Health Consultation

CHICAGO MILWAUKEE AND ST. PAUL RAIL YARD
TARGETED BROWNFIELDS ASSESSMENT

SPRING VALLEY TOWNSHIP

PERRY, DALLAS COUNTY, IOWA

MAY 31, 2007

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

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In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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TARGETED BROWNFIELDS ASSESSMENT

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PERRY, DALLAS COUNTY, IOWA

Prepared By:

Iowa Department of Public Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Table of Contents

Purpose

The Iowa Department of Natural Resources (IDNR) has requested the Iowa Department of Public Health (IDPH) Hazardous Waste Site Health Assessment Program evaluate future health impacts of exposures at the formerly utilized Chicago Milwaukee St. Paul Rail Yard located on the west side of Perry, Iowa. This site has undergone a Targeted Brownfields Assessment conducted by the Contaminated Sites Section of the IDNR. This health consultation assesses potential health risks to people from future exposure to soil and surface water within the property boundary, and any health impacts resulting from contaminated groundwater beneath the site property from an evaluation of the data collected during the Targeted Brownfields Assessment. The information in this health consultation was current at the time of writing. Data that emerges later could alter this document's conclusions and recommendations.

Background

The site is a formerly operated rail yard located on the west side of Perry, Iowa. The site is 140 acres in size and previously included a roundhouse and turntable, a power house, a shop and numerous other offices, and various rail lines and associated platforms (Figure 1). According to site records and conversations with former employees, additional site activity areas included an ash pit, a fuel area, a waste pond, a boiler washout area, and scale house fueling areas (1). It is the understanding of the IDPH that this former rail yard is being considered for redevelopment as a historical site by reintroducing the bays of the roundhouse and other outbuildings, and for use as trail and recreational areas.

The roundhouse and turntable was an area utilized for the maintenance and repair of locomotives. The power house was utilized for the storage and handling of coal and petroleum. The shop was utilized for general repair and service of railroad equipment. The ash pit was utilized as an on-site disposal area. The fuel area was utilized for fuel storage and handling. The waste pond was utilized as an on-site disposal area for oils, grease, fuel, and general waste fluids from locomotive maintenance and repair. The boiler washout area was utilized for a disposal area during locomotive boiler maintenance. The scale house fueling areas included the locations of above ground fuel storage tanks.

Site Evaluation

The site evaluation completed by IDNR, as part of the Targeted Brownfields Assessment, focused on areas of the greatest potential for the detection of contamination in soil and groundwater related to the maintenance and fueling of locomotives and rail cars that could have resulted from spills, leaks and general operations of the rail yard and the associated fuel storage and transfer, and liquid waste disposal. In August and October, 2006 soil and groundwater samples were obtained in the areas suspected of having the greatest potential for contamination. Over the course of the evaluation a total of 76 soil samples and 5 groundwater samples were collected. Tables A-1 through A-12 in the Appendix include the results of the soil and groundwater sample analysis completed during the evaluation. These tables only include the

chemicals that were detected in the collected samples. Tables A-1 through A-12 also indicate comparison values, if they are available, for each of the detected chemicals. Comparison values are calculated concentrations of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in the most sensitive portions of the population. Comparison values are developed through human or animal health studies and have safety factors included in their calculation. The comparison values included in tables A-1 through A-12 have been developed by either the Agency for Toxic Substances and Disease Registry (ATSDR) or the U.S. Environmental Protection Agency (EPA). Chemicals that are detected in soil and groundwater below comparison values are considered not to present a health concern and will not be further discussed in this health consultation.

Chemicals of Concern

The chemicals of concern at the site further discussed in this health consultation are the contaminants detected within the soil and groundwater samples that were above comparison values. Tables 1 and 2, below, lists the chemicals detected in the soil and groundwater samples that were present above comparison values.

Table 1 – Soil Contaminants Detected Above Comparison Values

Site Area	Chemical Parameter	Highest Value	Comparison Value
Roundhouse/Turntable	Arochlor 1260 (PCB)	1.1 mg/kg	1.0 mg/kg
	Arsenic	97 mg/kg	20 mg/kg
	Lead	584 mg/kg	400 mg/kg
	Benzo(a)pyrene	4 mg/kg	0.1 mg/kg
Power House	Arsenic	60 mg/kg	20 mg/kg
Shop	Arsenic	39 mg/kg	20 mg/kg
	Lead	2,100 mg/kg	400 mg/kg
Boiler Washout	Arsenic	34 mg/kg	20 mg/kg
	Lead	630 mg/kg	400 mg/kg
Main Track N of Salvage Yard	Arsenic	30 mg/kg	20 mg/kg
Main Track W of Salvage Yard	Arsenic	154 mg/kg	20 mg/kg

Comparison values are not readily available for total extractable hydrocarbons (TEH), since this laboratory analysis measures the total concentration of many chemicals within a specified volatility range and comparison values are available for individual chemicals. The TEH (motor oil) analysis is for TEH in the motor oil volatility range and TEH (diesel) analysis is for TEH in the diesel volatility range. Motor oil is a complex mixture of low and high molecular weight aliphatic and aromatic hydrocarbons, lubrication additives, metals, and various other organic and inorganic compounds (2). Diesel fuel is a complex mixture of higher molecular weight aliphatic and aromatic hydrocarbons (3).

Although numerous chemicals can be components of used motor oil, the chemical constituents of diesel fuel is somewhat more defined. According to the ATSDR Toxicological Profile for fuel oil, one of the largest components of diesel fuel is naphthalene. According to this profile diesel fuel may contain up to 8 percent naphthalene (3). Comparison values are available for naphthalene. In order to utilize these comparison values, the comparison values for naphthalene (200 μg/L) could be divided by 0.08 and then compared to the measured concentrations for TEH (diesel). Table 2 includes the detected concentrations of THE (diesel) in groundwater samples that are above the calculated comparison values for THE (diesel) assuming that diesel fuel contains 8 percent naphthalene.

Table 2 – TEH (diesel) Detected in Groundwater above Calculated Comparison Value

Site Area	Highest TEH (diesel) Level Detected	Calculated Comparison Value
Groundwater (MW-2)	490,000 μg/L	2,500 μg/L

Discussion

Exposure to Chemicals of Concern

Exposure to the chemicals of concern at the former rail yard site is determined by examining human exposure pathways. An exposure pathway has five parts:

1. a source of contamination,
2. an environmental medium such as air, water, or soil that can hold or move the contamination,
3. a point at which people come in contact with a contaminated medium, such as, in drinking water, or in surface soil,
4. an exposure route such as, drinking water from a well, or eating contaminated soil on homegrown vegetables, and
5. a population who could come in contact with the contaminants.

An exposure pathway can be eliminated if at least one on the five parts is missing and will not occur in the future. For a completed pathway, all five pathway parts must exist and exposure to a contaminant must have occurred, is occurring, or will occur.

Exposure to Groundwater

Exposure to any contaminated groundwater from the site would be possible if individuals were drinking water supplied by wells located in the vicinity of the site that obtained water from the same source as the contamination was located. The nearest public water supply wells are located within the site (1). According to the IDNR these wells receive groundwater from a buried channel aquifer located about 85 feet below the ground surface and separated by 40-50 feet of lower permeability glacial till from the alluvium in which the site groundwater monitoring wells have been installed (1). The 40-50 feet of glacial till will provide some protection from any contaminated site groundwater from reaching the groundwater that is extracted by the on-site public water supply wells.

A review was made of the results of analytical testing of samples obtained from the City of Perry public water supply (4). There has been detection of some of the chemicals of concern in the raw and treated public water supply wells (arsenic and lead), but the levels of these chemicals of concern have been below the maximum contaminant levels established by the US Environmental Protection Agency (EPA). There has most likely not been a significant exposure of chemicals of concern from the site to individuals consuming public water within Perry.

According to the IDNR the nearest private wells are located to the south and southwest of the site on the opposite side of the Raccoon River (1). The Raccoon River will act as a hydrologic break-point and will effectively inhibit any contaminated site groundwater from reaching the private wells located on the opposite side of the river. As a result, it is expected that the exposure pathway from site contaminants through groundwater to nearby private wells can be eliminated.

Exposure to Soils

Exposure to soils at the site will be possible through incidental ingestion of the soils from exposure to dust and from hand to mouth activities. Due to the proposed future use of the site as a historic site and as a trail and recreational area, it is anticipated that exposure to soils will mostly be limited to the top several inches of surface soil. The surface soil sampling completed at the site during the site evaluation was composite sampling obtained from 0 to 3 inches below the ground surface, 0 to 1 feet below the surface, and from 0 to 2 feet below the ground surface. Some of the surface soil sampling at the site was obtained at a depth greater than several inches below ground surface. Therefore, some of the soil samples may not be representative of the soil that a site worker and visitor may be exposed. Even through soil samples were obtained from a depth of greater than the top several inches, the results of these surface soil samples will be utilized in the following toxicological evaluation.

Toxicological Evaluation

The following information has been prepared as a toxicological evaluation of exposure to the chemicals of concern in surface soils at the maximum detected concentration in surface soil samples collected at the site. In order to complete a realistic toxicological evaluation of exposure to site contaminants it is necessary to estimate realistic exposure levels to site soils. Exposure levels are related to site usage and the frequency of exposure to surface soils by individuals who regularly have access to the site.

Exposure Levels

The greatest potential for exposure to site contaminants would be from incidental ingestion of surface soils by individuals that would be regularly working at this site after it has been developed into a historic site and a trail and recreational area. Exposure to children (the most sensitive portion of the population) at this site will be limited to the exposure that will occur when a child may visit the site. It is not anticipated that children will be exposed to surface soils at the site on a daily basis as they would at their own home or at neighborhood play areas. Exposure estimates included in this health consultation will be limited to exposure to adult

workers that may be daily exposure to site surface soils, as these individuals represent the ones with the greatest potential for exposure.

The amount of soil a worker at the site would incidentally ingest on a daily basis can be estimated. The US EPA has completed research on many exposure factors and included this information in their Exposure Factors Handbook (5). Within this handbook is a section on incidental ingestion of soil. According to this handbook, an adult involved in gardening activities would incidentally ingest approximately 20 mg/hour of soil. It is anticipated that most workers at the site will not be conducting activities as exposure-intensive as gardening. It is assumed that an average adult incidentally ingests 100 mg/day or approximately 4 mg/hour from all sources of soil (indoor and outdoor). Therefore, the incidental ingestion of soil of 20 mg/hour from the outside portions of the site property is a conservative estimate. A site worker completing 7 hours of outside duties may ingest up to 140 mg of soil per day of site surface soil.

Utilizing the data collect during the site evaluation an estimate can be made as to the amount of chemicals of concern that an adult working at the site may be exposed. The maximum concentration of chemicals of concern detected in site soils are: 154 mg/kg of arsenic, 2,100 mg/kg of lead, 4 mg/kg of benzo(a)pyrene, and 1.1 mg/kg of Arochlor 1260 (PCBs). If we assume that an average adult weighs 70 kg, then the estimated amount of arsenic incidentally ingested on a per kilogram per day basis is calculated as shown below:

$$\frac{140 \text{ mg soil}}{\text{day}} \times \frac{\text{kg soil}}{10^6 \text{ mg soil}} \times \frac{154 \text{ mg As}}{\text{kg soil}} \times \frac{1}{70 \text{ kg}} = 3.08 \times 10^{-4} \text{ mg As/kg/day}$$

A similar calculation can be used to estimate the amount of lead, benzo(a)pyrene and Arochlor 1260 a site work may ingest on a per kilogram per day basis. The following table displays an estimate of the arsenic, lead, benzo(a)pyrene, and Arochlor 1260 incidentally ingested by a worker at the site.

Table 3 –Estimated Incidentally Ingested Chemicals of Concern

Contaminant	Maximum Concentration in Surface Soil (mg/kg)	Estimated Ingestion (mg/kg/day)
Arsenic	154	3.1×10^{-4}
Lead	2,100	4.2×10^{-3}
Benzo(a)pyrene	4	8.0×10^{-6}
Arochlor 1260	1.1	2.2×10^{-6}

This toxicological evaluation will compare this estimated daily ingestion amount to the following comparison values: ATSDR Oral Minimum Risk Levels (MRLs), the EPA Chronic Reference Dose (RfD), the level of exposure that translates to a one-in-ten-thousand (10^{-4}) increased risk of cancer utilizing an EPA oral slope factor, and any other relevant comparison values.

Minimum Risk Levels

Minimum risk levels (MRLs) are established by the Agency for Toxic Substances and Disease Registry (ATSDR). The MRL is defined as, "an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure. (6)." MRLs are based upon human and animal studies, include several safety factors, and are reported for acute exposure ($\leq$ 14 days), intermediate exposure (15 – 364 days), and chronic exposure ($\geq$ 365 days). The MRL for chronic oral exposure to inorganic arsenic is 3×10^{-4} mg/kg/day (6). The MRL for chronic oral exposure to Arochlor 1254 is 2×10^{-5} mg/kg/day (6). MRLs for oral exposure to lead and benzo(a)pyrene are not available.

Chronic Oral Reference Dose

The EPA chronic oral RfD is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime (7)." The chronic oral RfDs are based upon human and animal studies, include safety factors, and are reported for lifetime exposures. The chronic oral RfD for inorganic arsenic is 3×10^{-4} mg/kg/day (8). The chronic oral RfD for Arochlor 1254 is 2×10^{-5} mg/kg/day (9). A chronic oral RfD for lead and benzo(a)pyrene have not been established.

Increased Risk of Cancer

The EPA has developed oral slope factors for evaluating increased risk of cancer from a lifetime of exposure to certain chemicals. The slope factor is defined as "An upper bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime exposure to an agent. This estimate, usually expressed in units of proportion (of a population) affected per mg/kg-day, is generally reserved for use in the low-dose region of the dose-response relationship, that is, for exposures corresponding to risks less than 1 in 100. (10)." The interpretation of slope factor would be as follows: if slope factor = 1.5×10^{-2} $(mg/kg/day)^{-1}$, 1.5 excess cancer incidences are expected to develop per 100 people if exposed daily for a lifetime to 1 mg of the chemical per kg of body weight. The oral slope factor for inorganic arsenic is 1.5 $(mg/kg/day)^{-1}$ (8). The oral slope factor for benzo(a)pyrene is 7.3 $(mg/kg/day)^{-1}$ (11). There has not been an oral slope factor established for Arochlor 1260 or lead.

This slope factor for inorganic arsenic and benzo(a)pyrene can be converted to a daily ingestion rate that would equate to an excess cancer incidence risk of one-in-ten-thousand as shown below:

Ingestion Rate for arsenic = 1×10^{-4} (one-in-ten-thousand) / 1.5 $(mg/kg/day)^{-1}$ = 6.7×10^{-5} mg/kg/day

Ingestion Rate for benzo(a)pyrene = 1×10^{-4} / 7.3 $(mg/kg/day)^{-1}$ = 1.4×10^{-5} mg/kg/day

Other Comparison Values for Lead

The US EPA has established a standard for exposure to lead within bare soil located in places where children play. The standard is 400 mg/kg lead in soil. There is also a standard for areas of bare soil in areas of a residential yard where children do not play of 1,200 mg/kg lead in soil (12). These standards are based upon exposures to children not adults. It is anticipated that children will not be routinely exposed to soil at the site on a daily basis. Therefore, these standards may not be applicable for use in evaluating exposures at the former rail yard site.

The US EPA established a technical workgroup that provided an approach to assessing risks of adult exposure to lead in soil (13). Included in the recommendations of the workgroup is a preliminary remediation goal of 1,700 mg/kg lead in soil for adult exposure to lead in soil. Since it is anticipated that daily exposures to site soil will be limited to adults, the comparison value of 1,700 mg/kg may be a more appropriate comparison value to utilize in this health consultation.

Potential Health Impacts from Exposure to Chemicals of Concern

The first step in evaluating potential health impacts from exposure to chemicals of concern at the site is determining the potential of adverse health impacts from exposures to areas of the site where the chemicals of concern are at their highest concentrations. The exposure estimates included in Table 15 are in the areas of greatest soil contamination detected during the site evaluation completed by the IDNR.

Exposure to Highest Levels of Arsenic in Soil

The estimated highest level of exposure to arsenic in soil is almost the same level as the MRL for chronic oral exposure and the chronic oral RfD. The estimated highest level of exposure to arsenic in soil is greater than the exposure level that would equated to an excess cancer incidence risk of one-in-ten-thousand.

Exposure to Highest Levels of Lead in Soil

The highest concentration of lead in soil was measured at 2,100 mg/kg. This concentration is greater than the preliminary remediation goal of 1,700 mg/kg for adult exposure to lead in soil.

Exposure to Highest Levels of Benzo(a)pyrene in Soil

The estimated highest level of exposure to benzo(a)pyrene is less than the exposure level that would equated to an excess cancer incidence risk of one-in-ten-thousand.

Exposure to Highest Levels of Arochlor 1260 in Soil

The estimated highest level of exposure to Arochlor 1260 is less than the MRL for chronic oral. The estimated highest level of exposure to Arochlor 1260 is less than the chronic oral RfD.

Exposure to Average Detectable Levels of Chemicals of Concern in Soil

Any adult individual that is exposed to soil at the site will not necessarily be exposed to the same soil on a daily basis since they will not be working at the same location every day. One estimate of the degree of their exposure can be made by assuming that an individual will be exposure to average levels of contamination at the site. Table 16 is an estimate of an adult ingestion rate

assuming that they would be exposed to the average detected concentration of chemicals of concern in site soils.

Table 4 –Estimated Average Level of Incidentally Ingested Chemicals of Concern

Contaminant	Average Concentration in Surface Soil (mg/kg)	Estimated Ingestion (mg/kg/day)
Arsenic	54	$1.1x\ 10^{-4}$
Lead	406	$8.1\ x\ 10^{-4}$
Benzo(a)pyrene	2.8	$5.4\ x\ 10^{-6}$
Arochlor 1260	1.1	$2.2\ x\ 10^{-6}$

Exposure to average detected levels of arsenic in site soils are above the exposure level that would equated to an excess cancer incidence risk of one-in-ten-thousand for an adult working at the site and exposed to site soils on a daily basis.

At the present time it is concluded that there are some areas of site that may have the potential of causing adverse health impacts due to the exposure of arsenic and lead in the soil. The average levels of arsenic in the soil in areas where arsenic was detected may have the potential of causing a greater than background level of cancer risk to employees consistently working in these areas. It is anticipated that the average levels of lead, benzo(a)pyrene, or Arochlor 1260 found in site soils would not cause a potential of adverse health effects to employees working at the site.

Children's Health Concerns

Children have unique vulnerabilities to some environmental chemicals, and IDPH's Hazardous Waste Site Health Assessment Program evaluated the potential impact of the presence of the chemicals of concern detected in the soil samples collected during the site evaluation on children's health. It is anticipated that children have not been exposed to site soils on a regular basis in the past, and since the site is not being proposed to be utilized for residential development, it is concluded that children's health would not be negatively impacted by the presence of these chemicals at the levels detected within the soil samples. If the proposed use of the site would be changed to residential use, than an evaluation of children's health concerns would be warranted.

Community Health Concerns

The IDPH is aware that there are concerns about the health impacts to future employees working at the proposed historic site and trail and recreational area. The data utilized in this health consultation was obtained prior to any site remedial or cleanup activities. The levels of all chemicals detected in the site soil suggest that the site, as it exists now, may pose some human health risks to employees working at the site. Future remedial activities at the site, such as the removal of soil in areas of higher arsenic and lead contamination, may reduce the levels of soil contamination to a point where health risks are not anticipated.

Conclusions

From evaluating the soil and groundwater sampling and analytical data collected during August and October 2006 sampling events; and other background information on the site it is concluded that:

- The former Chicago Milwaukee St. Paul Rail Yard may pose a public health hazard due to the exposure of site soils through incidental ingestion of site soils by employees working at the site.

- It is anticipated that individuals working at the site or living in close proximity to the site will not be exposed to any contaminated groundwater. Most residents in the area are supplied with water from the City of Perry Public Water Supply, which at the present time has not shown any significant contamination with site chemicals of concern. All existing private wells currently utilized by residents in the area are not anticipated to be negatively impacted by site groundwater contamination.

- It is difficult to make any conclusions regarding soil contaminated with total extractable hydrocarbons (TEH) since comparison values are not available for TEH.

Recommendations

- Any site remedial activities should be targeted toward areas of the site that have higher levels of arsenic contamination.

- Any future site investigation activities should consider the selection of individual analysis of chemicals rather than broad chemicals scans such at TEH, since health comparison values are not available for TEH.

- If possible, soil samples should be obtained from the upper three inches of soil profile after construction activities are complete to provide a more accurate determination of potential exposures to site contaminants.

- Site remedial activities including preventing exposures to soil contaminated areas such as importing of cleaner soil, or construction of parking areas should be considered.

- Additional private wells for potable use should not be installed in the vicinity of the site.

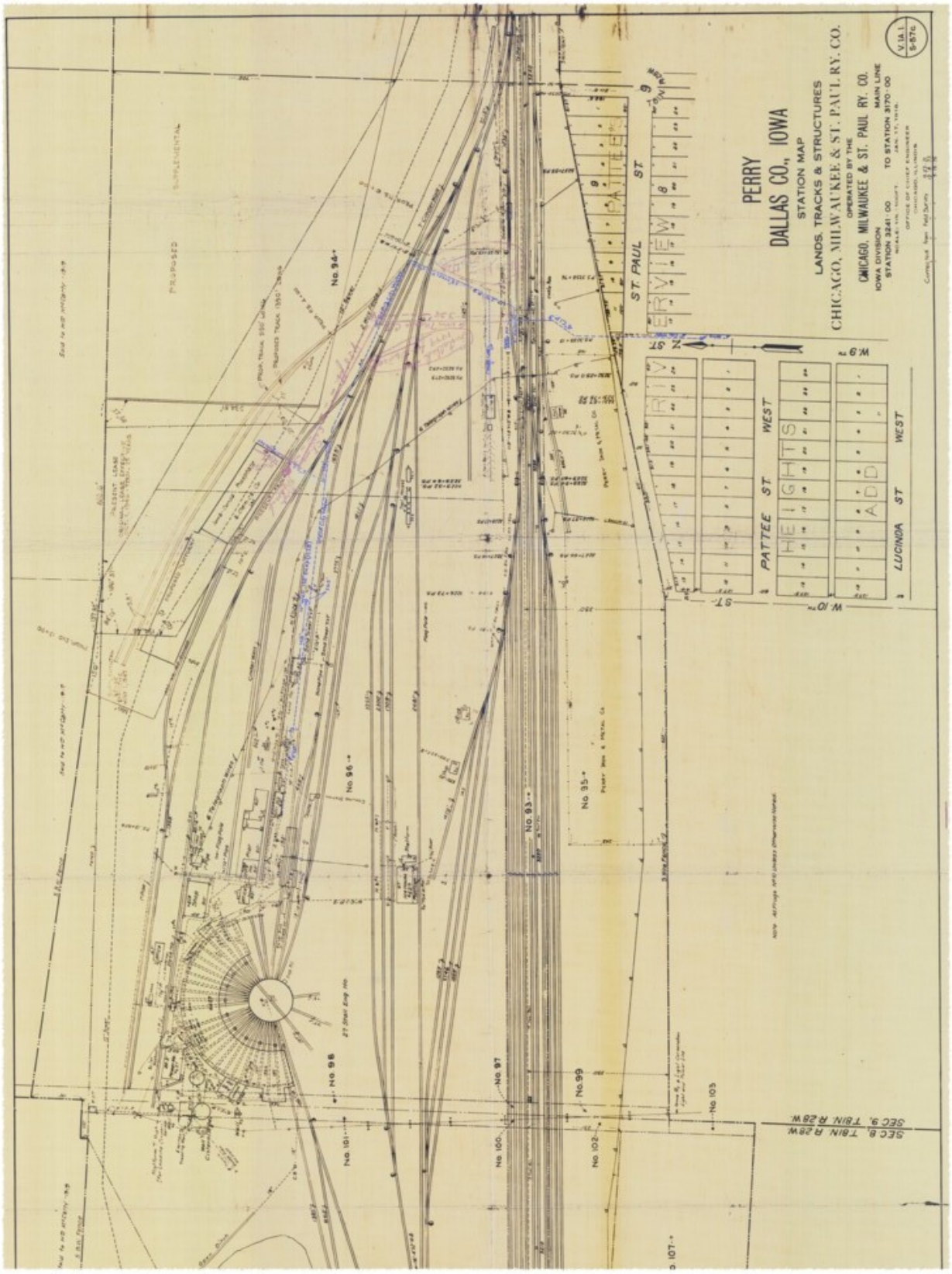
Public Health Action Plan

- IDPH will provide assistance with community health education as needed and requested.

- IDPH will continue to review additional sampling and analytical data provided by the IDNR or others and update health recommendations as necessary.

- IDPH will continue to address and evaluate community concerns.

Figure 1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STATION MAP
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CHICAGO, MILWAUKEE & ST. PAUL RY. CO.
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IOWA DIVISION
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LUCINDA ST WEST
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No 94
No 95
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No 97
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No 99
No 100
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No 102
No 103
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Preparers of the Report

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CERTIFICATION

The Iowa Department of Public Health, Hazardous Waste Site Health Assessment Program, has prepared this health consultation evaluating site information and soil and groundwater sampling data at the former Chicago Milwaukee St. Paul Rail Yard in Perry, Iowa under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). The document is in accordance with approved methodology and procedures existing when the health consultation was being prepared. Editorial review was completed by the Cooperative Agreement Partner.

Technical Project Officer, CAT, SPAB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation and concurs with its findings.

Team Lead, CAT, SPAB, DHAC, ATSDR

Appendix 1

Table A-1 – Soil Analysis at the Roundhouse/Turntable Area (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
Turntable (0-1 ft.)	Fluoranthene	2.4	2,000
RH-1 (0-1 ft.)	Phenanthrene	13	NA
	Fluoranthene.	16	2,000
	Pyrene	12	2,000
	Arochlor 1260 (PCB)	1.1	1.0 [a]
RH-3 (0-1 ft.)	Phenanthrene	10	NA
	Anthracene	1.7	NA
	Carbazole	2.5	NA
	Fluoranthene	14	2,000
	Pyrene	10	2,000
	Benzo(a)anthracene	5.2	NA
	Benzo(b)fluoranthene	6.3	NA
	Benzo(k)fluoranthene	2.2	NA
	Benzo(a)pyrene	4	0.1
	Chrysene	5.8	NA

NA means there is no applicable comparison value for that particular chemical parameter.
[a] There is no comparison value for Arochlor 1260. The comparison value for Arochlor 1254 is shown in the table.

Table A-2 – Confirmation Soil Analysis at the Roundhouse/Turntable Area (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
RH-1c (0-1 ft.)	Pyrene	3	2,000
	Lead	227	400
	Arsenic	**97**	20
RH-2c (0-1 ft.)	Phenanthrene	0.71	NA
	Fluoranthene	0.82	2,000
	Pyrene	1.3	2,000
	Benzo(a)anthracene	0.37	NA
	Chrysene	0.48	NA
	Benzo(b)fluoranthene	0.61	NA
	Benzo(a)pyrene	**0.31**	0.1
	Indeno(1,2,3cd)pyrene	0.28	NA
	Benzo(ghi)perylene	0.26	NA
	Lead	**543**	400
	Arsenic	**126**	20
RH-3c (0-1 ft.)	Phenanthrene	7.3	NA
	Anthracene	1.6	20,000
	Carbazole	1.4	NA
	Fluoranthene	7.9	2,000
	Pyrene	12	2,000
	Benzo(a)anthracene	4.3	NA

NA means there is no applicable comparison value for that particular chemical parameter.

Table A-2 (Cont.) – Confirmation Soil Analysis at the Roundhouse/Turntable Area (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
RH-3c (0-1 ft.)	Benzo(b)fluoranthene	6.3	NA
	Benzo(k)fluoranthene	2.1	NA
	Benzo(a)pyrene	**4**	0.1
	Indeno(1,2,3cd)pyrene	2.9	NA
	Benzo(ghi)perylene	2.7	NA
	Chrysene	4.8	NA
	Lead	**584**	400
	Arsenic	**51**	20

NA means there is no applicable comparison value for that particular chemical parameter.

Table A-3 –Soil Analysis at the Power House Area (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
PH-1 (0-1 ft.)	Arsenic	**47**	20
	Lead	340	400
PH-1c (0-1 ft.)	Arsenic	**60**	20
	Lead	230	400

Table A-4 –Soil Analysis at the Shop Area (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
S-1 (0-1 ft.)	Arsenic	18	20
	Lead	260	400
S-2 (0-1 ft.)	Arsenic	**39**	20
	Lead	**2,100**	400
S-2 confirm (0-1 ft)	Arsenic	ND	20
	Lead	**1,451**	400
S-2 comp (0-1 ft.)	Arsenic	**42**	20
	Lead	**512**	400

Table A-5 –Soil Analysis at the Ash Pit Area (1)

Sample ID (Depth)	TEH (as motor oil) Concentration (mg/kg)	Comparison Value (mg/kg)
SB-1 (0-1 ft.)	270	NA
SB-2 (0-1 ft.)	280	NA
SB-3 (0-1 ft.)	150	NA
SB-4 (0-1 ft.)	590	NA
SB-5 (0-1 ft.)	53	NA
SB-6 (0-1 ft.)	1,800	NA
SB-7 (0-1 ft.)	71	NA
SB-8 (0-1 ft.)	17,000	NA

TEH means total extractable hydrocarbons
NA means there is no applicable comparison value for that particular chemical parameter.

Table A-5 (Cont.) –Soil Analysis at the Ash Pit Area (1)

Sample ID (Depth)	TEH (as motor oil) Concentration (mg/kg)	Comparison Value (mg/kg)
SB-9 (0-1 ft.)	9,400	NA
SB-10 (0-1 ft.)	8,200	NA
SB-11 (0-1 ft.)	1,000	NA
SB-12 (0-1 ft.)	2,200	NA
SB-13 (0-1 ft.)	78,000	NA
SB-14 (0-1 ft.)	130,000	NA
SB-15 (0-1 ft.)	4,100	NA
GP-1 (1-4 ft.)	3,800	NA

TEH means total extractable hydrocarbons
NA means there is no applicable comparison value for that particular chemical parameter.

Table A-6 –Soil Analysis at the Ash Pit Area (1)

Sample ID (Depth)	TEH (as motor oil) Concentration (mg/kg)	Comparison Value (mg/kg)
GP-2 (0-2 ft.)	680	NA

TEH means total extractable hydrocarbons
NA means there is no applicable comparison value for that particular chemical parameter.

Table A-7 –Soil Analysis at the Waste Pond Area (1)

Sample ID (Depth)	TEH (as motor oil) Concentration (mg/kg)	Comparison Value (mg/kg)
WP-1 (0-2 ft.)	700	NA
WP-2 (2-3 ft.)	840	NA
WP-2 (0-2 ft.)	370	NA
WP-2 (2-3 ft.)	130	NA

TEH means total extractable hydrocarbons
NA means there is no applicable comparison value for that particular chemical parameter.

Table A-8 –Soil Analysis at the Boiler Washout Area (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
BW-1 (0-1 ft.)	Arsenic	14	20
	Lead	380	400
BW-2 (0-1 ft.)	Arsenic	20	20
	Lead	260	400
BW-3 (0-1 ft.)	Arsenic	**34**	20
	Lead	**630**	400
BW-3c (0-1 ft.)	Arsenic	**30**	20
	Lead	205	400

Table A-9 – Soil Analysis at the Scale House Fueling Areas (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
SHS (#1) (0-1 ft.)	TEH (motor oil)	110	NA
Saddle #2 (0-1 ft.)	TEH (diesel)	1,100	NA
Saddle #2 dup (0-1 ft.)	TEH (diesel)	530	NA
Saddle #3 (0-1 ft.)	TEH (motor oil)	740	NA
	TEH (diesel)	79	NA
Saddle #3 dup (0-1 ft.)	TEH (motor oil)	2,100	NA
Sample 3a (0-1 ft.)	Phenanthrene	3.3	NA
	Fluoranthene	3.9	2,000
	Pyrene	5.5	2,000
	Chrysene	1.4	NA
	Benzo(b)fluoranthene	1.3	NA
Road Sample	Phenanthrene	1.3	NA
	Fluoranthene	1.1	2,000
	Pyrene	1.6	2,000
	Chrysene	0.5	NA
	Benzo(b)fluoranthene	0.74	NA

TEH means total extractable hydrocarbons
NA means there is no applicable comparison value for that particular chemical parameter.

Table A-10 – Soil Analysis at the Main Track Area North of Salvage Yard (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
JY-1 (0-1 ft.)	Arsenic	11	20
	Lead	96	400
JY-2 (0-1 ft.)	Arsenic	**30**	20
	Lead	205	400
	TEH (motor oil)	5,300	NA
JY-2 (0-1 ft.)	Arsenic	9.6	20
	Lead	160	400

TEH means total extractable hydrocarbons
NA means there is no applicable comparison value for that particular chemical parameter.

Table A-11 – Soil Analysis at the Main Track Area West of Salvage Yard (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
RR-1 (0-3in.)	Arsenic	**26**	20
	Lead	79	400
RR-2 (0-3in.)	Arsenic	**29**	20
	Lead	232	400

Table A-11 (Cont.) – Soil Analysis at the Main Track Area West of Salvage Yard (1)

Sample ID (Depth)	Chemical Parameter	Concentration (mg/kg)	Comparison Value (mg/kg)
RR-3 (0-3in.)	Arsenic	**60**	20
	Lead	282	400
RR-4 (0-3in.)	Arsenic	**65**	20
	Lead	297	400
RR-5 (0-3in.)	Arsenic	**112**	20
	Lead	276	400
RR-6 (0-3in.)	Arsenic	**154**	20
	Lead	331	400
RR-7 (0-3in.)	Arsenic	**108**	20
	Lead	162	400
RR-8 (0-3 in.)	Arsenic	**76**	20
	Lead	116	400
RR-9 (0-3 in.)	Arsenic	**96**	20
	Lead	99	400
RR-10 (0-3 in.)	Arsenic	20	20
	Lead	60	400
RR-11 (0-3 in.)	Arsenic	**27**	20
	Lead	56	400

Table A-12 – Ground Water Analysis at the Main Track Area North of Salvage Yard (1)

Sample ID (Date)	Chemical Parameter	Concentration (µg/L)	Comparison Value (µg/L)
MW-1 (8/15/2006)	TEH (diesel)	520	NA
MW-1 (10/19/2006)	TEH (motor oil)	520	NA
	TEH (diesel)	440	NA
MW-2 (8/15/2006)	TEH (diesel)	180,000	NA
MW-2 (10/19/2006)	TEH (diesel)	490,000	NA

TEH means total extractable hydrocarbons
NA means there is no applicable comparison value for that particular chemical parameter.