inks, pesticides, and carpet glue. We do not know whether children are more sensitive to the effects of ethylbenzene than adults.

It is not known whether ethylbenzene can affect the development of the human fetus. Animal studies have shown that when pregnant animals were exposed to ethylbenzene in air, their babies had an increased number of birth defects.

How can families reduce the risk of exposure to ethylbenzene?

Exposure to ethylbenzene vapors from household products and newly installed carpeting can be minimized by using adequate ventilation.

Household chemicals should be stored out of reach of children to prevent accidental poisoning. Always store household chemicals in their original containers; never store them in containers children would find attractive to eat or drink from, such as old soda bottles. Gasoline should be stored in a gasoline can with a locked cap.

Sometimes older children sniff household chemicals, including ethylbenzene, in an attempt to get high. Talk with your children about the dangers of sniffing chemicals.

Is there a medical test to show whether I've been exposed to ethylbenzene?

Ethylbenzene is found in the blood, urine, breath, and

some body tissues of exposed people. The most common way to test for ethylbenzene is in the urine. This test measures substances formed by the breakdown of ethylbenzene. This test needs to be done within a few hours after exposure occurs, because the substances leave the body very quickly.

These tests can show you were exposed to ethylbenzene, but cannot predict the kind of health effects that might occur.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level of 0.7 milligrams of ethylbenzene per liter of drinking water (0.7 mg/L).

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of ethylbenzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 100 parts of ethylbenzene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for ethylbenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.





FUEL OILS CAS # 8008-20-6, 70892-10-3, 68476-30-2, 68476-34-6, 68476-31-3

Agency for Toxic Substances and Disease Registry ToxFAQs

September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about fuel oils. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Fuel oils are liquid mixtures produced from petroleum, and their use mostly involves burning them as fuels. Drinking or breathing fuel oils may cause nausea or nervous system effects. However, exposure under normal use conditions is not likely to be harmful. Fuel oils have been found in at least 26 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are fuel oils?

(Pronounced fyoo'əl oilz)

Fuel oils are a variety of yellowish to light brown liquid mixtures that come from crude petroleum. Some chemicals found in fuel oils may evaporate easily, while others may more easily dissolve in water.

Fuel oils are produced by different petroleum refining processes, depending on their intended uses. Fuel oils may be used as fuel for engines, lamps, heaters, furnaces, and stoves, or as solvents.

Some commonly found fuel oils include kerosene, diesel fuel, jet fuel, range oil, and home heating oil. These fuel oils differ from one another by their hydrocarbon compositions, boiling point ranges, chemical additives, and uses.

What happens to fuel oils when they enter the environment?

- □ Some chemicals found in fuel oils may evaporate into the air from open containers or contaminated soil or water.
- □ Some chemicals found in fuel oils may dissolve in water after spills to surface waters or leaks from underground storage tanks.

- □ Some chemicals found in fuel oils may stick to particles in water, which will eventually cause them to settle to the bottom sediment.
- □ Some of the chemicals found in fuel oils may be broken down slowly in air, water, and soil by sunlight or small organisms.
- □ Some of the chemicals found in fuel oils may build up significantly in plants and animals.

How might I be exposed to fuel oils?

- □ Using a home kerosene heater or stove, or using fuel oils at work.
- □ Breathing air in home or building basements that has been contaminated with fuel oil vapors entering from the soil.
- Drinking or swimming in water that has been contaminated with fuel oils from a spill or a leaking underground storage tank.
- □ Touching soil contaminated with fuel oils.
- □ Using fuel oils to wash paint or grease from skin or equipment.

How can fuel oils affect my health?

Little information is available about the health effects that may be caused by fuel oils. People who use kerosene

ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

stoves for cooking do not seem to have any health problems related to their exposure.

Breathing some fuel oils for short periods may cause nausea, eye irritation, increased blood pressure, headache, lightheadedness, loss of appetite, poor coordination, and difficulty concentrating. Breathing diesel fuel vapors for long periods may cause kidney damage and lower your blood's ability to clot.

Drinking small amounts of kerosene may cause vomiting, diarrhea, coughing, stomach swelling and cramps, drowsiness, restlessness, painful breathing, irritability, and unconsciousness. Drinking large amounts of kerosene may cause convulsions, coma, or death. Skin contact with kerosene for short periods may cause itchy, red, sore, or peeling skin.

How likely are fuel oils to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that some fuel oils (heavy) may possibly cause cancer in humans, but for other fuel oils (light) there is not enough information to make a determination. IARC has also determined that occupational exposures to fuel oils during petroleum refining are probably carcinogenic in humans.

Some studies with mice have suggested that repeated contact with fuel oils may cause liver or skin cancer. However, other mouse studies have found this not to be the case. No studies are available in other animals or in people on the carcinogenic effects of fuel oils.

Is there a medical test to show whether I've been exposed to fuel oils?

There is no medical test that shows if you have been exposed to fuel oils. Tests are available to determine if some of

the chemicals commonly found in fuel oils are in your blood. However, the presence of these chemicals in blood may not necessarily mean that you have been exposed to fuel oils.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) and the Air Force Office of Safety and Health (AFOSH) have set a permissible exposure level (PEL) of 400 parts of petroleum distillates per million parts of air (400 ppm) for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that average workplace air levels not exceed 350 milligrams of petroleum distillates per cubic meter of air (350 mg/m³) for a 40-hour workweek.

The Department of Transportation (DOT) lists fuel oils as hazardous materials and, therefore, regulates their transportation.

Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for fuel oils. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



Division of Toxicology and Environmental Medicine ToxFAQsTM

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,272 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is lead?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years. The use of lead as an additive to gasoline was banned in 1996 in the United States.

What happens to lead when it enters the environment?

□ Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.

□ When lead is released to the air, it may travel long distances before settling to the ground.

□ Once lead falls onto soil, it usually sticks to soil particles.

□ Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.

How might I be exposed to lead?

□ Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out into the water.

□ Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.

❑ Working in a job where lead is used or engaging in certain hobbies in which lead is used, such as making stained glass.

□ Using health-care products or folk remedies that contain lead.

How can lead affect my health?

The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. Highlevel exposure in men can damage the organs responsible for sperm production.

How likely is lead to cause cancer?

We have no conclusive proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services

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LEAD CAS # 7439-92-1

ToxFAQsTM Internet address is http://www.atsdr.cdc.gov/toxfaq.html

(DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans.

How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead. Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead. Some of these effects may persist beyond childhood.

How can families reduce the risks of exposure to lead?

Avoid exposure to sources of lead.

□ Do not allow children to chew or mouth surfaces that may have been painted with lead-based paint.

□ If you have a water lead problem, run or flush water that has been standing overnight before drinking or cooking with it.

□ Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children

□ If your home contains lead-based paint or you live in an area contaminated with lead, wash children's hands and faces

often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to determine whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your recent exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth or bones can be measured by X-ray techniques, but these methods are not widely available. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (μ g/dL). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that states test children at ages 1 and 2 years. Children should be tested at ages 3–6 years if they have never been tested for lead, if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children, if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers a blood lead level of 10 μ g/dL to be a level of concern for children.

EPA limits lead in drinking water to 15 µg per liter.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for lead (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



Agency for Toxic Substances and Disease Registry ToxFAQs

This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to mercury occurs from breathing contaminated air, ingesting contaminated water and food, and having dental and medical treatments. Mercury, at high levels, may damage the brain, kidneys, and developing fetus. This chemical has been found in at least 714 of 1,467 National Priorities List sites identified by the Environmental Protection Agency.

What is mercury?

(Pronounced mūr/kyə-rē)

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

What happens to mercury when it enters the environment?

- □ Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- □ It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.

- □ Methylmercury may be formed in water and soil by small organisms called bacteria.
- □ Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

- □ Eating fish or shellfish contaminated with methylmercury.
- □ Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fuels.
- □ Release of mercury from dental work and medical treatments.
- Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).
- □ Practicing rituals that include mercury.

How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea,

April 1999



MERCURY CAS # 7439-97-6

ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

How likely is mercury to cause cancer?

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

How can mercury affect children?

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. It can also can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

How can families reduce the risk of exposure to mercury?

Carefully handle and dispose of products that contain mercury, such as thermometers or fluorescent light bulbs. Do not vacuum up spilled mercury, because it will vaporize and increase exposure. If a large amount of mercury has been spilled, contact your health department. Teach children not to play with shiny, silver liquids.

Properly dispose of older medicines that contain mercury. Keep all mercury-containing medicines away from children. rooms where liquid mercury has been used.

Learn about wildlife and fish advisories in your area from your public health or natural resources department.

Is there a medical test to show whether I've been exposed to mercury?

Tests are available to measure mercury levels in the body. Blood or urine samples are used to test for exposure to metallic mercury and to inorganic forms of mercury. Mercury in whole blood or in scalp hair is measured to determine exposure to methylmercury. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb).

The Food and Drug Administration (FDA) has set a maximum permissible level of 1 part of methylmercury in a million parts of seafood (1 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m³) and 0.05 mg/m³ of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Pregnant women and children should keep away from

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.





POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Agency for Toxic Substances and Disease Registry ToxFAQs

September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl'ĭ-sī'klĭk ăr'ə-măt'ĭk hī'drəkar'bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

What happens to PAHs when they enter the environment?

- □ PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- □ PAHs can occur in air attached to dust particles.
- □ Some PAH particles can readily evaporate into the air from soil or surface waters.
- □ PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.

- □ PAHs enter water through discharges from industrial and wastewater treatment plants.
- □ Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- □ Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- □ In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- □ PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- □ Coming in contact with air, water, or soil near hazardous waste sites.
- □ Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- Drinking contaminated water or cow's milk.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service Agency for Toxic Substances and Disease Registry

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

How can PAHs affect my health?

Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.

How likely are PAHs to cause cancer?

The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m³). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m³ averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m^3 for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.





POLYCHLORINATED BIPHENYLS

Division of Toxicology ToxFAQsTM

February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

What happens to PCBs when they enter the environment?

□ PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.

□ PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.

□ PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.

□ PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

How might I be exposed to PCBs?

□ Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.

□ Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.

□ Breathing air near hazardous waste sites and drinking contaminated well water.

□ In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

How can PCBs affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects

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of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

How likely are PCBs to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

How can PCBs affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCBcontaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported In most cases, the benefits of breastfeeding outweigh any risks from exposure to PCBs in mother's milk.

How can families reduce the risk of exposure to PCBs?

You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.
 Children should be told not play with old appliances,

electrical equipment, or transformers, since they may contain PCBs.

Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.
 If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

Is there a medical test to show whether I've been exposed to PCBs?

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQsTM Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.





TETRACHLOROETHYLENE CAS # 127-18-4

Agency for Toxic Substances and Disease Registry ToxFAQs

September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?

(Pronounced tĕt'rə-klôr' ō-ĕth'ə-lēn')

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- □ Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- □ Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- □ In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- □ It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- □ When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- □ When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethyl-

TETRACHLOROETHYLENE CAS # 127-18-4

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ene can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage. Exposure to very high levels of tetrachloroethylene can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant.

How likely is tetrachloroethylene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats.

Is there a medical test to show whether I've been exposed to tetrachloroethylene?

One way of testing for tetrachloroethylene exposure is to measure the amount of the chemical in the breath, much the same way breath-alcohol measurements are used to determine the amount of alcohol in the blood.

Because it is stored in the body's fat and slowly released into the bloodstream, tetrachloroethylene can be detected in the breath for weeks following a heavy exposure.

Tetrachloroethylene and trichloroacetic acid (TCA), a breakdown product of tetrachloroethylene, can be detected in the blood. These tests are relatively simple to perform. These tests aren't available at most doctors' offices, but can be performed at special laboratories that have the right equipment.

Because exposure to other chemicals can produce the same breakdown products in the urine and blood, the tests for breakdown products cannot determine if you have been exposed to tetrachloroethylene or the other chemicals.

Has the federal government made recommendations to protect human health?

The EPA maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water is 0.005 milligrams tetrachloroethylene per liter of water (0.005 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Glossary

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Tetrachloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.





TRICHLOROETHYLENE CAS # 79-01-6

Division of Toxicology ToxFAQsTM

July 2003

This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.

□ Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.

□ Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.

□ Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.

Trichloroethylene does not build up significantly in

plants and animals.

How might I be exposed to trichloroethylene?

□ Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.

□ Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.

Contact with soil contaminated with trichloroethylene,

such as near a hazardous waste site.

□ Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

TRICHLOROETHYLENE CAS # 79-01-6

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Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death.

Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with trichloroethylene for short periods may cause skin rashes.

How likely is trichloroethylene to cause cancer?

Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver, kidney, or lung cancer. Some studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. Although, there are some concerns about the studies of people who were exposed to trichloroethylene, some of the effects found in people were similar to effects in animals.

In its 9th Report on Carcinogens, the National Toxicology Program (NTP) determined that trichloroethylene is "reasonably anticipated to be a human carcinogen." The International Agency for Research on Cancer (IARC) has determined that trichloroethylene is "probably carcinogenic to humans."

Is there a medical test to show whether I've been exposed to trichloroethylene?

If you have recently been exposed to

trichloroethylene, it can be detected in your breath, blood, or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of trichloroethylene.

Exposure to larger amounts is assessed by blood

and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. This test isn't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level for trichloroethylene in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water.

The EPA has also developed regulations for the handling and disposal of trichloroethylene.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 100 parts of trichloroethylene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: The ability of a substance to cause cancer. CAS: Chemical Abstracts Service. Evaporate: To change into a vapor or gas. Milligram (mg): One thousandth of a gram. Nonflammable: Will not burn. ppm: Parts per million. Sediment: Mud and debris that have settled to the bottom of a body of water. Solvent: A chemical that dissolves other substances. **References**

This ToxFAQs information is taken from the 1997 Toxicological Profile for Trichloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQsTM Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



Division of Toxicology ToxFAQsTM

This fact sheet answers the most frequently asked health questions (FAOs) about toluene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to toluene occurs from breathing contaminated workplace air, in automobile exhaust, some consumer products paints, paint thinners, fingernail polish, lacquers, and adhesives. Toluene affects the nervous system. Toluene has been found at 959 of the 1,591 National Priority List sites identified by the Environmental Protection Agency

What is toluene?

Toluene is a clear, colorless liquid with a distinctive smell. Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline and other fuels from crude oil and making coke from coal.

Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

What happens to toluene when it enters the environment?

□ Toluene enters the environment when you use materials that contain it. It can also enter surface water and groundwater from spills of solvents and petrolieum products as well as from leasking underground storage tanks at gasoline stations and other facilities.

U When toluene-containing products are placed in landfills or waste disposal sites, the toluene can enter the soil or water near the waste site.

□ Toluene does not usually stay in the environment long.

□ Toluene does not concentrate or buildup to high levels in animals.

How might I be exposed to toluene?

Breathing contaminated workplace air or automobile exhaust.

U Working with gasoline, kerosene, heating oil, paints, and lacquers.

Drinking contaminated well-water.

Living near uncontrolled hazardous waste sites containing toluene products.

How can toluene affect my health?

Toluene may affect the nervous system. Low to moderate levles can cause tiredness, confusion, weakness, drunkentype actions, memory loss, nausea, loss of appetite, and

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TOLUENE

CAS # 108-88-3

AGENCY FOR TOXIC SUBSTANCES



TOLUENE CAS # 108-88-3

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hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

Inhaling High levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death.

High levels of toluene may affect your kidneys.

How likely is toluene to cause cancer?

Studies in humans and animals generally indicate that toluene does not cause cancer.

The EPA has determined that the carcinogenicity of toluene can not be classified.

How can toluene affect children?

It is likely that health effects seen in children exposed to toluene will be similar to the effects seen in adults. Some studies in animals suggest that babies may be more sensitive than adults.

Breathing very high levels of toluene during pregnancy can result in children with birth defects and retard mental abilities, and growth. We do not know if toluene harms the unborn child if the mother is exposed to low levels of toluene during pregnancy.

How can families reduce the risk of exposure to toluene?

Use toluene-containing products in well-ventilated areas.

□ When not in use, toluene-containing products should be tightly covered to prevent evaporation into the air.

Is there a medical test to show whether I've been exposed to toluene?

There are tests to measure the level of toluene or its breakdown products in exhaled air, urine, and blood. To determine if you have been exposed to toluene, your urine or blood must be checked within 12 hours of exposure. Several other chemicals are also changed into the same breakdown products as toluene, so some of these tests are not specific for toluene.

Has the federal government made recommendations to protect human health?

EPA has set a limit of 1 milligram per liter of drinking water (1 mg/L).

Discharges, releases, or spills of more than 1,000 pounds of toluene must be reported to the National Response Center.

The Occupational Safety and Health Administration has set a limit of 200 parts toluene per million of workplace air (200 ppm).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Toluene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQsTM Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



Agency for Toxic Substances and Disease Registry ToxFAQs

This fact sheet answers the most frequently asked health questions (FAQs) about xylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to xylene occurs in the workplace and when you use paint, gasoline, paint thinners and other products that contain it. People who breathe high levels may have dizziness, confusion, and a change in their sense of balance. This substance has been found in at least 658 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is xylene?

(Pronounced zī/lēn)

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. It occurs naturally in petroleum and coal tar and is formed during forest fires. You can smell xylene in air at 0.08–3.7 parts of xylene per million parts of air (ppm) and begin to taste it in water at 0.53–1.8 ppm.

Chemical industries produce xylene from petroleum. It's one of the top 30 chemicals produced in the United States in terms of volume.

Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

What happens to xylene when it enters the environment?

- □ Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.
- □ It evaporates quickly from the soil and surface water into the air.

- □ In the air, it is broken down by sunlight into other less harmful chemicals.
- □ It is broken down by microorganisms in soil and water.
- □ Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

How might I be exposed to xylene?

- □ Breathing xylene in workplace air or in automobile exhaust.
- □ Breathing contaminated air.
- □ Touching gasoline, paint, paint removers, varnish, shellac, and rust preventatives that contain it.
- □ Breathing cigarette smoke that has small amounts of xylene in it.
- Drinking contaminated water or breathing air near waste sites and landfills that contain xylene.
- \Box The amount of xylene in food is likely to be low.

How can xylene affect my health?

Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of

XYLENE CAS # 1330-20-7



September 1996

ToxFAQs Internet home page via WWW is http://www.atsdr.cdc.gov/toxfaq.html

people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

How likely is xylene to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans.

Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.

Is there a medical test to show whether I've been exposed to xylene?

Laboratory tests can detect xylene or its breakdown products in exhaled air, blood, or urine. There is a high degree of agreement between the levels of exposure to xylene and the levels of xylene breakdown products in the urine. However, a urine sample must be provided very soon after exposure ends because xylene quickly leaves the body. These tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 10 ppm of xylene in drinking water.

The EPA requires that spills or accidental releases of xylenes into the environment of 1,000 pounds or more must be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum level of 100 ppm xylene in workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) also recommend exposure limits of 100 ppm in workplace air.

NIOSH has recommended that 900 ppm of xylene be considered immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Evaporate: To change from a liquid into a vapor or a gas.Carcinogenic: Having the ability to cause cancer.CAS: Chemical Abstracts Service.ppm: Parts per million.Solvent: A liquid that can dissolve other substances.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for xylenes (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



Division of Toxicology ToxFAQsTM

This fact sheet answers the most frequently asked health questions (FAQs) about zinc. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Zinc is a naturally occurring element. Exposure to high levels of zinc occurs mostly from eating food, drinking water, or breathing workplace air that is contaminated. Low levels of zinc are essential for maintaining good health. Exposure to large amounts of zinc can be harmful. It can cause stomach cramps, anemia, and changes in cholesterol levels. Zinc has been found in at least 985 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is zinc?

Zinc is one of the most common elements in the earth's crust. It is found in air, soil, and water, and is present in all foods. Pure zinc is a bluish-white shiny metal.

Zinc has many commercial uses as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys like brass, and bronze. A zinc and copper alloy is used to make pennies in the United States.

Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dyes, wood preservatives, and ointments.

What happens to zinc when it enters the environment?

□ Some is released into the environment by natural processes, but most comes from human activities like mining, steel production, coal burning, and burning of waste.

 \Box It attaches to soil, sediments, and dust particles in the air.

□ Rain and snow remove zinc dust particles from the air.

Depending on the type of soil, some zinc compounds can move into the groundwater and into lakes, streams, and rivers.

 $\hfill\square$ Most of the zinc in soil stays bound to soil particles and

does not dissolve in water.

 \Box It builds up in fish and other organisms, but it does not build up in plants.

How might I be exposed to zinc?

Ingesting small amounts present in your food and water.
 Drinking contaminated water or a beverage that has been stored in metal containers or flows through pipes that have been coated with zinc to resist rust.

Eating too many dietary supplements that contain zinc.
 Working on any of the following jobs: construction, painting, automobile mechanics, mining, smelting, and welding; manufacture of brass, bronze, or other zinc-containing alloys; manufacture of galvanized metals; and manufacture of machine parts, rubber, paint, linoleum, oilcloths, batteries, some kind of glass, ceramics, and dyes.

How can zinc affect my health?

Zinc is an essential element in our diet. Too little zinc can cause problems, but too much zinc is also harmful.

Harmful effects generally begin at levels 10-15 times higher than the amount needed for good health. Large doses taken by mouth even for a short time can cause stomach cramps, nausea, and vomiting. Taken longer, it can cause anemia and decrease the levels of your good cholesterol. We do not know if high levels of zinc affect reproduction in humans. Rats that were fed large amounts of zinc became infertile.

August 2005

CAS # 7440-66-6

ZINC



ToxFAQs[™] Internet address is http://www.atsdr.cdc.gov/toxfaq.html

Inhaling large amounts of zinc (as dusts or fumes) can cause a specific short-term disease called metal fume fever. We do not know the long-term effects of breathing high levels of zinc.

Putting low levels of zinc acetate and zinc chloride on the skin of rabbits, guinea pigs, and mice caused skin irritation. Skin irritation will probably occur in people.

How likely is zinc to cause cancer?

The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have not classified zinc for carcinogenicity. Based on incomplete information from human and animal studies, the EPA has determined that zinc is not classifiable as to its human carcinogenicity.

How can zinc affect children?

Zinc is essential for proper growth and development of young children. It is likely that children exposed to very high levels of zinc will have similar effects as adults. We do not know whether children are more susceptible to the effects of excessive intake of zinc than the adults.

We do not know if excess zinc can cause developmental effects in humans. Animal studies have found decreased weight in the offspring of animals that ingested very high amounts of zinc.

How can families reduce the risks of exposure to zinc?

□ Children living near waste sites that contain zinc may be exposed to higher levels of zinc through breathing contaminated air, drinking contaminated drinking water, touching or eating contaminated soil.

□ Discourage your children from eating soil or putting their hands in their mouths and teach them to wash their hands frequently and before eating.

□ If you use medicines or vitamin supplements containing

zinc, make sure you use them appropriately and keep them out of the reach of children.

Is there a medical test to determine whether I've been exposed to zinc?

There are tests available to measure zinc in your blood, urine, hair, saliva, and feces. These tests are not usually done in the doctor's office because they require special equipment. High levels of zinc in the feces can mean high recent zinc exposure. High levels of zinc in the blood can mean high zinc consumption and/or high exposure. Tests to measure zinc in hair may provide information on long-term zinc exposure; however, the relationship between levels in your hair and the amount of zinc you were exposed to is not clear.

Has the federal government made recommendations to protect human health?

The EPA recommends that drinking water should contain no more than 5 milligrams per liter of water (5 mg/L) because of taste. The EPA requires that any release of 1,000 pounds (or in some cases 5,000 pounds) into the environment be reported to the agency.

To protect workers, the Occupational Safety and Health Administration (OSHA) has set an average limit of 1 mg/m^3 for zinc chloride fumes and 5 mg/m^3 for zinc oxide (dusts and fumes) in workplace air during an 8-hour workday, 40-hour workweek.

Similarly, the National Institute for Occupational Safety and Health (NIOSH) has set the same standards for up to a 10-hour workday over a 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Zinc (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



ATTACHMENT B REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending:	Project Name/Number: 2647 Stillwell /220241				
Report Date:	Project Manager Name:				
Summary of any violations of procedures occurring that week:					
Summary of any job relate	d injuries illnesses or near misses that week.				
	a injuries, fillesses, of field fillsses that week.				
Summary of air monitorir actions taken):	ng data that week (include and sample analyses, action levels exceeded, and				
Comments:					
Name:	Company:				
Signature:	Title:				

INCIDENT REPORT FORM

Date of Report:		
Injured:		
Employer:		
Site:	Site Location:	2647 Stillwell Avenue, Brooklyn, NY
Report Prepared By:		
Sign	ature	Title
ACCIDENT/INCIDENT	CATEGORY (check all that appl	lies)
Injury	Illness	Near Miss
Property Damage	Fire	Chemical Exposure
On-site Equipment	Motor Vehicle	Electrical
Mechanical	Spill	Other
WITNESS TO ACCIDEN	T/INCIDENT:	
Name:	Company	:
Address:	Address:	
Phone No.:	Phone No	.:
Name:	Company	:
Address:	Address:	
Phone No.:	Phone No	.:

Name:	SSN:	
Address:	Age:	
Length of Service:	Time on Pre	esent Job:
Time/Classification:		
SEVERITY OF INJURY OF	R ILLNESS:	
Disabling	Non-disabling	Fatality
Medical Treatment	First Aid Only	
CLASSIFICATION OF INJ	URY:	
CLASSIFICATION OF INJ Abrasions	URY: Dislocations	Punctures
CLASSIFICATION OF INJ Abrasions Bites	URY: Dislocations Faint/Dizziness	Punctures Radiation Burns
CLASSIFICATION OF INJ Abrasions Bites Blisters	URY: Dislocations Faint/Dizziness Fractures	Punctures Radiation Burns Respiratory Allergy
CLASSIFICATION OF INJ Abrasions Bites Blisters Blisters Bruises	URY: Dislocations Faint/Dizziness Fractures Frostbite	 Punctures Radiation Burns Respiratory Allergy Sprains
CLASSIFICATION OF INJ Abrasions Bites Blisters Bruises Chemical Burns	URY: Dislocations Faint/Dizziness Fractures Frostbite Heat Burns	 Punctures Radiation Burns Respiratory Allergy Sprains Toxic Resp. Exposure
CLASSIFICATION OF INJ Abrasions Bites Blisters Bruises Chemical Burns Cold Exposure	URY: Dislocations Faint/Dizziness Fractures Frostbite Heat Burns Heat Exhaustion	Punctures Radiation Burns Respiratory Allergy Sprains Toxic Resp. Exposure Toxic Ingestion
CLASSIFICATION OF INJ Abrasions Bites Blisters Bruises Chemical Burns Cold Exposure Concussion	URY: Dislocations Faint/Dizziness Fractures Frostbite Heat Burns Heat Exhaustion Heat Stroke	Punctures Radiation Burns Respiratory Allergy Sprains Toxic Resp. Exposure Toxic Ingestion Dermal Allergy
CLASSIFICATION OF INJ Abrasions Bites Bites Blisters Bruises Chemical Burns Cold Exposure Concussion Lacerations	URY: Dislocations Faint/Dizziness Fractures Frostbite Heat Burns Heat Exhaustion Heat Stroke	Punctures Radiation Burns Respiratory Allergy Sprains Toxic Resp. Exposure Toxic Ingestion Dermal Allergy
CLASSIFICATION OF INJ Abrasions Bites Bites Blisters Bruises Chemical Burns Cold Exposure Concussion Lacerations Part of Body Affected:	URY: Dislocations Faint/Dizziness Fractures Frostbite Heat Burns Heat Exhaustion Heat Stroke	Punctures Radiation Burns Respiratory Allergy Sprains Toxic Resp. Exposure Toxic Ingestion Dermal Allergy
CLASSIFICATION OF INJ Abrasions Bites Bites Blisters Bruises Chemical Burns Cold Exposure Concussion Lacerations Part of Body Affected: Degree of Disability:	URY: Dislocations Faint/Dizziness Fractures Frostbite Heat Burns Heat Exhaustion Heat Stroke	 Punctures Radiation Burns Respiratory Allergy Sprains Toxic Resp. Exposure Toxic Ingestion Dermal Allergy
CLASSIFICATION OF INJ Abrasions Bites Bites Blisters Bruises Chemical Burns Cold Exposure Concussion Lacerations Part of Body Affected: Degree of Disability: Date Medical Care was Received	URY: Dislocations Faint/Dizziness Fractures Frostbite Heat Burns Heat Exhaustion Heat Stroke	 Punctures Radiation Burns Respiratory Allergy Sprains Toxic Resp. Exposure Toxic Ingestion Dermal Allergy
CLASSIFICATION OF INJ Abrasions	URY: Dislocations Faint/Dizziness Fractures Frostbite Heat Burns Heat Exhaustion Heat Stroke	 Punctures Radiation Burns Respiratory Allergy Sprains Toxic Resp. Exposure Toxic Ingestion Dermal Allergy

PROPERTY DAMAGE:

Description of Damage:	
Cost of Damage:	\$
ACCIDENT/INCIDEN	۲ LOCATION:
ACCIDENT/INCIDENT (Object, substance, mater	Γ ANALYSIS: Causative agent most directly related to accident/incident ial, machinery, equipment, conditions)
Was weather a factor?:	
Unsafe mechanical/physic	cal/environmental condition at time of accident/incident (Be specific):
Personal factors (Attitude	, knowledge or skill, reaction time, fatigue):
Level of personal protecti	on equipment required in Site Safety Plan:
Modifications:	
Was injured using require	d equipment?:

If not, how did actual equipment use differ from plan?:

ACTION TAKEN TO PREVENT RECURRENCE: (Be specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?

ACCIDENT/INCIDENT REPORT R	REVIEWED BY	·	
SSO Name Printed		SSO Signature	
OTHERS PARTICIPATING IN INV	ESTIGATION	:	
Signature		Title	
Signature		Title	
Signature		Title	
ACCIDENT/INCIDENT FOLLOW-	UP: Date:		
Outcome of accident/incident:			
Dhusisian's maximum dations			
Date injured returned to work: Follow-up performed by:			_
Signature	Title		

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT C EMERGENCY HAND SIGNALS

EMERGENCY SIGNALS

In most cases, field personnel will carry portable radios for communication. If this is the case, a transmission that indicates an emergency will take priority over all other transmissions. All other site radios will yield the frequency to the emergency transmissions.

Where radio communications is not available, the following air-horn and/or hand signals will be used:

EMERGENCY HAND SIGNALS

OUT OF AIR, CAN'T BREATHE!



Hand gripping throat

LEAVE AREA IMMEDIATELY, NO DEBATE!

(No Picture) Grip partner's wrist or place both hands around waist

NEED ASSISTANCE!



Hands on top of head

OKAY! – I'M ALL RIGHT! - I UNDERSTAND!



Thumbs up

NO! - NEGATIVE!



ATTACHMENT D

SPECIAL REQUIREMENTS FOR COVID-19

ATTACHMENT E

ON-SITE AND OFF-SITE PROCEDURES TO LIMIT CONTAMINATION AND <u>POTENTIAL SPREAD OF COVID-19</u>

Sources: <u>CDC - COVID-19 Spread and Prevention Information; OSHA - Workplace Preparation</u> Guidance; CDC - Guidance on Extended Use/Limited Reuse of Respiratory Protection

- 1) Maintain minimum 6-foot separation from others whenever possible (social distancing). The virus is thought to spread mainly from person-to-person, between people who are in close contact, through respiratory droplets produced when an infected person coughs or sneezes.
- 2) Wash your hands frequently with soap and water. Wash for at least 20 seconds and, if no soap is present, use a hand sanitizer that contains at least 60% alcohol.
- 3) Wear nitrile gloves whenever possible and be especially mindful of touching common surfaces.
- 4) Disinfect commonly touched surfaces frequently, and items frequently used in public immediately upon returning home.
- 5) Face Coverings and Masks:
 - a) <u>On-site</u>: Wear a cloth face covering or mask at all times when there is no issue with maintaining social distancing. N95/KN95 masks or respirators should be reserved for situations where social distancing on-site is difficult or impossible. Appropriate circumstances for donning an N95/KN95 mask or respirator on-site include, but are not necessarily limited to, going inside the Site trailer; and/or entering, exiting, or traversing the Site if proper social distancing cannot be achieved. This tiered approach will help maintain the supply of N95/KN95 masks so they are available for the highest risk scenarios.
 - b) <u>Off-site During Work-related Commute</u>: The CDC now recommends wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain (<u>https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html</u>). A mask or cloth face covering should worn during your commute to and from the site if you are unable to achieve proper social distancing. Appropriate times to wear a mask or cloth face covering include, but are not necessarily limited to, walking on crowded sidewalks, traveling in a shared vehicle, and/or if you are required to enter an occupied indoor space to acquire supplies for the site.
- 6) Wear safety glasses or goggles at all times while on-site and some form of eye covering (e.g., sunglasses, prescription and non-prescription glasses, or safety glasses) should be considered when commuting.
- 7) Avoid touching your face (eyes, nose, and mouth).

- 8) Cover your nose and mouth when coughing, sneezing, etc./ cough into elbow.
- 9) Do not spit.
- 10) Try to take your temperature regularly.
- 11) Talk to your supervisor if you, your friends or family members that you live with or spend time with have displayed symptoms of COVID-19, tested positive, or are afflicted with even the common cold/flu.
- 12) Talk to your supervisor if anyone you know at the site tested positive for the COVID-19.
- 13) Follow any additional health & safety protocols required at the site or elsewhere.

APPENDIX C

PERMIT FOR CLEAR FLO TECHNOLOGIES

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 1 SUNY @ Stony Brook, 50 Circle Road, Stony Brook, NY 11790 P: (631) 444-0365 I F: (631) 444-0360 www.dec.ny.gov

May 4, 2023

Posillico Materials, LLC 1750 New Highway Farmingdale, NY 11735

Re: Application #1-4720-00695/00009 Posillico Soil Wash Facility Permit Renewal

Dear Permittee:

In conformance with the requirements of the State Uniform Procedures Act (Article 70, ECL) and its implementing regulations (6NYCRR, Part 621) we are enclosing your renewed permit identified above. Please carefully read all permit conditions and the schedule contained in the permit carefully to ensure compliance during the term of the permit. If you are unable to comply with any conditions, please contact us at the above address.

This permit must always be kept available on the premises of the facility.

Sincerely,

Élyssa Scott Environmental Analyst

cc: R. Keane DEC Division of Materials Management File



Department of Environmental Conservation
PERMIT Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To: POSILLICO MATERIALS, LLC 1750 NEW HWY FARMINGDALE, NY 11735-1510 (631) 249-1872 **Facility:** POSILLICO MATERIALS LLC 1610 NEW HWY FARMINGDALE, NY 11735

Facility Application Contact:

THOMAS J POSILLICO Posillico Materials East LLC 1750 New Hwy Farmingdale, NY 11735-1562 (631) 390-5762

Facility Location: in BABYLON in SUFFOLK COUNTYFacility Principal Reference Point: NYTM-E: 633.8NYTM-N: 4511.5Latitude: 40°44'36.9"Longitude: 73°24'54.8"

Authorized Activity: The permittee is authorized to operate a solid waste management facility receiving and processing the following:

- a. 500 cubic yards per day based on a two week average, with a maximum of 850 cubic yards in any day, of recognizable uncontaminated concrete, asphalt, rock, brick, and soil (RUCARBS). An additional 2,000 cubic yards per day based on a two week average, with a maximum of 4,000 cubic yards in any day, of asphalt or recycled asphalt pavement (RAP) may also be received.
- b. 2,000 cubic yards per day based on a two week average, with a maximum of 3,000 cubic yards on any day, of fill material destined to the soil wash plant. The fill material includes petroleum contaminated soil (PCS), contaminated fill material or soil, navigational dredged material, vacuum truck slurry material, general fill, and uncontaminated fill material or soil.

Solid Waste Management Activity No(s).:

Construction and Demolition Debris Handling and Recovery - 52CP0259

Facility Owner/Operator: Posillico Materials LLC is the facility owner and operator for the contaminated soil area, soil wash plant, RUCARBS Areas #1 and #2, and asphalt plant areas. Con-Strux, LLC is limited to being the operator of RUCARBS Area #3. These areas are described in the approved Engineering Report, Site Plans, and related documents.

Permit Authorizations

Solid Waste Management - Under Article 27, Title 7 Permit ID 1-4720-00695/00009 Renewal

Effective Date: 5/4/2023

Expiration Date: 5/3/2028

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: KEVIN A KISPERT, Deputy Regional Permit Administrator NYSDEC Region 1 Headquarters Address: SUNY @ Stony Brook 50 Circle Rd Stony Brook, NY 11790 -3409

Authorized Signature:

Date 51412023

Distribution List

THOMAS J POSILLICO Materials Management Elyssa E Scott

Permit Components

SOLID WASTE MANAGEMENT PERMIT CONDITIONS

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

SOLID WASTE MANAGEMENT PERMIT CONDITIONS

1. Conformance With Plans All activities authorized by this permit must be in strict conformance with the permit application, plans and materials prepared by permittee or permittee's consultant on the date(s) specified in Permit Condition No. 2.

2. Terms of Operation, Approval for Changes The facility shall be operated in conformance with:

- a. Terms and conditions of this permit;
- b. 6NYCRR Part 360 Solid Waste Management Facilities regulations;
- c. The approved Engineering Report, revised October 2022, prepared by Robert S. Keane, P.E.

Any revision to the above approved documents identified in item (c) of this condition or to the operations at this site requires prior written approval from the Department. If these documents conflict with any condition of this permit, the permit condition shall prevail. Furthermore, the permittee must comply with a permit condition that is more stringent than a regulatory requirement.

The permittee shall not add a facility component that would otherwise qualify as an exempt or registered facility, unless the permittee first receives a modified permit to incorporate the additional component of the operation.

3. Authorized Activity The permittee is authorized to operate a solid waste management facility receiving and processing the following:

- a. 500 cubic yards per day based on a two week average, with a maximum of 850 cubic yards in any day, of recognizable uncontaminated concrete, asphalt, rock, brick, and soil (RUCARBS). An additional 2,000 cubic yards per day based on a two week average, with a maximum of 4,000 cubic yards in any day, of asphalt or recycled asphalt pavement (RAP) may also be received.
- b. 2,000 cubic yards per day based on a two week average, with a maximum of 3,000 cubic yards on any day, of fill material destined to the soil wash plant. The fill material includes petroleum contaminated soil (PCS), contaminated fill material or soil, navigational dredged material, vacuum truck slurry material, general fill, and uncontaminated fill material or soil.

4. Other Activities The permittee also conducts non-solid waste management facility operations at the site. These activities include receiving and processing of natural stone and sand from mining activities, and operation of an asphalt plant.

5. Unacceptable Wastes The permittee is prohibited from accepting friable asbestos-containing waste, ash residue, radioactive waste, hazardous waste, industrial waste, regulated medical waste, liquid waste, septage, sewage sludge, yard trimmings, tree debris, municipal solid waste (MSW), construction and demolition debris other than RUCARBS and fill material, and any other waste not specifically authorized for receipt.

6. Soil Wash Plant Operations All activities related to the soil wash plant must comply with the following requirements:

- a. Waste Handling Requirements
 - i. All contaminated fill material and filter cake must be stored inside the contaminated soil storage building. Uncontaminated fill material may be stored outside of the building in RUCARBS Area #2.
 - All activities with respect to contaminated fill material must take place on an concrete pad. All containment pads, liners, and enclosures must be constructed and maintained in accordance with the most current Suffolk County Department of Health Article 12 Permit.
 - iii. Vacuum truck slurry may only be tipped at the HydroTip pad area used for dewatering prior to storage inside the contaminated storage building.
 - iv. At the end of each day, and as needed throughout the workday, the site shall be swept clean.
 - v. The permittee shall ensure that the all storage areas which contain contaminated material is labeled on all sides with "Contaminated Soil Storage" and must be easily readable from a distance of 25 feet.

b. Analytical Sampling Requirements

- i. Prior to receiving contaminated fill material, it must be sampled and analyzed at the generating site and shown to be non-hazardous. All sampling procedures, methods, and analysis must be acceptable to the Department, and must demonstrate the material qualifies for acceptance by the permittee under this permit.
- ii. Fill material or soil contaminated with No. 2 fuel oil from residential properties, and fill material or soil generated from roadside spills contaminated with diesel fuel may be received without chemical analysis, provided a Department Spill Number is generated from the spill location. This provision does not apply to spills generated on industrial properties.
- iii. Vacuum truck slurry waste generated from locations with minimal potential for contamination, and which does not exhibit visual or other indication of contamination, does not require chemical sampling prior to receiving.

- iv. Navigational dredged material requires sampling prior to receipt. If the material meets the requirement of containing greater than 90% sand and gravel, as determined by grain size analysis, and contains less than 0.5% total organic carbon, it may be received without further sampling. Material exceeding these parameters must be sampled consistent with paragraph (b)(i) of this condition.
- v. Inbound General Fill to RUCARBS Area #2 is subject to the RUCARBS Waste Handling and Quality Assurance Requirements for RUCARBS as outlined in this permit.

7. Operations Related to Recongizable Uncontaminatd Concrete, Asphalt Pavement, Rock, Brick, and Soil (RUCARBS) Operations related to RUCARBS, which includes asphalt or RAP, and general fill, must comply with the following:

a. Waste Handling Requirements

i. All activities related to RUCARBS may be conducted outdoors.

ii. At the end of each workday the facility and tipping areas shall be cleaned of any solid waste. All overnight storage of solid waste shall be in its respective storage area.

b. Quality Assurance of Incoming RUCARBS

The permittee shall ensure that waste control procedures acceptable to the Department are implemented to ensure that all incoming RUCARBS is acceptable pursuant to this permit. The Department may require the permittee to comply with paragraphs (i) and (ii) below for the receipt of solid waste from any source of solid waste to ensure conformance with this permit, and disapprove the permittee's acceptance of the solid waste or require removal of non- conforming solid waste, if already accepted at the facility.

i. Analytical sampling may be required for solid waste received from certain sources to ensure it is suitable for the facility to accept. All sampling must be done in accordance with Department approved methods. Unless otherwise approved by the Department on a case specific basis, such sampling shall be done at a minimum rate of one sample per 1,000 cubic yards. The Department reserves the right to reject any sampling results, when the sampling is not coordinated with the Department.

ii. Documentation regarding the generators of incoming solid waste, which may include, but not be limited to:

- Name of the generator of the material and contact information.
- The exact location of the generating site. Type of generating site such as excavation, building demolition/deconstruction site, solid waste management facility, road work, etc. If the site is a solid waste management facility, provide the facility's permit number or registration number.

- Description of the site history such as industrial, commercial, residential, road construction, solid waste management facility, etc.
- Any analytical results performed at the generating site accompanied by any other reports prepared by the generating site engineer or qualified environmental professional, if done at the generating site.
- Amount and type of the material that the site will generate.
- 8. Requirements for All Facility Operations The permittee shall comply with the following:
 - a. Contaminated soil and contaminated fill material must be kept separate from RUCARBS and other uncontaminated material at all times. In the event contaminated soil or contaminated fill material becomes commingled with uncontaminated material, the whole pile must be considered contaminated, and managed as such.
 - b. The permittee must ensure that trucks entering the facility do not queue on offsite roadways.
 - c. The permittee must ensure that trucks do not track dirt and mud out of the facility onto offsite roadways.
 - d. Unprocessed RUCARBS materials must be processed within 365 days of receipt. Processed materials shall not remain onsite for more than 365 days, unless otherwise approved by the Department.

9. Use of Tracking Documents The Department reserves the right to require the permittee to have incoming or outgoing loads accompanied with complete tracking documents. However, contaminated soil or contaminated fill material must have complete tracking documents for both incoming and outgoing loads, and all non-contaminated loads coming from or going to other solid waste management facilities must also be accompanied with a complete tracking document. All tracking documents must be acceptable to the Department. The names of all individuals required to sign the tracking document (generator, hauler, and receiving facility representatives) must be neatly printed, in addition to their signatures.

10. Outgoing Fill Material Analysis Requirements The permittee must analyze all outbound fill material, soil and/or wash plant sand in accordance with the following:

- a. Material destined for use as fill material, including wash plant sand destined for use in or as fill material, or soil to be amended with yard waste or compost, must be sampled at a rate of no less than one analysis per 1,000 cubic yards.
- b. Material including wash plant sand destined for use as commercial aggregate in concrete or asphalt manufacturing must be sampled at a rate of no less than one analysis per 5,000 cubic yards.

c. All sampling must be done in accordance with provisions of applicable regulations and procedures acceptable to the Department. The permittee must ensure unanalyzed fill material is stored separately and distinctly from other waste onsite. After receipt of results demonstrating qualification for the intended use, the permittee may consolidate the fill material, or amend with yard waste or compost, accordingly. If unanalyzed fill material is commingled with material already analyzed, then the entire pile must be reanalyzed.

11. Maximum Quantity Onsite The permittee shall not exceed the following quantities onsite:

a. Soil Wash Plant; Contaminated Storage Building:

i. 3,940 cubic yards of PCS.
ii. 4,640 cubic yards of contaminated soil or fill material.
iii. 2,520 cubic yards of soil wash filter cake.
iv. 6,340 cubic yards of stone and 5,730 cubic yards of sand in the Wash Plant outbound areas.

b. RUCARBS Area #1: 8,400 cubic yards of RUCARBS, no more than 4,950 unprocessed.

c. RUCARBS Area #2: 19,150 cubic yards of uncontaminated soil or general fill

d. RUCARBS Area #3: 12,670 cubic yards of RUCARBS with no more than 10,100 unprocessed.

e. 42,420 cubic yards of RAP, asphalt, and millings that is separate from other RUCARBS, with no more than 34,000 cubic yards unprocessed.

12. Hours of Operation Hours of operation shall not conflict with any local laws or ordinances. The permittee's hours and days of operation are as follows:

- a. The receipt of fill material at the soil wash plant may be received from 6:00 AM to 4:00 PM, Monday through Friday, and 6:00 AM to 3:00 PM on Saturday. If fill material is received outside of these hours of operation, other than New York State Department of Transportation or Metropolitan Transportation Authority projects, a minimum of 48 hours notice shall be provided to the Department, and such notice shall include the anticipated date(s) and time(s) of receipt.
- b. RUCARBS may be received and processed 24 hours per day, 7 days per week.

13. Signs The permittee must post clearly legible signs indicating hours of operation, the types of waste accepted, and the types of waste not accepted. The signs shall be located so that they are visible to any vehicles and/or persons approaching the facility.

14. Waste Control An attendant shall be on duty during all hours of operation. The attendant shall inspect all vehicles entering the facility, rejecting any loads containing unauthorized material.

15. Control of Nuisance Conditions Odors, dust, insects, vectors, noise, blowing litter and other potential nuisances shall be adequately controlled at all times. The permittee shall immediately implement any controls required by the Department including cessation of facility operations.

16. Fire Protection and Detection The permittee shall maintain fire protection and detection equipment in accordance with local laws and ordinances.

17. Cessation of Operations The permittee must notify the Department immediately of any event which causes an unscheduled facility shutdown that exceeds 24 hours, as well as indicate the proposed waste management activities. A written report must be submitted to the Department within 7 days of the event.

18. Ultimate Disposal of Waste All solid waste passing through the facility that does not qualify for a beneficial use must be ultimately disposed of at a facility authorized by the Department if located in New York State, or by the appropriate governmental agency or agencies if in other states, territories, or nations. All waste destined for beneficial use must meet the requirements of a predetermined or case-specific beneficial use determination.

19. Unauthorized Waste In the event that any hazardous waste, medical waste, or other regulated waste not allowed under this permit is accepted at the facility, the unauthorized waste shall be contained and properly secured immediately. The permittee shall notify the Department and the Suffolk County Department of Health Services within 24 hours of the event. The waste material shall be removed by a waste transporter authorized under 6 NYCRR Part 364 to transport such waste. A written report shall be submitted to the Department within 7 days of the event.

20. Small Spill Containment The facility shall keep available at the site equipment and materials necessary to contain small quantities of chemicals or spills. These materials shall be stored in well identified accessible storage areas. As a minimum, the following must be available at all times:

4 - 55 gallon drums with covers and securing rings400 lbs. absorbent material (e.g. Speedi-Dri)

50 lbs. Boric Acid

50 lbs. Sodium Bicarbonate

Assorted brooms, shovels, gloves, masks, and other protective gear

21. Maintenance and Repair of Facility The permittee shall adequately maintain and make repairs to the facility as necessary. This includes any part of the facility, such as doors to buildings; odor and dust controls and equipment; punctures, holes, or other damage to buildings; minimizing the ponding of stormwater; and concrete and/ or asphalt pavement that becomes damaged or worn.

The permittee shall undertake all repairs immediately and have all work completed within one week. Repairs related to dust or odor controls must be completed within 24 hours. If the permittee is unable to complete repairs within the specified time outlined by this condition, the permittee shall provide an acceptable schedule to the Department which shall include a description of the work to be completed and any controls that will be implemented to ensure the facility remains in compliance with this permit, including the cessation of all or part of the facility operations.

22. Recordkeeping Requirements The permittee shall maintain the following records at the facility for a minimum of 7 years from the date of creation and be available immediately to the Department upon request:

- a. Daily log of solid waste received and transported from the facility which includes:
 - i. Type, quantity, planning unit, and origin of the solid waste received.
 - ii. Destination of all solid waste and recovered materials transported from the facility.
 - iii. The following additional information for incoming PCS: NYSDEC Spill Number, type of fuel contamination (ie: gasoline, #2 oil), source of contamination (ie: UST, surface spill)
- b. All weight tickets, hauling receipts, disposal receipts, invoices, tracking documents, etc. to support entries made into the daily log.
- c. All analytical sampling results for incoming fill material, if required, and outgoing fill material, and Spill Response Engineer certification letters.

23. Notification and Reporting Requirements These requirements include the following:

- a. The permittee must maintain the required Suffolk County Department of Health Article 12 permit. The most recent Article 12 permit must be maintained on file with the Region 1 Office.
- b. The permittee shall notify the Department 5 days in advance of any sampling required by this permit to offer the Department the opportunity to witness sampling and, if desired, collect split samples.

- c. Upon receiving any sample results, the permittee must provide the results to the Department in a format prescribed by or acceptable to the Department.
- d. The permittee must submit the original copy of the annual report to the Region 1 Office, and a copy to the Central Office. The report must be submitted no later than March 1 following each year of operation on forms prescribed by or acceptable to the Department.
- e. All notifications and submittals to the Department shall be to the Region 1 Office located at the New York State Department of Environmental Conservation, Division of Materials Management, 50 Circle Road, SUNY @ Stony Brook, NY 11790, or electronically as directed by Department staff. The annual report may be submitted via email to SWMFAnnualReportR1@dec.ny.gov.
- f. A copy of the annual report shall be sent to SWMFannualreport@dec.ny.gov.

24. Financial Assurance The permittee shall maintain the financial assurance in the amount of at least \$2,687,440. Each year thereafter, the permittee must submit for review and approval adjusted closure costs estimates, including supporting justification to account for inflation and changes in facility conditions, and increase the amount once approved by the Department. The Department reserves the right to adjust the amount of the financial assurance in the future to account for increases in closure costs, and for non-compliance with any conditions of this permit and any requirement of 6 NYCRR Part 360.

In the event that the permittee fails to maintain financial assurance as required by this permit, the permittee must immediately cease accepting solid waste until financial assurance acceptable to the Department is in place. Within 10 days from the cessation of the required financial assurance, the permittee shall have all solid waste, including recovered recyclables, removed from the facility and the facility shall be in "broom clean" condition.

25. Environmental Monitor The environmental monitor shall be funded in accordance with the following for operations directly related to the permittee:

a. The permittee shall fund environmental monitoring services to be performed by or on behalf of the Department. These monitoring services will include, but not be limited to, the scope of work in an annual environmental monitoring work plan which is incorporated by reference and enforceable under this permit.

b. The permittee shall provide to the Department on an annual basis the funds necessary to support the activities set forth in the annual environmental monitoring work plan. The sum to be provided will be based on the annual budgeted amount and is subject to annual revision. Subsequent annual payments shall be made for the duration of this permit or until the environmental monitoring services are no longer necessary, whichever comes first.

c. The permittee shall be billed annually, prior to the start of each State Fiscal Year (SFY) (April 1). If this permit is to first become effective subsequent to April 1, the initial bill will be for an amount sufficient to meet the anticipated cost of the environmental monitoring services through the end of the current SFY.

d. The Department may revise the required annual bill on an annual basis to include all of the Department's estimated costs associated with the environmental monitoring services. The annual revision may take into account such factors as inflation, salary increases, changes in the fringe benefits rate, changes in operating hours and procedures, changes in non-personal service costs (including travel, training, sampling and analytical, and equipment costs, etc.), an increase or decrease in the level of environmental monitoring services necessary, and an increase or decrease in the number of environmental monitors. Upon written request by the permittee, the Department shall provide the permittee with a written explanation of the basis for any revisions.

e. Prior to making its annual payment, the permittee will receive, and have an opportunity to review and request adjustment to, an annual environmental monitoring work plan that the Department will undertake during the year. The Department will provide a final annual work plan that the Department will undertake during the year.

f. Payments are to be made in advance of the period in which they will be expended and shall be made in full within 30 days of receiving a bill from the Department. The bill from the Department to the permittee will provide information regarding to whom payments should be made payable and the address to which payments should be sent.

g. Failure to make the required payments shall be a violation of this permit. The Department reserves all rights to take appropriate action to enforce the above payment provisions.

h. The environmental monitor shall, when present at any of the permittee's facilities, abide by all of the permittee's health and safety and operational requirements and policies, if such requirements and policies exist and provided they are not inconsistent with Department policies and labor management contracts, and further provided, however, that this shall not be construed as limiting the environmental monitor's powers as otherwise provided for by law and shall not result in the environmental monitor being afforded less protection than otherwise provided to the environmental monitor by State and Federal health and safety requirements.

i. The environmental monitor shall receive from the permittee all general and site-specific safety training which is normally given to new facility/site employees for all areas of the facility or site. This training will be a supplement to the health and safety training that the environmental monitor routinely receives from the Department.

j. The permittee shall immediately furnish to the environmental monitor any facility/site health and safety and operational requirements and policies. Within five (5) days of any revision to the facility/site health and safety and operational requirements and policies, the permittee shall furnish to the environmental monitor the health and safety and operational requirements and policies.

k. The environmental monitor shall be permitted to use environmental monitoring and data collection devices (e.g., photo ionization detectors, cameras, video recording devices, computers, cell phones, etc.) deemed necessary by the Department to evaluate and document observed conditions. The permittee may request the data and images collected from areas where confidentiality is a concern be considered confidential information if appropriate. Copies of the data or images collected from areas where confidentiality has been determined to be a concern shall be provided to the permittee.

1. It will remain the responsibility of the permittee to contact the Spill Hotline or any Division within the Department regarding any required notification of any spill, release, exceedances etc. Notification to the environmental monitor will not be considered sufficient to replace any required notifications.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71-0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. Relationship of this Permit to Other Department Orders and Determinations Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. Applications For Permit Renewals, Modifications or Transfers The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator NYSDEC Region 1 Headquarters SUNY @ Stony Brook|50 Circle Rd Stony Brook, NY11790 -3409

4. Submission of Renewal Application The permittee must submit a renewal application at least 180 days before permit expiration for the following permit authorizations: Solid Waste Management.

5. Permit Modifications, Suspensions and Revocations by the Department The Department — reserves the right to exercise all available authority to modify, suspend or revoke this permit. The ______ grounds for modification, suspension or revocation include:

- a. materially false or inaccurate statements in the permit application or supporting papers;
- b. failure by the permittee to comply with any terms or conditions of the permit;
- c. exceeding the scope of the project as described in the permit application;
- d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;
- e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. **Permit Transfer** Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification

The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit

The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

Item C: Permittee Responsible for Obtaining Other Required Permits

The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-ofway that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights

This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.