Wenck Associates, Inc.
360 North Robert Street, Suite 711
St. Paul, MN 55101

(651) 228-1909
Fax (651) 228-1969
E-mail: wenckmp@wenck.com

Wenck

JUL - 7 2006

June 30, 2006

Mr. Wayne Sarappo, Project Manager
Minnesota Pollution Control Agency
VIC Program
520 Lafayette Road
St. Paul, Minnesota 55155-4194

Ms. Lynne Grigor, Hydrogeologist
Minnesota Pollution Control Agency
VIC Program
520 Lafayette Road
St. Paul, Minnesota 55155-4194

RE: Revised Contingency Plan
TCF Bank Stadium Site
University of Minnesota East Bank Campus
VIC Program Project Number VP20200
Wenck Project Number 0179-16-1

Dear Mr. Sarappo and Ms. Grigor:

Enclosed you will find a copy of the Revised Site Redevelopment Construction Contingency Plan ("Contingency Plan") for the above-referenced project site.

The proposed actions at the Site remain consistent with the Proposed Actions Letter, dated May 2, 2006, that accompanied the original draft of the Contingency Plan. As you are aware, construction will commence in earnest during the week of July 10, 2006.

If you have any questions, please feel free to contact me at (651) 294-4587. Site Health and Safety Plan will be submitted under a separate cover early next week.

Sincerely,

WENCK ASSOCIATES, INC.

J. Joseph Otte, Team Leader
Real Estate Sector

Enclosure
C: Mr. Rick Kubler, Gray Plant Mooty
Mr. Brian Swanson, University of Minnesota
Ms. Janet Dalgleish, Env. Affairs Coordinator, University of Minnesota
Mr. Mike Monahan, SRF Consulting Group
Mr. David Spillman, Hines
Mr. Rollo Wallmow, Veit Companies

UMR - 5709

Site Redevelopment Construction Contingency Plan

Proposed TCF Bank
Stadium Site
University of Minnesota
Minneapolis, Minnesota

Wenck

Prepared for

University of Minnesota

Revised
June 30, 2006

UMR - 5710

Site Redevelopment Construction Contingency Plan

Proposed TCF Bank
Stadium Site
University of Minnesota
Minneapolis, Minnesota

Wenck File #0179-16-01

Prepared for:

UNIVERSITY OF MINNESOTA
c/o Gray Plant Mooty
500 IDS Center
80 South Eighth Street
Minneapolis, MN 55402

Prepared by:

WENCK ASSOCIATES, INC.
360 North Robert Street
Suite 711
St. Paul, Minnesota 55101

Revised
June 30, 2006

Wenck

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1.0 Purpose and Scope

This Site Redevelopment Construction Contingency Plan ("Contingency Plan") is to be reviewed and followed by University of Minnesota personnel and all contractors and subcontractors who are assigned to work on the University of Minnesota TCF Bank Football Stadium ("the Stadium") project. For purposes of this Contingency Plan, the Stadium project site is defined as being bounded by (and including) University Avenue to the south, Oak Street SE to the west, 5th Street NE to the north and 23rd Street SE to the east in Minneapolis, Minnesota ("the Site"). The Site also includes the nearby or adjacent properties, on which project-related construction activities and infrastructure improvements (e.g., utilities, roads and parking) will occur as part of the Stadium project.

This Contingency Plan sets forth the procedures to be followed during project activities to identify the presence of contamination or hazardous materials and provides guidance to Site personnel in the event that contamination or hazardous materials are encountered.

The anticipated future use of the Site is for the Stadium. The Site will be re-developed with a 50,000-seat stadium building, related surface parking features, and landscaping systems which will integrate storm water improvement features. Site preparation activities will also involve road and utility realignments, and construction and reconfiguration of parking areas.

This Contingency Plan is a companion document to other Site-specific and project-specific Site Health and Safety Plans (SHSPs). The reader is encouraged to become familiar with the contents of the applicable SHSP for a more complete understanding of the project activities, potential hazards, and safety procedures.

This document has been prepared on behalf of the University of Minnesota. It has been prepared for the exclusive use of University of Minnesota and those parties working on the Site with the University's permission.

2.0 Site Description and Background

2.1 SITE DESCRIPTION

The Site is located on the University of Minnesota's East Bank Campus in Minneapolis, Hennepin County, Minnesota. The Site is generally located in the Southwest ¼ of the Southwest ¼ of Section 19, and the Northwest ¼ of the Northwest ¼ of Section 30, Township 29 North, and Range 23 West. The Site location is shown in Figure 1. The Stadium Site boundaries generally coincide with University Avenue to the south, Oak Street SE to the west, 5th Street NE to the north and 23rd Avenue SE to the east.. Much of the Site is currently being used for surface parking. University-owned buildings currently occupy the southern portion of the Site along University Avenue.

Due to the extensive scale of the redevelopment activity, roadway and utility work supporting the Stadium project will encroach onto nearby properties, some of which have been investigated by other environmental consultants working on behalf of the University of Minnesota. These adjacent and nearby properties include the following Voluntary Investigation and Cleanup ("VIC") Program projects, which are also depicted on Figure 1:

VP11350	Reichhold
VP11650	Indoor Women's Hockey Arena
VP14060	Kempf Paper Building
VP16720	Center for Magnetic Resonance Research
VP17340	Translational Lab Site
VP17290	Midwest Warehouse Building
VP17660	Lorraine Larson Property
VP17670	Union Pacific Railroad Property
VP18960	Translational Research Steam Line
VP21820	ConAgra - 23rd Avenue
VP21570	University Technology Center East

2.2 PHYSICAL SETTING

2.2.1 Topography

The property is generally level and is at an elevation of approximately 830 to 840 feet above mean sea level. The topographic gradient in the vicinity of the Site is to the southwest toward the Mississippi River. The Mississippi River is located approximately ¾-mile southwest of the Site.

2.2.2 Geology

According to published geologic reference maps, surface geology at the Site is described as Quaternary-aged Middle Terrace deposits of the Minneapolis outwash plain. These deposits are characterized as sand, gravely sand and loamy sand overlain by thin deposits of silt, loam, or organic sediment (Gary N. Meyer and Howard C. Hobbs in the Geologic Atlas of Hennepin County, Minnesota, N.H. Balaban, Editor, 1989). According to the published references, depth to bedrock is less than 50 feet (Bruce A. Bloomgren, *et al*, in the Geologic Atlas of Hennepin County, Minnesota, N.H. Balaban, Editor, 1989).

This investigation and previous investigations performed at the Site have shown that unconsolidated deposits are approximately 40 feet in thickness. Site-specific test trenches and soil borings show the native overburden as consisting of a mix of well-graded sand and gravel with varying amounts of peat, organic clay and cobbles. In addition, fill, consisting of well-graded sand and gravel with brick pavers, railroad ties, glass, concrete rubble, ash, clinkers, coal and limestone flagstone was identified in some areas on the Site. Where present, this fill appears to range in thickness from approximately 0 to 9 feet.

The unconsolidated deposits overlie bedrock of the Platteville and Glenwood Formations. The Platteville formation is a fine-grained limestone containing thin shale partings near the top and base, underlain by green sandy shale of the Glenwood Formation. The Glenwood Formation is

considered to be an aquitard that prevents downward migration of groundwater in the area, but is so thin that it is not always identified in well records. Directly underlying the Platteville and Glenwood Formations is the St. Peter Sandstone. The upper half of the St. Peter Sandstone is comprised of fine- to medium-grained friable quartz sandstone. The lower half of this unit is composed of sandy mudstone and siltstone. Underlying the St. Peter Sandstone are the Prairie Du Chien Group and the Jordan Sandstone (Bruce M. Olsen and Bruce A. Bloomgren in the Geologic Atlas of Hennepin County, Minnesota, N.H. Balaban, Editor, 1989).

2.2.3 Hydrogeology

Depth to groundwater in the unconfined water table aquifer ranges from approximately 10 to 17 feet across the Site. Groundwater flow in the surficial aquifer is to the southwest toward the Mississippi River (Figure 1). Depth to groundwater within the bedrock ranges from approximately 32 to 37 feet across the Site. As with the shallow groundwater table aquifer, groundwater flow in the bedrock aquifer is to the southwest toward the Mississippi River. There appears to be a confining unit in the vicinity of the Site between the Middle Terrace deposits and the Platteville Formation. This is apparently due to the approximately 20-foot head difference observed between the shallow water table monitoring wells and the bedrock monitoring wells.

The Prairie du Chien Group and the Jordan Sandstone comprise the most heavily used bedrock aquifer system in the area. Due to the higher demand during the summer months (e.g., for cooling and irrigation purposes) a localized increase in pumping may influence groundwater flow within these units (Roman Kanivetsky in the Geologic Atlas of Hennepin County, Minnesota, N.H. Balaban, Editor, 1989).

2.3 HISTORY AND PAST LAND USE

Based on information gathered by Peer Engineering, Inc. ("Peer") as summarized in Peer's report entitled *"Phase I Environmental Site Assessment"* (October 2002) ("Peer Phase I"), and other prior studies, the Site has had a number of past industrial uses, including a former wood treating facility, a rail yard, a bulk petroleum storage facility, a grain elevator and an asphalt plant.

The Site has been the subject of several previous environmental projects. Environmental studies have also been conducted by the University and others regarding properties adjacent to or near the Site. Reports documenting prior environmental studies are cited in Section 7.0, *References.* Many of these studies involved the collection of soil and/or groundwater samples at the Site.

Wenck has considered historical information and sampling data presented in these prior studies in preparing the Contingency Plan. The following is a brief summary of historical information regarding environmentally significant past land uses of the Site.

2.3.1 Former Creosoting Facility

The former Republic Creosoting facility operated from approximately 1903 to 1913. The facility occupied approximately 2.75 acres and included a creosote wood treating plant, a lumber processing plant, coal bins, storage buildings and railroad loading areas. Also associated with the Republic Creosoting facility were several large aboveground storage tanks ("ASTs"). The ASTs ranged in size from approximately 25,000-gallons to 100,000-gallons and were used to store creosote oil. The facility also had a settling basin where wood was treated with the creosote oil.

The Republic Creosoting facility has been the subject of several prior environmental investigations. A voluntary response action was completed in 1995 regarding the settling basin.

That response action was limited to settling basin soils and did not address other historical creosote releases to the Site soils or groundwater.

2.3.2 Former Bulk Petroleum Storage Facility

Standard Oil operated a bulk petroleum facility on the western portion of the Site from approximately the late-1800s through the mid-1960s. The approximate location of the former bulk petroleum facility is depicted on Figures 2 and 3. The Peer Phase I indicates that between approximately 1912 and 1952, the facility included thirteen ASTs ranging in size from 10' in diameter and 16'-10' feet tall to 50' in diameter by 30' tall. All ASTs were removed from the Site by 1957. Some soil and groundwater testing were previously conducted in the early 1990s on a portion of the former petroleum storage facility, which identified a historical release of petroleum. The University reported the release (Leak Site No. 6134) and conducted limited soil excavation in the vicinity of Oak Street and 5th Street. The MPCA issued a closure letter as to this Leak Site in 1998. A closure letter means the investigation of extent and magnitude has been completed, and no current risk pathways are completed requiring corrective action of on-going monitoring activities. An MPCA Leak Site closure letter does not eliminate the possibility of residual contamination at the site. Residual soil and groundwater contamination are understood to exist in connection with this former petroleum bulk storage facility.

2.3.3 Former Rail Yard

A majority (approximately 23.8 acres) of the Site was formerly operated as a railroad yard by Chicago Great Western Railway Company from approximately the 1880s through the mid-1960s (see Figure 2). According to the Peer Phase I, buildings associated with the railroad yard operations included lumber and tool sheds. The former Republic Creosoting facility was located on railroad property. With the exception of the testing performed regarding Republic Creosoting, the railroad yard property has not been the focus of an environmental investigation.

2.3.4 Former Grain Elevator Site

A grain elevator facility was operated in the southeast portion of the Site by various entities, including Interstate Grain Company, from approximately 1889 through 1966. The grain elevator and associated structures were razed at some point between 1966 and 1974. The approximate location of the former grain elevator facility is identified on Figure 2. Based upon the Peer Phase I and other available reports, it does not appear that environmental testing had previously been conducted with respect to the former grain elevator facility.

2.3.5 Former Asphalt Plant Site

The Peer Phase I reports that an asphalt plant that was located in the south central portion of the Site in the early 1900s. The approximate location of the asphalt plant is identified in Figure 2. Very little historical information is extant relative to the former asphalt plant site.

3.0 Previous Investigations – Stadium Site

3.1 GENERAL

Several investigation and cleanup activities have previously been conducted at various locations within the project area. The following text briefly summarizes those efforts.

3.2 FORMER REPUBLIC CREOSOTING FACILITY

According to revealed information, the former Republic Creosoting ("Republic Creosoting") facility operated from approximately 1903 to 1913. The facility occupied approximately 2.75 acres and included a creosote wood treating plant, a lumber processing plant, coal bins, storage buildings and railroad loading areas. Also associated with the property were several large ASTs. The ASTs ranged in size from approximately 25,000-gallons to 100,000-gallons and were used to store creosote oil. The facility also had a settling basin where wood was treated with the creosote oil. According to the Peer Phase I, the settling basin may have been filled at times with sludge generated from cleaning the creosote oil ASTs. After treatment, the wood was moved to the storage areas. The Republic Creosoting facility was decommissioned in 1913 and the buildings razed in 1916. As reported in the Peer Phase I, the majority of the building demolition debris was hauled off-site but some of the debris was buried in place.

The University purchased a 23.8-acre parcel of property in 1990, which included the former Republic Creosoting site. The University purchased the property from C&NW, now Union Pacific Railroad. Subsequent development of the property includes:

- several bituminous parking lots (Parking Lot C60, the Buckeye, Hawkeye, Badger, Gopher, and Hawkeye Lots),

- the bus transit way that separates the Hawkeye and Badger parking lots from the Gopher and Wolverine Parking Lots, 6th Street S.E.,
- a bituminous bicycle path just north of 6th Street S.E.,
- the Lions Research Building/McGuire Translational Research Building
- the Center for Magnetic Resonance Imaging, and
- the University's Thompson Integrated Waste Management Facility.

Several subsurface investigations have been performed at or near the former Republic Creosoting facility site. The most significant investigative work performed at the former Republic Creosoting site was by Dahl & Associates, Inc. ("Dahl") in the mid-1990s and Peer in the late 1990s. Other environmental consultants including Barr Engineering Company ("Barr") and Twin City Testing Corporation ("TCT") performed relatively limited subsurface investigations on the property. Only the investigation activities performed by Dahl and Peer are discussed herein.

In 1990, on behalf of C&NW, Dahl conducted subsurface investigation activities at the former Republic Creosoting site including soil and groundwater assessment. Dahl concluded that the highest concentrations of compounds related to the past use of the property as a creosoting facility were present in the soils near the former settling basin and in the groundwater near and downgradient from the former settling basin. In general, the compounds identified in the soil included numerous poly-aromatic hydrocarbons ("PAHs"), phenolic compounds, and arsenic.

Based on Dahl's findings, a limited response action was implemented on the property starting in 1994, which included the on-site thermal treatment of approximately 7,700 tons of creosote-impacted soil excavated from the former settling basin. The soil treatment activities were completed in cooperation with the MPCA VIC Program. The MPCA VIC Program initially establish a site-specific cleanup standard of 10 milligrams per kilogram ("mg/kg") total PAHs based on criteria it determined to be protective of human health and the environment, as well as the University's request to receive an unrestricted land use designation for the property. Upon completing the first phase of the treatment activities, and assessing the post-thermal treatment sampling results, it was determined that the initial cleanup standard was not achievable. Based on

this finding, MPCA VIC staff revised the cleanup standard on a pile-by-pile basis using a health risk evaluation spreadsheet for PAHs. According to Dahl's Remedial Action Implementation Report, dated March 30, 1995, lenses of impacted soil (typically less than 3 inches) were encountered in the sidewalls (upper 2 to 4 feet) of the excavation. The MPCA concluded that the isolated pockets (i.e., lenses) of impacted material remaining at the conclusion of the Dahl response action required further investigation and provided a "no further action" assurance only with respect to the soils within the limits of the former settling basin. The MPCA also requested the Union Pacific complete further investigation of releases of hazardous substances to the groundwater of the Site. According to a report prepared by Peer entitled *"Subsurface Investigation Report, Former Republic Creosote Facility Site"* and dated December 1997, C&NW indicated to the MPCA in early 1995 that it did not intend to undertake any further investigation or additional corrective actions on the Republic Creosoting site.

In 1996 the University entered the Site into the VIC Program to investigate the remaining soil and groundwater issues on the Republic Creosoting site. In 1997, Peer was contracted by the University to perform additional investigation activities. The investigation consisted of collecting soil and groundwater samples through trenching, probing and soil boring methods. Seventeen (17) test trenches were advanced in a radial pattern around the edge of the excavated creosote settling basin. Thirty-five (35) push probes were advanced within and around the former settling basin. In addition, five (5) permanent groundwater monitoring wells were installed at the site. All five (5) groundwater monitoring wells were completed to intersect the shallow groundwater table. Vertical assessment of groundwater impacts was not part of the scope of the Peer investigation.

Peer's subsurface investigation activities identified several areas exhibiting gross creosote impacts. The creosote-impacted soil was typically identified less than five (5) feet from the surface. The soil was described as having a tar-like consistency, generally stained gray or black, and having a strong creosote odor. In general the investigation identified both carcinogenic (namely benzo(a)pyrene) and non-carcinogenic (namely naphthalene) PAHs in the soil. Total carcinogenic PAHs were identified at concentrations ranging from non-detect to 9,970 mg/kg.

Total non-carcinogenic PAHs were detected at concentrations ranging from non-detect to 66,790 mg/kg. In addition, diesel range organic compounds ("DRO"), polychlorinated biphenyl ("PCB"), organochlorine pesticides, volatile organic compounds ("VOCs"), and Resource Conservation Recovery Act Metals ("RCRA") sample were also collected. DRO was revealed at concentration ranging from non-detect to 120,000 mg/kg. The only VOCs identified in soil above applicable regulatory screening criteria were naphthalene, 1,2,4-trimethylbenzene and 1,3,5-trimethylbezene. Naphthalene concentrations ranged from non-detect to 7,000 mg/kg. PCBs results were all non-detect. Several pesticides were identified in the soil samples collected during the investigation activities, but none were identified above their applicable regulatory screening criteria. The only metal revealed above its regulatory limit was mercury. Mercury was identified in one sample at a concentration of 3.8 mg/kg.

Results from the five permanent groundwater monitoring well network were generally consistent with the findings in the soil. VOCs identified above their applicable Minnesota Department of Health's, ("MDH") Health Risk Limit ("HRL") included benzene and naphthalene. The maximum concentrations of benzene and naphthalene were identified in monitoring well PMW-4 located on the northern edge of the remediated creosote settling basin. The maximum concentrations of benzene and naphthalene revealed in well PMW-4 were 370 and 16,000 micrograms per liter (ug/l), respectively. The only semi-volatile organic compound ("SVOC") identified above its regulatory limit was 4-Methylphenol. Total non-carcinogenic PAHs ranged in concentration from non-detect to 16,893 ug/l. Total carcinogenic PAHs ranged in concentration from non-detect to 117.1 ug/l. DRO was present in samples collected from all five groundwater monitoring wells. DRO ranged from a low of 230 to 21,000 ug/l. GRO was identified in two of the five wells ranging from non-detect to 29,000 ug/l.

Peer concluded that creosote-impacted soils remained at the Republic Creosoting site near the former creosote settling basin. Peer also concluded that shallow groundwater impacted with naphthalene, other SVOCs (including PAHs and phenolic compounds), organochlorine pesticides, VOCs, DRO, and GRO exists at the site. Peer estimated that the groundwater contaminant plume extended from the former creosote settling basin downgradient (south-

southwest) approximately 300 feet. Peer recommended additional investigation of the soil and groundwater at the Site.

3.3 FORMER STANDARD OIL FACILITY

Standard Oil operated a bulk petroleum facility on the western portion of the Site from approximately the late 1800s through the mid-1960s. The approximate location of the former bulk petroleum facility is depicted on Figures 2 and 3. The Peer Phase I indicates that between approximately 1912 and 1952, the facility included thirteen ASTs ranging in size from 10' in diameter and 16'-10' feet tall to 50' in diameter by 30' tall. All ASTs were removed from the Site by 1957. Some soil and groundwater testing were previously conducted in the early 1990s on a portion of the former petroleum storage facility, which identified a historical release of petroleum. The University reported the release (Leak Site No. 6134) and conducted limited soil excavation in the vicinity of Oak Street and 5th Street. The MPCA issued a closure letter as to this Leak Site in 1998. Residual soil and groundwater contamination are understood to exist in connection with the former petroleum bulk storage facility.

3.4 INTERSTATE GRAIN ELEVATOR

While no historic subsurface investigations had been performed relative to the Interstate Grain Elevator, concern that potential that undiscovered releases were associated with the Interstate Grain Elevator Operations lead to the area being investigated as part of the Work Plan. The Interstate Grain Elevator site was reportedly constructed in two phases: 1889 and 1896. It is depicted on Sanborn® Fire Insurance maps from 1912 through 1966. It was located in the southeast portion of the Site, on the east end of what is now the Wolverine Parking Lot.

3.5 FORMER ASPHALT PLANT

Little information is available relative to the operations of a former asphalt plant, which is thought to have been associated with the Site in the early 1900s. The former asphalt plant location is reported to have been in the area just north of Huron at the east end of the Gopher Parking Lot. The Work Plan proposed investigation activities in the vicinity of the former asphalt plant to evaluate the potential for releases of petroleum products or other related chemicals.

3.6 WENCK INVESTIGATION, TCF BANK STADIUM SITE – 2005

Wenck's assessment was designed to complete data gaps that were identified in earlier assessments, as well as to develop additional information from which to prepare a limited risk assessment and evaluate potential remedial alternatives.

The field portion of the project was completed between June and September 2005. There were four main objectives for the subsurface investigation. The first objective was to collect a sufficient amount of geologic data to interpret the local geologic setting. The second objective was to collect sufficient soil analytical data to characterize previously uninvestigated areas within the Site boundaries. The third objective was to collect additional groundwater analytical data to identify magnitude and extent of previously identified releases in both the shallow unconfined water table aquifer and the deeper bedrock aquifer by installing a network of permanent groundwater monitoring wells at the Site. The fourth objective was to integrate previous investigation data with the investigation data obtained during this investigation to provide sufficient information to evaluate potential risks associated with past releases of hazardous substances, pollutants or contaminants, and identify and assess Site cleanup alternatives.

Fifteen (15) test trenches were installed to evaluate the soil characteristics and extent and magnitude of soil contamination within the Site boundaries. The trenches were generally 8 to 10

feet deep, and ranged from 15 to 50 feet in length. Soil samples were collected, field screened, and submitted for laboratory analysis from locations deemed to display the highest likelihood for contamination (e.g., fill horizons displaying odors, discoloration or evidence of anthropogenic materials such as glass, cinders or brick).

Twenty-three (23) additional soil borings were advanced in locations around the Site to evaluate soil lithology, soil characteristics and extent and magnitude of soil fill horizons (and potential impacts). Eight of the twenty-three borings were completed as monitoring wells. Four of the wells were completed in the unconfined system within the terrace deposits, and four of the wells were completed in the bedrock (Platteville Limestone) aquifer system.

One-hundred and fourteen (114) soil samples were collected and submitted for laboratory analysis. Summarized soil analytical results are presented in Table 1.

Two rounds of groundwater samples were collected and submitted for laboratory analysis. With respect to groundwater impacts, very few analytes or compounds were detected above applicable groundwater standards with respect to drinking water or surface water criteria. Lead was identified above the Environmental Protection Agency's Maximum Contaminant Level ("MCL") of 0.015 mg/L in the samples collected form W-2P (0.035 mg/L), W-6P (0.078 mg/L) and MW-9P (0.032 mg/L), although it does not appear that these impacts are related to impacts related to the Site.

A more detailed discussion of investigation results and potential risk pathways is found in the Wenck Investigation Report, dated October 2005. The conclusions presented in the Investigation Report are summarized as follows:

1. Arsenic was detected above the MPCA Tier 2 Industrial SRV of 20 mg/kg in five (5) of the soil samples collected. Arsenic values ranged from non-detect to a high of 130 mg/kg. It should be noted that the highest detected concentration of arsenic was from a sample

where the duplicate (i.e., split sample) was non-detect. The average arsenic concentration was 7.99 mg/kg.

2. Barium was detected above the method detection limit in all of the soil samples collected, with a low-end value of 7.1 mg/kg and a high-end value of 1,300 mg/kg. The sample collected from soil boring SB-19 (1,300 mg/kg) at a depth of 5-7 feet was the highest concentration, bud did not exceed the Tier 2 Industrial SRV of 1,800 mg/kg or the short-term worker SRV of 1,400 mg/kg. The average barium concentration was 89 mg/kg.

3. Detectable levels of lead were revealed over the method detection limit in approximately 96% of the soil samples collected. Two (2) samples exceeded the Tier 2 Industrial SRV of 700 mg/kg. Lead concentrations ranged from non-detect to 2,100 mg/kg. The average lead concentration was 133 mg/kg.

4. Mercury was detected above the method detection limit in eighty-three (83) of the one hundred and fourteen (114) soil samples collected. Mercury was not detected above the Tier 2 Industrial SRV of 2 mg/kg. The sample collected on the southwest end of test trench TP-15 at an approximate depth of two (2) feet below grade (070105-03) revealed a mercury concentration of 1.2 mg/kg, which is above the short-term worker SRV of 0.40 mg/kg. The average detected mercury concentration in soil was 0.090 mg/kg.

5. Eighty-six (86) of the soil samples showed GRO results ranging from non-detect to a high of 98 mg/kg.

6. Eighty (80) of the soil samples showed DRO results ranging from non-detect to a high of 2,500 mg/kg.

7. Low-level SVOCs were identified in soil at various locations around the Site. The only SVOC identified above its Tier 2 Industrial SRV was benzo(a)pyrene. Benzo(a)pyrene equivalents ("BaP") were calculated for each sample using three different scenarios and

compared to the Tier 2 Industrial SRV of 3 mg/kg. Of the one hundred and one (101) soil samples, nine (9) of the calculated values exceeded the SRV. None of the soil samples exceed the short-term worker SRV of 14 mg/kg.

8. No PCBs were identified in any of the soil samples above the laboratory method detection limits during this investigation.

9. Although several VOCs were detected in soil above their respective method detection limits, none were detect above applicable SRVs.

10. Several pesticides (4,4-DDD, 4,4-DDE, 4,4-DDT and Dieldrin) were detected in soil slightly above their applicable method detection limit. None of the detected values were above applicable SRVs.

11. Lead was identified in groundwater above the Environmental Protection Agency's Health Based Value ("HBV") of 0.015 mg/L in the samples collected form W-2P (0.035 mg/L), W-6P (0.078 mg/L) and MW-9P (0.032 mg/L).

12. Silver was identified in groundwater above the HRL of 0.030 mg/L in the groundwater sample collected from PMW-4 during the August 2005 sampling event. Silver was revealed at a concentration of 0.047 mg/L in PMW-4 in the August 2005 sampling event. It was not detected above the Reporting Limit in the October 2005 sampling event.

13. DRO was revealed in groundwater from monitoring wells MW-1, PMW-4 and PMW-1 at concentrations ranging from 0.1 mg/L to 1.7 mg/L.

14. GRO was identified in groundwater from two (2) monitoring wells during the August 2005 sampling event. GRO was identified in PMW-4 and PMW-1 at concentrations of 0.59 mg/L and 0.12 mg/L, respectively.

15. Detectable levels of VOCs were identified in the groundwater samples collected from monitoring wells W-9P, W-10P, W-10, PMW-1 and PMW-4 during both sampling events. None of the VOCs detected were revealed above the established HRLs for the detected compounds, although benzene was detected above the MCL in the September 30, 2005 sampling event (the sampling event mishandled during transport to the laboratory). Benzene was not subsequently identified above the MCL in the October 10, 2005 sampling event.

16. No pesticides were identified in the groundwater above the laboratory method detection limits in the groundwater samples collected during the August 2005 sampling event.

WITH RESPECT TO THOSE AREAS OF THE SITE WHERE SOIL CONTAMINATION IS KNOWN TO BE PRESENT IN EXCESS OF APPROVED CLEANUP GOALS, WENCK FIELD STAFF WILL IDENTIFY THOSE AREAS BY FLAGGING, STAKING OR MARKING THE AREA WITH PAINT (IF ON A SURFACE LOT). IF PROJECT ACTIVITIES ENCOUNTER THOSE AREAS OF KNOWN EXCEEDANCES, THE CONTAMINATED SOIL OR OTHER MATERIAL WILL BE REMOVED TO AN OFF-SITE DISPOSAL LOCATION, OR, WITH PRIOR APPROVAL OF MPCA PROGRAM STAFF, REINCORPORATED ON-SITE

4.0 Previous Investigations – Project Area Sites

4.1 GENERAL

Multiple sites of past environmental regulatory interest within the broad area that will require construction-related activities in support of the Stadium project. The intent of this Contingency Plan is to ensure that activities related to Stadium and Stadium infrastructure improvements will be comprehensively managed to avoid potential confusion with respect to monitoring, cleanup criteria, or conflicting roles and responsibilities.

4.2 VP#11350 – REICHHOLD

The Reichhold property is located at 601-25th Avenue SE. Previous investigations of the Reichhold Chemical Site revealed soil and groundwater impacts related to petroleum, solvents and metals. Additionally, it is understood that chemical storage at the site included mineral spirits, caustics, acids, xylene, naphtha as well as vegetable oils (primarily linseed oil). Two petroleum releases were reported from USTs and several thousand cubic yards of linseed oil contaminated soil and debris were removed. The MPCA issued a No Further Action letter on December 1, 2000, subject to Institutional Controls requiring the property be kept in industrial use. This site was also investigated under a different VIC Program site investigation, number VP#7870 – Proposed University Steam Plant. A limited No Further Action letter was issued on September 7, 2000. Subsequently, another No Further Action letter was issued on October 3, 2005.

4.3 VP#11650 – INDOOR WOMEN'S HOCKEY ARENA

A Construction Contingency Plan was developed in February 1999 and revised in July 2000. The arena, located at 1815 4th Street SE (between 4th and 5th Streets SE), was constructed in 2001. No information was available regarding the implementation of the Contingency Plan.

4.4 VP#14060 – KEMPF PAPER BUILDING

The Kempf Paper Building site, located at 2525 4th Street SE, was investigated by Meisch & Associates ("Meisch") in 2001. Based on a long history of industrial use, the Kempf Paper Building site posed concerns relative to old floor drains, sumps, manholes and sub-grade cavities. Low-levels of DRO and PAHs were identified, generally at levels below their respective screening criteria, although one location showed impacts above the B(a)P equivalent SRV. Groundwater screening revealed impacts of DRO and sixteen VOCs. With the exception of tetrachloroethene ("PCE") and trichloroethene ("TCE"), these groundwater impacts did not exceed applicable drinking water criteria.

Due to the presence of VOCs in soil, source area mitigation or further evaluation of the vapor risk pathway is necessary if site construction activities will substantially alter the site through paving or utility work.

4.5 VP#16720 – CENTER FOR MAGNETIC RESONANCE RESEARCH

The Center for Magnetic Resonance Research is located at 2021 6th Street SE. The site was nominally investigated by Meisch with a Phase I Environmental Site Assessment, dated May 31, 2002, and a Limited Phase II Environmental Site Assessment, dated August 6, 2002. Based on that investigation, Meisch developed a contingency plan dated November 5, 2002. The concern was driven by the presence of cinders in soil borings in the vicinity of the site, and the elevated

levels of DRO, PAHs and metals on the site and in the area. During construction and under the implementation of the contingency plan, 357 tons of soil was managed off-site in two phases of implementation of the contingency plan during construction work.

4.6 VP#17290 – MIDWEST WAREHOUSE BUILDING

A Phase II Investigation was performed by Peer in October 2002. The investigation involved the Midwest Warehouse parcel, the adjacent Century Mills parcel, which is listed as a separate VIC Program site – the Lorraine Larson Property (see Section 4.8 below), and several other University owned parcels. Due to the presence of a building on the site at the time of the investigation, only one boring was completed on the Midwest Warehouse parcel. Soil samples from adjacent, University-owned property revealed elevated levels of metals and PAHs in fill.

The investigation identified only two- to four-feet of fill across the site, with some evidence of coal or cinders intermixed.

4.7 VP#17340 – TRANSLATIONAL LAB SITE

The VIC Program site file for the Translational Lab site appears to pertain to a contingency plan developed to govern construction activities related to expansion of an existing building, located at 2001 6th Street SE. The Contingency Plan was approved September 15, 2002. A Contingency Plan Implementation Report, dated October 14, 2004, was developed by Meisch as a result of field activities conducted in May of 2002 during utility construction activities. Approximately 160 cubic yards of soil were excavated, segregated and screened in accordance with the utility construction. All excavated soil was subsequently re-used as utility trench backfill.

During additional site development work in August and September of 2002, conducted under the same contingency plan, Meisch observed excavation of approximately 740 cubic yards of soil.

Approximately 145 cubic yards of this soil failed field-screening criteria and was set aside and covered with poly-sheeting in anticipation of approval of a waste profile for off-site disposal. The material was disposed at the Waste Management, Inc. Spruce Ridge facility. The remaining soil was used to backfill utility trenches.

4.8 VP#17660 – LORRAINE LARSON PROPERTY

The Lorraine Larson site was the former location of the Century Mills, the foundations of which appear to still be located at the site. An investigation conducted by Peer in October 2002 revealed impacts to soil and groundwater. In general, the site is impacted by PAHs, and metals at levels above screening criteria for unrestricted re-use. Asbestos and low levels of pesticides, PCBs and VOCs were also identified. A No Association Determination was issued to the University of Minnesota on February 18, 2004. Any redevelopment activity in this area will need to attend to the high probability of encountering asbestos-containing demolition wastes during site construction or grading.

4.9 VP#17670 – UNION PACIFIC RAILROAD PROPERTY

The Union Pacific Railroad Property site is a 2.5-acre strip located north of the University of Minnesota Lions Research Lab, the Magnetic Resonance Research Building, and Parking Lot 37. It is generally at the extreme northwest corner of the Stadium project area, south of the existing railroad right-of-way. Historically, the site contained grain elevators, although at the time of a November 6, 2000, Phase I Environmental Site Assessment performed by Meisch, the elevators had been removed. The report did not indicate the date the elevators were removed. Due to the lack of documentation regarding previous demolition activity, extra precautions shall be taken with respect to the potential for buried demolition waste during construction activity on this parcel.

A Phase II Investigation conducted by Peer and documented in a report dated September 24, 2003, revealed soil impacts including VOCs below applicable SRVs, PAHs below applicable SRVs, organochlorine pesticides below applicable SRVs, low levels of DRO and RCRA metals, with only arsenic exceeding the SRV (at 11 mg/kg). Groundwater impacts of note were limited to TCE above the MCL but below the HRL (of 30 µg/kg) in effect at the time. A request for No Association Determination was made on March 9, 2004, and included lead, arsenic and mercury in soil, several organochlorine pesticides in soil and petroleum-related VOCs in soil. The No Association Determination was issued by the MPCA on March 12, 2004.

4.10 VP#18960 – TRANSLATIONAL RESEARCH STEAM LINE

A contingency plan was developed May 21, 2004 by STS regarding construction of a steam line to serve the Translational Research Building. The path of this steam line crosses the Stadium Site. According to that contingency plan, no previous investigations had been completed "specifically in the alignment" of the proposed steam line. The STS contingency plan anticipated impacts including VOCs (both petroleum and non-petroleum), DRO/GRO, PAHs, metals, and PCBs.

In general, the contingency plan incorporated use of visual criteria coupled with 10 PID units (calibrated to an isobutylene standard) as an action level for differentiating chemically impacted soil from re-useable soil. The Contingency Plan was approved May 28, 2004.

4.11 VP#21820 – CON AGRA - 23RD AVENUE

A Phase II Investigation has recently been completed for the Con Agra - 23rd Avenue site. Results of that investigation have shown site is impacted by RCRA metals and copper, manganese, tin and zinc, petroleum hydrocarbons and low-level PAHs. Several pesticides and

fungicides were also identified, indicating that excavated soil stockpiled from this area will require additional analytical parameters.

A Development Response Action Plan ("DRAP") and Construction Contingency Plan, dated May 10, 2006, was developed by Peer. This document has been approved by the MPCA. It proposes screening the Con Agra site to Industrial SRVs, MDA cleanup criteria (where applicable) and 10 parts per million on a PID for soil impacted by petroleum hydrocarbons.

4.12 VP#21570 – UNIVERSITY TECHNOLOGY CENTER EAST SITE

A Phase II Investigation was very recently completed for the University Technology Center East ("UTEC") site by Peer. The site includes buildings with the addresses 2301, 2315, 2328 2329 University Avenue SE. The Phase II Investigation Report indicates that the site is impacted by metals, petroleum hydrocarbons and low-level PAHs. The highest detected levels of metals included lead at 1500 mg/kg, and mercury at 5.5 mg/kg. PAHs were detected a levels up to a high of 10.8 mg/kg total B(a)P equivalents. DRO was detected at a high of 250 mg/kg.

Wenck conducted a supplemental investigation relative to Bid Pack #1 construction activities on June 1, 2006. These construction activities include removal of footings associated with the Minnesota Daily Building located at 2301 University Avenue (to be razed in June 2006) and realignment of 23rd Avenue SE adjacent to and on the UTEC property. Wenck's supplemental investigation consisted of a series of test trenches on the westernmost parcel to evaluate the nature and extent of soil impacts. The results of the test trenching indicated the presence of of approximately six to seven feet of fill across the western portion of the site. laboratory analytical results are pending at this time. Based upon the results of the testing, a waste profile for off-site disposal will be prepared to manage the portion of the impacted fill that must be excavated as a part of the Bid Pack #1 construction activities.

5.0 Description of Potential Hazards

5.1 GENERAL

During the performance of project activities, exposure to metals, PAHs, petroleum-related hydrocarbons, and pesticides may occur. Other possible materials of concern that may be encountered during excavation may include building demolition wastes, asbestos-containing materials (i.e., building debris, insulated piping, old boiler systems, discarded electrical equipment or panels), and ash or clinker materials mixed with soil. Creosote-contaminated soils from the former creosoting facility, which are presently classified by MPCA as a hazardous waste, are also anticipated to be encountered during site activities. If encountered, these materials must be managed consistent with rules governing the excavation, management, storage and transportation (if removed from the immediate project area or across a street) of this material.

5.2 CHEMICALS OF CONCERN AND CLEANUP GOALS

Chemicals of Concern identified at the Site include PAHs and metals. Petroleum compounds will be dealt with under a separate document due to the regulatory programmatic distinctions. Pesticide concerns are a potential at several other VIC project sites, in particular, the Con Agra facility. While VOCs have not been identified as a Chemical of Concern at the Site, if organic vapors are identified, health and safety protocols will be implemented, and appropriate air monitoring initiated.

In evaluating soil cleanup goals, the following considerations were taken into account: land use, likelihood (i.e., probability) of exposure, frequency of repeated visits, use of institutional controls, and worker safety. Tier 2 Industrial Soil Reference Values were deemed most appropriate for cleanup goals.

6.0 Project Organization

6.1 DESCRIPTION OF PROPOSED ACTIONS

Site development activities will include Site grading and utility work relating to the construction of an on-campus football stadium, associated parking, and infrastructure to accommodate future campus facilities.

In general, the work will begin in summer 2006 on roadways serving the stadium area and the creation of new parking areas to replace parking areas that will be removed to accommodate the stadium development. The majority of this work will take place in utility corridors or very near the surface. Removed (i.e., milled asphalt) surfaces and clean granular sub-base (i.e., Class V) will be evaluated by the Field Engineer ("FE") and either stockpiled for appropriate on-site reuse, or removed for off-site recycling. It is not currently known whether the amount of on-Site asphalt would warrant mobilizing a crushing operation to the Site. The decision will likely be left to the selected contractor.

Material being excavated, relocated or re-placed will be screened at a frequency dependent on whether it is native terrace deposit (i.e., sand or sand with peat) or fill. Native material will be screened using a photo-ionization detector ("PID") using bag-headspace methodology and a X-Ray Fluorimeter ("XRF") calibrated to a lead standard at a rate of at least one sample per hour of Site activity, or a rate of at least one sample per 500 cubic yards of material handled. As noted in Section 3.6, above, if previously characterized *in-situ* materials above cleanup goals are encountered, they will not be re-sampled, but rather, they will either be removed for off-site disposal, or, with prior MPCA VIC Program staff approval, re-incorporated on-Site.

Non-native fill material shall be screened at a more frequent basis, and some judgment shall be exercised by the FE in terms of identifying whether the encountered media is relatively

homogeneous (or closely resembles a material previously characterized) or if it is distinct enough to allow separate characterization or segregation. In general, screening shall be performed approximately 10 times as frequently as with native material, or at a rate of one sample approximately every 10 minutes of Site excavation activity or every 50 yards of non-native media managed.

A generalized flow chart showing the screening approach and field decision-making process is included as Attachment A.

Field screening criteria shall be established to generally require materials exhibiting greater than 10 parts per million ("ppm") response on the PID or greater than 500 ppm lead (Pb) using the XRF to be stockpiled and further evaluated using laboratory analytical methodology. Laboratory parameters shall generally include RCRA metals, TCLP RCRA metals and PAHs. Additional criteria shall be added depending on: 1) the FE's interpretation of the type of impact identified, 2) previously collected site-specific information, 3) consultation with MPCA VIC Program project staff, and, 4) other parameters deemed necessary for off-site disposal (i.e., landfill required parameters).

In addition to non-native fill failing field screening criteria, fill containing identifiable quantities of ash, clinkers or cinders (i.e., greater than approximately 10%) shall also be segregated into stockpiles for laboratory analysis.

Excavated stockpiled material failing to meet established Tier 2 Industrial SRVs shall be removed to a permitted landfill facility per an approved waste profile, or reincorporated into the Site at greater than four feet below grade, subject to MPCA VIC Program approval. The location and description of this reincorporated material, as well as locations of other areas of the Site where soil remains in place above cleanup goals, will be documented via an environmental restrictive covenant.

Due to the lack of stormwater detention currently existing on the Site, the Site improvements will include a system of stormwater "bio-swales" parallel to many of the roadway improvements. These bio-swales will require sub-cuts to an elevation of approximately 828' to 830'. Based on Site investigation data, it appears the sub-cuts required for the bio-swale areas will generally extend to native terrace deposits. In areas where the sub-cut for the bio-swale does not extend through the non-native fill, the excavation will proceed until native material is reached. Imported granular material (or material that has been stockpiled, tested and demonstrated to meet cleanup goals) will then be placed to bring the elevations to the appropriate grade for construction of the bio-swales.

Finally, some areas of the Site have been under-investigated due to the presence of remnant foundations or existing buildings. These areas of the Site (for example, the 2221 University Avenue SE building) will be more thoroughly investigated during demolition or removal to ensure that no previously unidentified releases are disturbed without appropriate characterization of risk.

6.2 PROJECT ORGANIZATION

The University of Minnesota will designate a FE for the construction activities who will act as Site Safety and Health Supervisor ("SSHS"). As SSHS, the FE will provide on-Site hazard evaluation of any encountered wastes or contaminated soils. The FE shall be an environmental professional, and shall have, at a minimum, asbestos certification issued by the Minnesota Department of Health (MDH).

6.3 SITE CONTROL

If any unanticipated wastes or contaminated soils are encountered during Site work, an exclusion zone will be designated on-Site around the area of concern. The zone will be physically delineated by the FE with flagging, caution tape, or fencing, as appropriate. Only personnel

authorized by the FE will be allowed to enter the exclusion zone. In the event that an exclusion zone is needed, the FE will direct further response actions in conjunction with MPCA oversight.

6.4 WASTE EVALUATION

The excavation and subsurface construction activities will be conducted in an area that shows evidence of historic filling and certain excavated materials may require characterization to determine if they are hazardous waste or inappropriate fill material. Excavated soils will be inspected for the presence of:

- Strong or unusual odors, especially odors indicative of creosote,
- Discolored soils or the presence of sludge,
- Soils containing visible ash or clinkers,
- Buried objects, building materials or railroad ties,
- Asbestos-containing materials (ACM).

Based on the observations of the FE, a decision protocol will be implemented in accordance with the flow chart included as Appendix A.

A supply of 10 mil plastic for stockpiling and covering these materials will be maintained on-Site by the FE. In addition, appropriate laboratory sampling containers will be maintained on the Site for sampling of wastes (if warranted). Uncovered hazardous materials, including creosote wastes or soils impacted by creosote, will not be reburied at the Site.

6.4.1 Demolition Debris

Demolition debris (if encountered) will be segregated from the excavated material and stored in an area designated by the FE. Demolition debris will be carefully evaluated for the potential

presence of asbestos-containing materials. Any demolition debris will be appropriately characterized and subsequently disposed at a permitted demolition solid waste disposal facility.

6.4.2 Potentially Hazardous Waste

Barrels, paint containers, creosote residue and other evidence of potentially hazardous waste (if encountered) are to be carefully segregated from the excavated materials and should be placed in a designated area lined with 10 mil plastic, or, if quantities are limited, 55-gallon drums or overpacks. The FE will assess the potential for release of hazardous materials. More secure storage may be warranted based upon specific Site conditions and waste types. The wastes will be analyzed and managed appropriately. These materials will not be re-used as, or part of the controlled fill on-Site.

It is anticipated that some creosote-impacted soils will be encountered during road and utility construction work related to 6th Street SE and 23rd Avenue SE. These materials will be managed as hazardous waste, and either stockpiled temporarily for subsequent removal at a secured location, or immediately transported off-site as hazardous waste to a Subtitle C disposal facility or an appropriately permitted hazardous waste treatment facility.

6.4.3 Refuse

Excavated materials may include a mixture of decomposable organic materials (wood, paper, vegetation, etc.) and inorganic material such as concrete, glass, plastic, metal, etc. To determine the suitability for use as backfill, the FE will inspect the material. Refuse materials deemed unsuitable will be segregated into a designated area for subsequent transport and off-Site disposal. It is anticipated that refuse will be managed off-Site and will not be used as backfill on-Site.

6.4.4 Ash

Ash material containing clinkers will likely be encountered in the excavated materials. The mixture of ash and soil materials may be used as controlled backfill material on-Site, but only with prior approval of the MPCA VIC Program staff. Such material will be appropriately characterized to ensure that it meets cleanup goals or, if it exceeds cleanup goals, it will be appropriately managed through an environmental restrictive covenant.

6.4.5 Soil Export

Currently, the proposed plan is to manage excess soil or granular material meeting cleanup goals on-Site in landscaping or other construction techniques to balance final grades. Soil export necessary to facilitate final grading will require characterization (i.e., development of a Special Waste Disposal Profile) and coordination with the MPCA and the County where the waste disposal facility is located. Soil will be sampled, at a minimum, in accordance with MPCA soil stockpile sampling guidance (MPCA, Risk Based Site Evaluation Manual, September 1998). If off-site disposal is necessary, sampling parameters will be dictated by the landfill's permit. In general, it is understood that characterization for the development of the waste profile will include: RCRA metals total and by TCLP (molybdenum, boron and strontium will be added to the parameter list if the material segregated appears to be ash), VOCs total and VOCs by TCLP, pesticides, PCBs, and PAHs. If eligible by the landfill's permit and subject to county approval, such exported granular media may be used for daily cover.

6.4.6 Stockpile Management

Wenck will prepare and submit to MPCA VIC Program staff a quarterly documentation report identifying: 1) the quantity of stockpiled soil; 2) the stockpile location(s); 3) the construction activity from which it was generated, and 4) its anticipated disposition.

6.4.7 Utility Corridors

To the extent practicable, utilities serving the new construction will share a common "clean" corridors. Soil in the utility corridor shall be over-excavated to the maximum depth to accommodate sewer pipe, water mains, and other infrastructure connected to private and utility public rights-of-way. Excavated media shall be managed elsewhere on-Site or off-Site in accordance with other sections of 5.3 above. "Clean" granular, either borrow from other areas of the Site free from debris or obvious contamination (from zones which have been appropriately characterized), or clean aggregate fill from an off-Site source shall be used as backfill in the utility corridor. The rationale for this effort is to ensure future worker safety relative to on-going maintenance or improvements.

6.5 HAZARD EVALUATION

6.5.1 Chemical Vapor Hazards

Based on investigation findings, it is anticipated that low concentrations of chemical vapors may be generated during earthwork activities at limited locations on the Site. The concentrations are not expected to pose a health risk to on Site workers or downwind personnel. However, there may be incidents of noticeable odors during the work, in particular, in the area of the former Republic Creosote facility.

6.5.2 Particulate Hazards

During the performance of project activities, exposure to metals, PAHs, petroleum-related hydrocarbons and pesticides may occur. These substances will be present as solid material incorporated within the soil matrix and or adsorbed to soil particles. These substances may be made airborne during excavation activities.

Potential health hazards to on-Site workers may exist from **ingestion** and through **dermal contact** with compounds. Ingestion of substances will be virtually eliminated by forbidding eating, drinking, smoking, and any other hand-to-mouth activities on-Site. Hands and face should be washed after leaving Site and prior to any eating, drinking or smoking. **Dermal contact** can be minimized by wearing proper protective clothing, using gloves during sampling activities and hand washing.

6.5.3 Physical Hazards

The project poses some physical hazards, which need to be addressed in order to perform the work in a safe manner. Potential physical hazards include but are not limited to the following:

- Operating or working near heavy equipment such as a crane, track hoe excavator, front-end loader, transport trucks, etc.
- Working within a confined space such as an excavation, tunnel, manhole, etc.
- Working within the vicinity of overhead power lines and underground utilities.
- Working in areas that are off the ground.
- Seasonal weather related problems.

Operating and working around heavy construction equipment shall conform to applicable OSHA standards. Safety around equipment must also be a consideration when traveling to and from the Site, moving equipment from location to location and performing maintenance work.

Excavations may represent a confined space, a confined space being deep enough where a standing person's head is below grade/ground surface. Excavations shall not have side slopes in excess of 3 horizontal to 1 vertical unless properly shored. Due to the potential dangers of engulfment, presence of hazardous airborne constituents, lack of oxygen, or lack of entry/exit access, no worker will be allowed to enter a confined space without proper approval.

The Site may have numerous underground utilities. "Gopher State One Call" must clear the utility locations prior to excavating. Generally, it is the responsibility of the subcontractor doing the excavation work to clear utilities.

Overhead power lines may also be present at the Site. A safe distance will be kept when working around overhead power lines. If necessary, power lines will be shrouded to increase visibility and worker awareness.

6.6 ENVIRONMENTAL MONITORING

Nuisance odors generated during excavation activities will be monitored as total airborne hydrocarbons upwind and downwind of the project work area.

Dust generated during excavation activities may contain particulates with elevated levels of metals, PAHs, and petroleum-related hydrocarbons. If visible dust is noted, wetting of soils will be done to control dust. Measurement of metals, PAHs and petroleum-related hydrocarbons as particulate matter in the air is generally not practical. However, emissions monitoring will be conducted for total suspended particulate upwind and downwind of the project work area.

If visible dust is noted during project activities, immediate wetting of the excavated material will be done for dust control.

6.7 ACTION LEVELS

Parameter Monitored	Action Level	Response Action
Total Hydrocarbons	1 ppm increase of downwind over upwind concentrations sustained for 15 minutes or more	• Investigate source and extent of material generating odorous hydrocarbons • If material is expected to be extensive, continue work with respirators equipped with combination activated carbon and high efficiency particulate air filters. • Remove respirators when the hydrocarbon concentration difference is less than 1 ppm
Fugitive Dust	Visible Dust Plume	• Move personnel upwind of work • Spray water on dust source • If water is not effective due to high winds, stop work until wind speed is reduced to below 10 mph
Total Suspended Particulate (TSP)	0.1 mg/m^3 increase of downwind over upwind concentrations sustained for 15 minutes or more	• Investigate source and extent of material generating fugitive particulate • If material is expected to be extensive, continue work with respirators equipped with high efficiency particulate air filters. • Remove respirators when the TSP concentration difference is less than 0.1 mg/m^3

6.8 RECOGNITION OF HAZARDOUS MATERIALS

The following occurrences may be signs that hazardous materials have been encountered at the Site during the subsurface activities:

- Strong or unusual chemical odors of solvents, petroleum, etc. from the excavation,
- Encountering suspected industrial waste such as tars, sludge, semi-solids, powders, resins, or liquids in the excavation,
- Discolored soils in or from the excavation,
- Drums and containers (labeled or unlabeled), buried metal objects such as cans, jars, or tanks in the excavation,
- Persons who suddenly become ill at the Site.

If any of the above occurs indicating that a hazardous substance may have been unearthed, work activities should be suspended pending further evaluation and the FE is to be notified immediately.

The FE will assess the situation using the available on-Site instrumentation, personal protective equipment, and his/her own knowledge and experience to determine the nature of the material and whether it should be segregated for special handling. The FE will determine if further investigation is needed in consultation with Mr. Timothy Colliton, CIH, Wenck Associates, Inc. (763-479-4236).

If the FE deems that a spill has occurred, the FE will immediately notify Mr. Colliton, CIH, Wenck Associates, Inc. (763-479-4236). The FE should be prepared to provide the following information:

- Company name at the Site (if applicable) and consultant name.
- Address of the spill Site.
- Date/time of incident.
- Extent of any injuries.

- Estimated quantity and disposition of recovered materials.
- Quantity/type of material involved.

Mr. Colliton will then contact the following:

	Telephone
Minnesota State Duty Officer:	(651) 659-5451
MPCA VIC Unit (Mr. Wayne Sarappo or Ms. Lynne Grigor)	(651) 296-6300

The FE will then ensure that Site personnel follow the instructions provided by each agency contacted.

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TABLES

Table 1

Soil Analytical Results

Table 2

Hazardous Substance Information

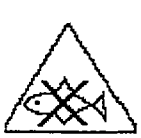
International Chemical Safety Cards

ARSENIC

ICSC: 0013

Grey arsenic
As
Atomic mass: 74.9

ICSC # 0013
CAS # 7440-38-2
RTECS # CG0525000
UN # 1558
EC # 033-001-00-X



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough. Sore throat. Shortness of breath. Weakness. (See Ingestion).	Closed system and ventilation.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Face shield, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	Do not transport with food and feedstuffs. Marine pollutant. T symbol R: 23/25 S: 1/2-20/21-28-45 UN Hazard Class: 6.1 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0013

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1999. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ARSENIC

ICSC: 0013

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce toxic arsine gas (see: ICSC # 0222).

OCCUPATIONAL EXPOSURE LIMITS:
TLV: ppm; 0.01 mg/m^3 (as TWA) A1 (ACGIH 1999).
NIOSH REL: Ca C 0.002 mg/m^3 15-minute See Appendix A
NIOSH IDLH: Potential occupational carcinogen 5 mg/m^3 (as As)

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes , the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract , cardiovascular system , central nervous system and kidneys , resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders , shock , convulsions and kidney impairment . Exposure above OEL may result in death. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. Repeated or prolonged contact may cause skin sensitization. The substance may have effects on the mucous membranes, skin, peripheral nervous system , liver and bone marrow, resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment , anaemia . This substance is carcinogenic to humans. Animal tests show that this substance possibly causes malformations in human babies.

PHYSICAL PROPERTIES

Sublimation point: 613°C
Density: 5.7 g/cm3
Solubility in water: none

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment.

NOTES

The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is indicated. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC # 0377), Arsenic trichloride (ICSC # 0221), Arsenic trioxide (ICSC # 0378), Arsine (ICSC # 0222).

Transport Emergency Card: TEC (R)-61G64b

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:

International Chemical Safety Cards

LEAD

ICSC: 0052

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR. **PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric and sulfuric acids. Attacked by pure water and by weak organic acids in the presence of oxygen. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: ppm; 0.15 mg/m^3 (as TWA) (ACGIH 1993-1994). OSHA PEL*: 1910.1025 TWA 0.050 mg/m^3 See Appendix C *Note: The PEL also applies to other lead NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C *Note: The REL also applies to other lead NIOSH IDLH: 100 mg/m^3 (as Pb) **ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance may cause effects on the gastrointestinal tract, blood, central nervous system and kidneys , resulting in colics, shock, anemia, kidney damage and encephalopathy. Exposure may result in death. The effects may be delayed. Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the gastrointestinal tract, nervous system, blood, kidneys and immune system , resulting in severe lead colics, paralysis of muscle groups of the upper extremities (forearm, wrist and fingers), anemia, mood and personality changes, retarded mental development, and irreversible nephropathy. May cause retarded development of the new-born. Danger of cumulative effect.
PHYSICAL PROPERTIES	Boiling point: 1740°C Melting point: 327.5°C Relative density (water = 1): 11.34 Solubility in water: none
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air and water. In the food chain important to humans, bioaccumulation takes place, specifically in plants and water organisms, especially shellfish. 

NOTES

Explosive limits are unknown in literature. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. Do NOT take working clothes home. Refer also to cards for specific lead compounds, e.g., lead chromate (ICSC 0003), lead(II) oxide (ICSC 0288).

Transport Emergency Card: TEC (R)-61G12b

ADDITIONAL INFORMATION

International Chemical Safety Cards

MERCURY

ICSC: 0056

UNEP

National Institute for Occupational Safety and Health NIOSH

Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

ICSC # 0056
CAS # 7439-97-6
RTECS # OV4550000
UN # 2809
EC # 080-001-00-0

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs . Well closed.	Special material. Do not transport with food and feedstuffs. T symbol N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0056

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 2001. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MERCURY

ICSC: 0056

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.025 mg/m^3 (as TWA) (skin, A4) (ACGIH 2000). MAK: 0.01 ppm; 0.1 mg/m^3; (1992). NIOSH REL: Hg Vapor: TWA 0.05 mg/m^3 skinOther: C 0.1 mg/m^3 skin NIOSH IDLH: 10 mg/m^3 (as Hg)	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its vapour and through the skin , also as a vapour! **INHALATION RISK:** A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance irritates the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous systemand kidneys. The effects may be delayed. Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the central nervous system and kidneys , resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. May cause inflammation and discoloration of the gums. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.
PHYSICAL PROPERTIES	Boiling point: 357°C Melting point: -39°C Relative density (water = 1): 13.5 Solubility in water: none	Vapour pressure, Pa at 20°C: 0.26 Relative vapour density (air = 1): 6.93 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish. 	

NOTES

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80G20c

ADDITIONAL INFORMATION

ICSC: 0056 **MERCURY**

Drinking Water and Health Basics
Frequently Asked Questions
Local Drinking Water Information
Drinking Water Standards
List of Contaminants & MCLs
Regulations & Guidance
Public Drinking Water Systems
Source Water Protection
Underground Injection Control
Data & Databases
Drinking Water Academy
Safe Drinking Water Act
National Drinking Water Advisory Council
Water Infrastructure Security

Technical Factsheet on: MERCURY

List of Contaminants

As part of the Drinking Water and Health pages, this fact sheet is part of a larger publication:
National Primary Drinking Water Regulations

Drinking Water Standards

MCLG: 0.002 mg/L
MCL: 0.002 mg/L
HAL(child): none

Health Effects Summary

Acute: EPA has found mercury to potentially cause kidney damage from short-term exposures at levels above the MCL. No Health Advisories have been established for short-term exposures.

Chronic: Mercury has the potential to cause kidney damage from long-term exposure at levels above the MCL.

Cancer: There is inadequate evidence to state whether or not mercury has the potential to cause cancer from lifetime exposures in drinking water.

Usage Patterns

Nearly 8 million lbs. of mercury were produced in the U.S. in 1986.

Electrical products such as dry-cell batteries, fluorescent light bulbs, switches, and other control equipment account for 50% of mercury used. Mercury is also used in substantial quantities in electrolytic preparation of chlorine and caustic soda (chlor-alkali industry, mercury cell process; 25%), paint manufacture (12%), and dental preparations (3%). Lesser quantities are used in industrial catalyst manufacture (2%), pesticides manufacture (1%), general laboratory use (1%), and pharmaceuticals (0.1%).

Release Patterns

A joint FAO/WHO expert committee on Food Additives in 1972 quotes the major source of mercury as the natural degassing of the earth's crust in the range of 25,000-150,000 ton of Hg/yr. Twenty thousand tons of mercury are also released into the environment each year by human activities such as combustion of fossil fuels and other industrial release. Anthropogenic sources of airborne mercury (Hg) may arise from the operation of metal smelters or cement manufacture. Water borne pollution may originate in sewage, metal refining operations, or most notably, from chloralkali plants. In general, industrial and domestic products, such as

thermometers, batteries, and electrical switches which account for a significant loss of mercury to the environment, ultimately become solid waste in major urban areas.

From 1987 to 1993, according to EPA's Toxic Chemical Release Inventory, mercury releases to land and water totalled nearly 68,000 lbs., of which 90 percent was to land. These releases were primarily from chemical and allied industries. The largest releases occurred in Tennessee and Louisiana. The largest direct releases to water occurred in West Virginia and Alabama.

Environmental Fate

Two characteristics, volatility and biotransformation, make mercury somewhat unique as an environmental toxicant. Its volatility accounts for atmospheric concentrations up to 4 times the level of contaminated soils in an area. Inorganic forms of mercury (Hg) can be converted to organic forms by microbial action in the biosphere.

In aquatic systems, mercury appears to bind to dissolved matter or fine particulates, while the transport of mercury bound to dust particles in the atmosphere or bed sediment particles in rivers and lakes is generally less substantial. The conversion, in aquatic environments, of inorganic mercury compounds to methyl mercury implies that recycling of mercury from sediment to water to air and back could be a rapid process. In a study of mercury elimination from wastewater, 47% of added mercury was removed in presence of a Pseudomonas strain. Uptake of mercury was severely inhibited by sodium chloride, sodium sulfate, and mono- and dibasic potassium phosphate.

In the atmosphere, 50% of the volatile form is mercury (Hg) vapor with sizeable portion of remainder being Hg(II) and methylmercury, 25 to 50% of Hg in water is organic. Hg in the environment is deposited and revolatilized many times, with a residence time in the atmosphere of at least a few days. In the volatile phase it can be transported hundreds of kilometers.

Bioconcentration factors of 63,000 for freshwater fish, 10,000 for salt water fish, 100,000 for marine invertebrates, and 1000 for freshwater and marine plants have been found. As the tissue concentration approaches steady-state, net accumulation rate is slowed either by a reduction in uptake rate, possibly due to inhibition of membrane transport, or by an increase in depuration rate, possibly because of a saturation of storage sites, or both. Acidification of a body of water might also increase mercury residues in fish even if no new input of mercury occurs, possibly because lower pH increases ventilation rate and membrane permeability, accelerates the rates of methylation and uptake, affects partitioning between sediment and water, or reduces growth or reproduction of fish.

Chemical/Physical Properties

CAS Number: 7439-97-6

Color/ Form/Odor: Silver-white, heavy, mobile, liquid metal. Solid mercury is tin-white. Odorless

M.P.: -38.87 C B.P.: 356.7 C

Vapor Pressure: 2x10-3 mm Hg at 25 C

Density/Spec. Grav.: 13.5 at 25 C

Solubility: 0.06 g/L of water at 25 C; Slightly soluble in water

Soil sorption coefficient: N/A

Odor/Taste Thresholds: N/A

Bioconcentration Factor: Bioconcentration factors of 63,000 for freshwater and 10,000 for salt water fishes. BCFs of 100,000 for invertebrates.

Henry's Law Coefficient: N/A; volatilization from water and soil is significant

Synonyms/Ores: Liquid silver, Quicksilver, Hydragyrum, Colloidial mercury. Important commercial ore is cinnabar, but also found in limestone, calcareous shales, sandstone, serpentine, chert andesite and others.

Other Regulatory Information

Monitoring:

-- For Ground Water Sources:

Initial Frequency-1 sample once every 3 years

Repeat Frequency-If no detections for 3 rounds, once every 9 years

-- For Surface Water Sources:

Initial Frequency-1 sample annually

Repeat Frequency-If no detections for 3 rounds, once every 9 years

-- Triggers - If detect at > 0.002 mg/L, sample quarterly.

Analysis

Reference Source	Method Number
EPA 600/4-79-020	245.1; 245.2
Standard Methods	303F

Treatment/Best Available Technologies: Coagulation/Filtration*; Granular Activated Carbon; Lime softening*; Reverse osmosis*

* These treatments are recommended only if influent Hg concentrations do not exceed 10 ug/L

Toxic Release Inventory - Releases to Water and Land, 1987 to 1993 (in pounds):

	Water	Land
TOTALS	**6,971**	**60,877**
Top Six States		
TN	164	29,161
LA	431	21,829
DE	117	3,860
OH	29	2,760
AL	1,462	4,001

WV	1,657	454	
Major Industries*			
Chemical, allied products		12,269	74,720
Electric lamps		0	2,750
Paper mills		2,500	0

For Additional Information:

EPA can provide further regulatory and other general information:
EPA Safe Drinking Water Hotline - 800/426-4791

Other sources of toxicological and environmental fate data include:
Toxic Substance Control Act Information Line - 202/554-1404
Toxics Release Inventory, National Library of Medicine - 301/496-6531
Agency for Toxic Substances and Disease Registry - 404/639-6000 National Pesticide Hotline - 800/858-7378

List of Contaminants

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EPA Home | Privacy and Security Notice | Contact Us

Last updated on Tuesday, November 26th, 2002
URL: http://www.epa.gov/OGWDW/dwh/t-ioc/mercury.html

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

Benz(a)pyrene
3,4-Benzopyrene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0104
CAS # 50-32-8
RTECS # DJ3675000
EC # 601-032-00-3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder,	Separated from strong oxidants.	T symbol R: 45-46-60-61 S: 53-45

then remove to safe place. (Extra personal protection: P3 filter respirator for toxic particles).	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0104	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** ODOURLESS PALE-YELLOW CRYSTALS OR POWDER. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Reacts with nitro derivatives and strong oxidants. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: A2 (ACGIH 1997). MAK: TRK List 0.002 mg/m^3; (1996)	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation and through the skin, and by ingestion. **INHALATION RISK:** A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is probably carcinogenic to humans. May cause genetic damage in humans. May cause reproductive toxicity in humans.
PHYSICAL PROPERTIES	Boiling point at 1.3 kPa: 310-312°C Melting point: 179°C Relative density (water = 1): 1.4	Solubility in water: none (<0.1 g/100 ml) Relative vapour density (air = 1): 8.7 Octanol/water partition coefficient as log Pow: 6.04
ENVIRONMENTAL DATA		

NOTES

Do NOT take working clothes home.

ADDITIONAL INFORMATION

ICSC: 0104	BENZO(a)PYRENE

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

1,2-Benzoanthracene
Benzo(a)anthracene
2,3-Benzphenanthrene
Naphthanthracene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 0385
CAS # 56-55-3
RTECS # CV9275000
EC # 601-033-00-9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles, face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING

Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Well closed.	T symbol R: 45 S: 53-45

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0385	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS TO YELLOW-BROWN FLUORESCENT FLAKES OR POWDER. **PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation, through the skin and by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is probably carcinogenic to humans.
PHYSICAL PROPERTIES	Sublimation point: 435°C Melting point: 162°C Relative density (water = 1): 1.274	Solubility in water: none Vapour pressure, Pa at 20°C: 292 Octanol/water partition coefficient as log Pow: 5.61

ENVIRONMENTAL DATA	In the food chain important to humans, bioaccumulation takes place, specifically in seafood.

NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name.

ADDITIONAL INFORMATION

ICSC: 0385 **BENZ(a)ANTHRACENE**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

Benz(e)acephenanthrylene
2,3-Benzofluoroanthene
Benzo(e)fluoranthene
3,4-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0720
CAS # 205-99-2
RTECS # CU1400000
EC # 601-034-00-4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53

remove to safe place. Do NOT let this chemical enter the environment.	S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS CRYSTALS **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: A2 (ACGIH 1998).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans. May cause genetic damage in humans.
PHYSICAL PROPERTIES	Boiling point: 481°C Melting point: 168°C	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.12
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air and water.	

NOTES

Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available

on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0720 **BENZO(b)FLUORANTHENE**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(k)FLUORANTHENE

ICSC: 0721

Dibenzo(b,jk)fluorene
8,9-Benzofluoranthene
11,12-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0721
CAS # 207-08-9
RTECS # DF6350000
EC # 601-036-00-5

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK	
ICSC: 0721	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(k)FLUORANTHENE

ICSC: 0721

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
YELLOW CRYSTALS

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 480°C
Melting point: 217°C

Solubility in water: none
Octanol/water partition coefficient as log Pow: 6.84

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to air and water. In the food chain important to humans, bioaccumulation takes place, specifically in crustacea and fish.

NOTES

Benzo(k)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION	
ICSC: 0721	**BENZO(k)FLUORANTHENE**

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CREOSOTE

0572
May 2003

CAS No: 8001-58-9
RTECS No: GF8615000
EC No: 648-101-00-4

Wash oil
Creosote oil
Coal tar creosote

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION			
EXPOSURE		**AVOID ALL CONTACT!**	
Inhalation	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
Skin	MAY BE ABSORBED! Redness. Burning sensation.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes	Redness. Pain.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Confusion. Headache. Nausea. Vomiting. Weakness. Shock or collapse.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Refer for medical attention. Do NOT induce vomiting.

SPILLAGE DISPOSAL	PACKAGING & LABELLING	
Collect leaking liquid in covered containers. Use face shield. (Extra personal protection: complete protective clothing and filter respirator for organic gases and vapours.) Do NOT let this chemical enter the environment.	T Symbol R: 45 S: 53-45 Note: H, J, M	Do not transport with food and feedstuffs.

EMERGENCY RESPONSE	STORAGE
NFPA Code: H2; F2; R0	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs.

IPCS
International Programme on Chemical Safety

Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission

SEE IMPORTANT INFORMATION ON THE BACK.

IMPORTANT DATA

Physical State; Appearance
BLACK TO BROWN, OILY LIQUID, WITH CHARACTERISTIC ODOUR.

Chemical dangers
On combustion, forms toxic fumes.

Occupational exposure limits
TLV not established.

Routes of exposure
The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.

Inhalation risk
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C and especially on spraying.

Effects of short-term exposure
The substance is irritating to the eyes, the skin and the respiratory tract. Exposure to sun may enhance the irritating effect of creosote on skin and eyes and lead to burns. Exposure by ingestion may result in death. Medical observation is indicated.

Effects of long-term or repeated exposure
Repeated or prolonged contact with skin may cause dermatitis and hyperpigmentation of skin. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 200-400°C
Melting point: about 20°C
Density: 1.0-1.17 g/cm^3
Solubility in water: very poor
Vapour pressure, kPa at 20°C: about 6
Flash point: above 66°C c.c.
Auto-ignition temperature: 335°C

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. This substance may be hazardous in the environment; special attention should be given to soil contamination, ground water contamination. It is strongly advised that this substance does not enter the environment.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested.
Do NOT take working clothes home.

ADDITIONAL INFORMATION

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

UNEP

National Institute for Occupational Safety and Health NIOSH

1,25,6-Dibenzanthracene
$C_{22}H_{14}$
Molecular mass: 278.4

ICSC # 0431
CAS # 53-70-3
RTECS # HN2625000
EC # 601-041-00-2

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: P3 filter respirator for toxic particles).	Well closed.	T symbol R: 45 S: 53-45

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0431	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS CRYSTALLINE POWDER.

PHYSICAL DANGERS:

CHEMICAL DANGERS:

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the skin , resulting in photosensitization. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 524°C
Melting point: 267°C
Relative density (water = 1): 1.28

Solubility in water: none
Octanol/water partition coefficient as log Pow: 6.5

ENVIRONMENTAL DATA

In the food chain important to humans, bioaccumulation takes place, specifically in seafood.

NOTES

This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).

ADDITIONAL INFORMATION

ICSC: 0431	DIBENZO(a,h)ANTHRACENE

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International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

UNEP

National Institute for Occupational Safety and Health NIOSH

o-Phenylenepyrene
2,3-Phenylenepyrene
$C_{22}H_{12}$
Molecular mass: 276.3

ICSC # 0730
CAS # 193-39-5
RTECS # NK9300000

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0730	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

IMPORTANT DATA		
	PHYSICAL STATE; APPEARANCE: YELLOW CRYSTALS **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 536°C Melting point: 164°C	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.58
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air and water. In the food chain important to humans, bioaccumulation takes place, specifically in fish. 	

NOTES

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0730	**INDENO(1,2,3-cd)PYRENE**

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International Chemical Safety Cards

DDT

ICSC: 0034

Dichlorodiphenyltrichloroethane
1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane
2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane
$C_{14}H_9Cl_5$
Molecular mass: 354.5

ICSC # 0034
CAS # 50-29-3
RTECS # KJ3325000
UN # 2761
EC # 602-045-00-7

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion if formulations contain flammable/explosive solvents.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough.	Avoid inhalation of fine dust and mist. Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Tremors. Convulsions. Diarrhoea. Dizziness. Vomiting. Numbness. Paresthesias. Hyperexcitability.	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: P3 filter respirator for toxic particles).	Provision to contain effluent from fire extinguishing. Separated from strong bases, iron, aluminum and its salts, food and feedstuffs.	Do not transport with food and feedstuffs. Do NOT keep in iron or aluminum containers. Severe marine pollutant. T symbol N symbol R: 25-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0034

International Chemical Safety Cards

DDT

ICSC: 0034

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS CRYSTALS OR WHITE POWDER.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with organic and inorganic bases, aluminum, iron.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 1 mg/m^3 (as TWA) (ACGIH 1993-1994).
OSHA PEL: TWA 1 mg/m^3 skin
NIOSH REL: Ca TWA 0.5 mg/m^3 See Appendix A
NIOSH IDLH: Potential occupational carcinogen 500 mg/m^3

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and through the skin, and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes, the skin and the respiratory tract. The substance may cause effects on the central nervous system , resulting in convulsions and respiratory failure. Exposure may result in death. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the central nervous system, liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES

Boiling point: 260°C
Melting point: 109°C
Relative density (water = 1): 1.5
Solubility in water: none
Octanol/water partition coefficient as log Pow: 6.36-6.38

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. In the food chain important to humans, bioaccumulation takes place, specifically in milk and aquatic organisms.

NOTES

Explosive limits are unknown in literature. Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, and Neocid are trade names.

Transport Emergency Card: TEC (R)-61G53b

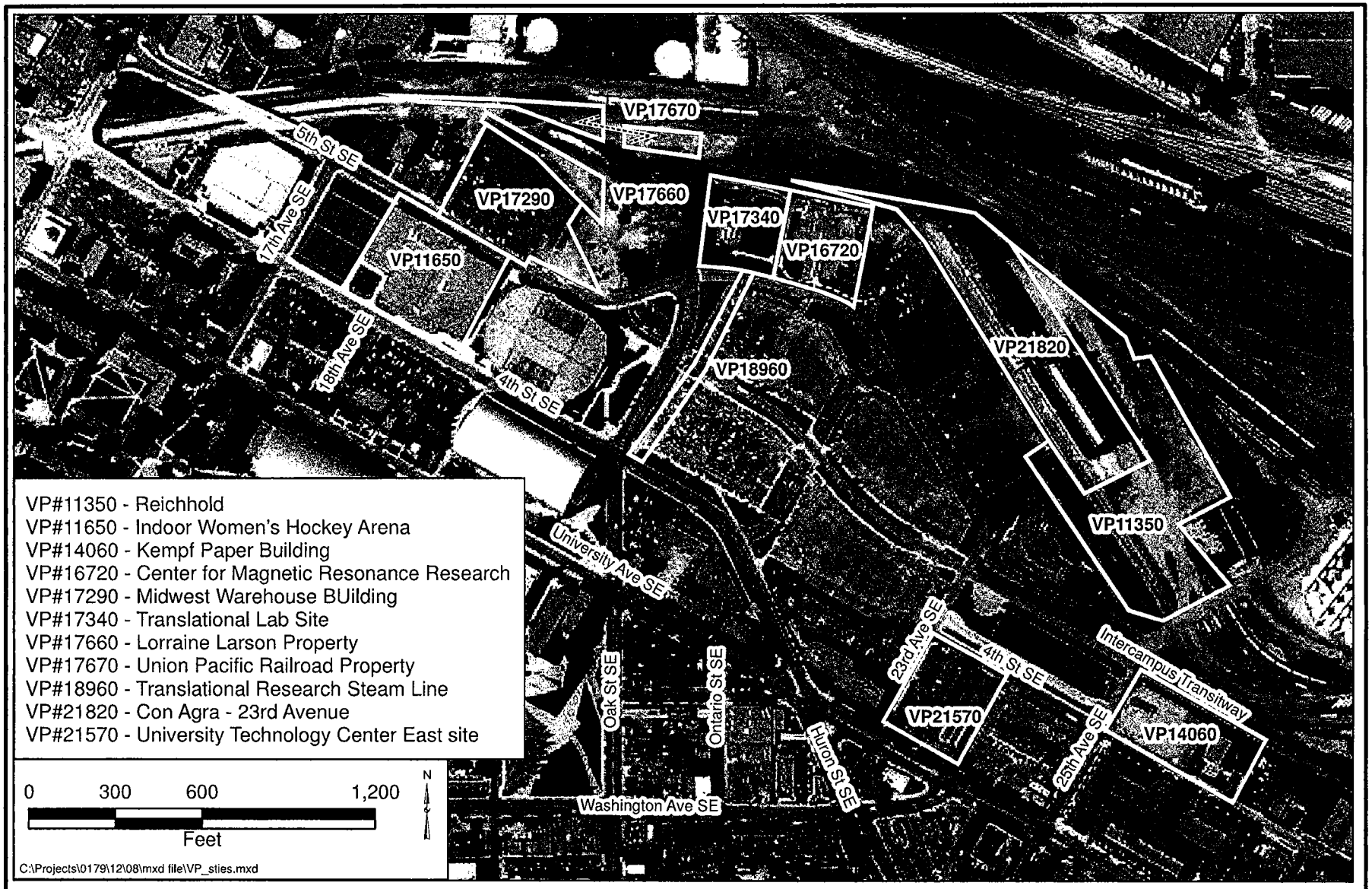
ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:

FIGURES

Figure 1

Site Location Map



UNIVERSITY OF MINNESOTA - TCF Bank Football Stadium

Voluntary Investigation and Cleanup ("VIC") Program Projects

Wenck
Wenck Associates, Inc. 1800 Pioneer Creek Center
Environmental Engineers Maple Plain, MN 55359-0429

JUN 2006

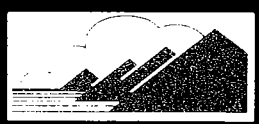
Figure 1

UMR - 5797

APPENDIX A

Appendix A

Fill Evaluation Flow Chart



Wenck

Wenck Associates, Inc.

1800 Pioneer Creek Center
P.O. Box 249
Maple Plain, MN 55359-0249
(763) 479-4200
Fax (763) 479-4242