Public Health Assessment

Public Comment Release

McFARLAND AND DWORSKY SITE

CITY OF MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA

Prepared by
The Minnesota Department of Health

JUNE 3, 2010

COMMENT PERIOD ENDS: JULY 19, 2010

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

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This information is distributed by the Agency for Toxic Substances and Disease Registry for public comment under applicable information quality guidelines. It does not represent and should not be construed to represent final agency conclusions or recommendations.

FOREWORD

This document summarizes public health concerns related to an industrial facility in Minnesota. It is based on a formal site evaluation prepared by the Minnesota Department of Health (MDH). For a formal site evaluation, a number of steps are necessary:

- *Evaluating exposure:* MDH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is found on the site, and how people might be exposed to it. Usually, MDH does not collect its own environmental sampling data. Rather, MDH relies on information provided by the Minnesota Pollution Control Agency (MPCA), the US Environmental Protection Agency (EPA), and other government agencies, private businesses, and the general public.

- *Evaluating health effects:* If there is evidence that people are being exposed—or could be exposed—to hazardous substances, MDH scientists will take steps to determine whether that exposure could be harmful to human health. MDH's report focuses on public health— that is, the health impact on the community as a whole. The report is based on existing scientific information.

- *Developing recommendations:* In the evaluation report, MDH outlines its conclusions regarding any potential health threat posed by a site and offers recommendations for reducing or eliminating human exposure to pollutants. The role of MDH is primarily advisory. For that reason, the evaluation report will typically recommend actions to be taken by other agencies—including EPA and MPCA. If, however, an immediate health threat exists, MDH will issue a public health advisory to warn people of the danger and will work to resolve the problem.

- *Soliciting community input*: The evaluation process is interactive. MDH starts by soliciting and evaluating information from various government agencies, the individuals or organizations responsible for the site, and community members living near the site. Any conclusions about the site are shared with the individuals, groups, and organizations that provided the information. Once an evaluation report has been prepared, MDH seeks feedback from the public. *If you have questions or comments about this report, we encourage you to contact us.*

Please write to: Community Relations Coordinator
Site Assessment and Consultation Unit
Minnesota Department of Health
625 North Robert Street
PO Box 64975
St. Paul, MN 55164-0975

OR call us at: (651) 201-4897 *or* 1-800-657-3908
(toll free call - press "4" on your touch tone phone)

On the web: http://www.health.state.mn.us/divs/eh/hazardous/index.html

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Executive Summary

INTRODUCTION

The Minnesota Department of Health's (MDH) mission is to protect, maintain, and improve the health of all Minnesotans.

For communities living near state or federal Superfund sites, MDH's goal is to protect people's health by providing health information the community needs to take actions to protect their health. MDH also evaluates environmental data, and advises MPCA, MDA and local governments on actions that can be taken to protect public health.

The McFarland and Dworsky site was contaminated by dioxins, furans, PCBs and PAHs in soil and by semi-volatile organic compounds in the groundwater. Soil contamination has been removed or covered in areas where the soil was analyzed for contamination. There are areas where the soil has not been thoroughly analyzed. No one is drinking the contaminated water because the area is supplied with water by the City of Minneapolis.

Any future development of the site itself or nearby areas should include analysis of soils that will be disturbed or exposed. A future development plan for this site and nearby areas should give careful attention to protecting public health and incorporating the community's vision.

OVERVIEW

MDH reached three conclusions in this Public Health Assessment.

CONCLUSION 1

MDH concludes that dioxins, furans, PCBs and PAHs in soil on the McFarland and Dworsky site will not harm people's health because people are not coming into contact with these contaminants.

BASIS FOR DECISION

Large amounts of contaminated soil were removed from the site. The areas where contamination was removed are now covered with fill, preventing people from coming into contact with any remaining contaminated soil.

NEXT STEPS

Government agencies who control future land use should take steps to ensure that any future land use continues to prevent access to these contaminated soils.

CONCLUSION 2

MDH concludes semi-volatile organic compounds in groundwater will not harm people's health because people get water from the City of Minneapolis and are not drinking the groundwater.

BASIS FOR DECISION

There are no drinking water wells affected by this site.

CONCLUSION 3

MDH cannot currently conclude whether people's health could be harmed if future development creates the possibility of contact with contaminants in soil near the facility site.

BASIS FOR DECISION

There are areas near the McFarland and Dworsky site where the soil has not been tested for contaminants. The site has a long history of industrial use, including an incinerator that had emissions that could have blown on to nearby

	areas and contaminated the soil. It is possible that there could be contamination from the site on land next to the site and that people could come into contact with these contaminants in the soil.
NEXT STEPS	Government agencies that have authority for land use should take steps to ensure any proposed land use near the site that includes soil excavation is preceded by a thorough soil investigation.
FOR MORE INFORMATION	If you have concerns about your health, you should contact your health care provider. You may also call MDH at 651-201-4897 or 1-800-657-3908 (press #4) and ask for information on dioxins. You may also visit our MDH Web site at http://www.health.state.mn.us/divs/eh/hazardous/topics/ .

I. Introduction

The Minnesota Department of Health (MDH) was asked by the Shoreham Area Advisory Committee (SAAC) to review the McFarland and Dworsky (MF&D) site environmental data and evaluate potential public health concerns. The MF&D site is neither a state or federal Superfund site. SAAC is a collaboration of several Minneapolis Neighborhood Associations formed by a court order to serve as "a forum and method for community outreach and communication, and for non-binding, informal resolution" of issues stemming from the Canadian Pacific Shoreham Yard facility. The name “Shoreham Yards” includes several sites, one of which is MF&D (Figures 1 and 2). The members of SAAC include local residents, responsible party representatives, government officials and other interested parties who meet every second Monday of the month (see www.shorehamyards.org/).

This public health assessment focuses on the MF&D site where thousands of barrels were reconditioned between 1956 and 1978. The MF&D facility operated an incinerator to burn barrel contents and exterior paint on each barrel in order to prepare them for reuse. The incinerator did not have any emission controls. The operating conditions of the incinerator, what type waste and the volume of waste incinerated are not known. This public health assessment evaluates past environmental contaminant concentrations and describes past soil remedial actions. This document also examines contaminated media (water, air and soil), transport mechanisms, and routes of exposure (ingestion, inhalation and dermal contact) to determine the likelihood of exposure to individuals.

The data and information that form the basis for this public health assessment were collected from Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Agriculture (MDA) site files, and technical reports provided to MDH by Canadian Pacific Railroad (CP).

II. Site History and Background

A. Site description

The MF&D site is located within the 260-acre CP Shoreham Yard Facility in Northeast Minneapolis (Figures 1 and 2). The 6 acre MF&D site is located in the north-central portion of the rail yard facility, south of St. Anthony Boulevard and west of Central Avenue.

The relatively flat land within the much larger Shoreham Yard railroad facility is currently owned and operated by the Soo Line Railroad Company (Soo Line), a business unit of Canadian Pacific Railway (CP). A golf course and park are located north of the site. The nearest residences are located approximately 1/2 mile west across University Avenue or east across Central Avenue. The Mississippi River is located approximately 2/3 mile to the west. The southern boundary of the site is a private access road within the Shoreham Yard Facility.

B. Site History

The L.D. McFarland Company leased the site from 1926-1955 and operated a creosote wood treating facility (Figure 3, Parcel B). The Dworsky Barrel Company leased approximately 2 acres of the site from 1956 to 1978 and operated a barrel reconditioning facility (Figure 3, Parcel B1). After 1978,

Dworsky no longer conducted barrel reconditioning at the site, although they continued leasing a portion of the property to store and clean barrels. These portions of the site were leased until 1983.

The general area surrounding the property was also used by the Scott Pole/Cedar Service Inc., and the Idaho Pole Treating Company (see, Figure 3, Parcels A and C, respectively). The Scott Pole and Treating Company operated at the site from 1926 to 1972 (1). The Scott Pole and Treating Company was involved in wood treating operations at the site using creosote (until the mid-1960s); later pentachlorophenol (PCP) mixed with fuel oil was used. The wood treating operation utilized a variety of steel-lined concrete tanks and a vat in a main process area on the western part of the site, and also stored untreated poles at the site.

C. Historical Facility Operations

The daily operations of the Dworsky Barrel Company drum reconditioning facility are not known. A number of buildings associated with the business no longer exist. The records reviewed for this public health assessment do not contain any information pertaining to drum content, volumes, or number of drums processed per year. An incinerator was used, and no records were found describing the physical layout of the incinerator or its operation. If chlorinated organic chemicals were incinerated, the synthesis and emission of dioxins and furans likely occurred. These contaminants were found onsite. Information such as stack height, operational temperatures, the types and quantities of waste burned, and other technical information would be needed to estimated potential emissions of toxic substances, including dioxin, furans, and polycyclic aromatic hydrocarbons (PAHs). Without this detailed information any estimate of emissions would be highly speculative.

D. Related MDH/ATSDR documents

In Dec. 2005, MDH completed a Cedar Services Health Consultation (23). A limited investigation of the Idaho Pole and Treating Company site was completed in 1996 (24). MDH completed the Soo Line Shoreham Yard East Side Health Consultation in September 2007 (25).

E. Current Status

The MF&D site is covered with gravel, and currently used for storage of intermodal shipping containers. The property surrounding the site is primarily used for commercial/industrial purposes.

F. Site Visit

MDH conducted a site visit at the MF&D site with representatives from MDA, MPCA, CP Rail, and their consultants on December 4, 2009. The wind was out of the southwest and temperatures were in the teens. It was clear from walking around the site that it has approximately 3-4 feet of fill as compared to the nearby Cedar Services site. The location where the hot spots were removed on the MF&D site appeared to be slightly lower in elevation, probably due to soil compression of the 12 ft. of fill.

Trespassing is unlikely because of site security and secure fencing. Staff also toured portions of the 18.5 acre residential development proposal area north of the tracks (see Appendix 2). The proposed development area is not likely to attract the interest of trespassers. Portions of the property are densely covered with shrubs and trees. This area is isolated by a 4 foot fence from a Minneapolis dog park on the north and CP's 7 foot tall fence to the south. The area appears to be occupied by numerous small burrowing animals evidenced by many areas where freshly dug soil is on the surface.

G. Demographics, Land Use and Natural Resources Use

The residential area of Northeast Minneapolis where the site is located is mainly comprised of 4 neighborhood associations. East of the site is the Audubon Park neighborhood association (population 5,256). To the south of the site is the Holland Neighborhood Improvement Association (population 4,381). West of the site is the Marshall Terrace Neighborhood Association (population 1,342). North of the site is the Columbia Golf Course (18 hole) and Columbia Park (population 1,834). The population estimates are based on the 2000 U.S. census as listed on the City of Minneapolis webpage (http://www.ci.minneapolis.mn.us/neighborhoods/).

The City of Minneapolis zoning map shows that the site is zoned industrial. A portion of the site abuts Central Avenue and is opposite a residential area from 31st Avenue Northeast to 28th Avenue Northeast (see Figure 5). The adjoining property to the west and the property northwest of the site are both zoned industrial.

One mile due west of the site is the Mississippi River. Municipal drinking water is provided to the site and surrounding area. Figure 2 illustrates the location of the former Cedar Services wood treatment facility in the northeast corner of the Shoreham Yard facility. The site has been remediated (see MDH Cedar Services Health Consultation, 2005). In the southeast corner of the Shoreham Yard Facility is the Soo Line Shoreham Yard East-Side site along Central Avenue (see MDH Soo Line Shoreham Yard Eastside Health Consultation, 2007). CP has been remediating the area, and there are a number of potential redevelopment interests in the roundhouse and the property along Central Avenue (see Figure 2).

H. Community Involvement and Public Comment Period

MDH has attended a number of Shoreham Area Advisor Committee (SAAC) meetings to solicit community concerns regarding the site. SAAC is a multi-neighborhood collaboration formed in 1998 to serve as a forum for community outreach and communication, and for non-binding, informal resolution of issues stemming from Shoreham Yards activities. Community concerns have evolved as the operations at the Shoreham Yards have changed over time. Some of the current concerns expressed by the SAAC and other community members include the following:

- Noise and hours of operation
- What are the quantities and types of hazardous materials onsite?
- Is the training and response time of first responders and Shoreham Yard operators sufficient to handle a hazardous chemical release?
- Who has jurisdiction and monitors lessee land use within the Shoreham Yard facility?

SAAC asked MDH to review MF&D environmental data and evaluate the potential public health concerns associated with site. During the public comment period for this document copies will be made available at the following locations:

- The Minneapolis Public Library at 2200 Central Avenue Northeast, and
- The SAAC office, collocated with the Holland Neighborhood Improvement Association.

Copies will also be supplied to SAAC members, CP, and government agencies. MDH will review and respond to public comments and prepare a final PHA.

I. Agency for Toxic Substances and Disease Registry Involvement

MDH, under a cooperative agreement with the U.S. Agency for Toxic Substances and Disease Registry (ATSDR), evaluated the public health significance of contamination associated with MF&D site. More specifically, MDH and ATSDR cooperated to determine whether exposures to

hazardous substances are occurring, if health effects are possible, and to make recommendations to reduce or prevent possible health effects. ATSDR, located in Atlanta, Georgia, is a federal agency within the U.S. Department of Health and Human Services. The ATSDR reviews, concurs, and publishes public health assessments written by cooperative agreement states.

III. Evaluation of Environmental Data and Exposure Pathways

A. Past Remedial Activities

There have been localized groundwater impacts and soil impacts. The groundwater impacts were limited and natural attenuation was the selected remedy.

Remediation of several contaminant source areas has occurred at the Scott Pole/Cedar Services site and the MF&D site. Other areas located within the Shoreham Yard Facility have also had soil remedial actions performed. These areas include the Soo Line Dump east of the MF&D site and Shoreham Yard East-Side located southeast of MF&D site (see Figure 2).

For the MF&D site, soil response actions were conducted in the historic process areas at the site in two phases. The data from the 2002 soil and groundwater investigations were used to delineate the areas for the first excavation. The first soil excavation activities were completed during the winter of 2005-2006 in accordance with the "Revised Response Action Plan," by Barr Engineering, dated November 17, 2005, that was jointly approved by the Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Agriculture (MDA) on December 5, 2005.

The MPCA and MDA approved an excavation goal to remove soils in the top 12 ft with concentrations of semi-volatile compounds (SVOCs) exceeding the MPCA's risk-based criteria for a direct contact exposure in an industrial land use setting, Tier II Soil Reference Values (Tier II SRVs) (6, 7). The Tier II Benzo-a-pyrene (BaP) potency equivalence SRV site cleanup goal for total carcinogenic PAHs is 3 mg/kg. The Tier II PCB SRV is 8 mg/kg. The 3 mg/kg BaP potency equivalence was used to confirm remedial compliance for the soil excavations. BaP potency equivalence is derived by adding the concentrations of several carcinogenic PAHs that have been modified with potency factors. A detailed explanation of the BaP potency equivalence calculation procedure for both carcinogenic PAHs and tetrachlorodibenzo-p-dioxin toxic equivalence (TCDD TEQ) is presented in the Appendix.

Soil excavations were initiated on December 6, 2005. The excavated materials from the main operations area were segregated based on visual, olfactory, and headspace criteria. Materials were stockpiled into three separate plastic lined piles from least contaminated to most contaminated (Piles 1-3). Each stockpile was characterized using 3 composite samples comprised of 4 subsamples. Each composite sample was analyzed for 69 SVOCs, 8 metals, dioxins, furans, and several PCB Aroclors. The benzo(a)pyrene (BaP) potency equivalence was used to confirm remedial compliance for the soil excavations. BaP potency equivalence is derived by adding the concentrations of several cPAHs that have been modified with potency factors (see Appedix).

Excavation Pile 1 contained 1960 tons of non-hazardous soil that was disposed at an industrial landfill in Buffalo, Minnesota. For Pile 1, composite sampling identified the following contaminants:

- BaP potency equivalence ranging from 0.3 to 0.9 mg/kg
- No Arochlors were detected

- TCDD TEQ (reporting at ½ the detection limit) ranging from 0.8 to 2.1 ng/kg

Excavation Pile 2 was split into thirds with 1/3 (730 tons) sent to the Buffalo Industrial Landfill as non-hazardous waste (disposed in a "Subtitle D" landfill see Attachment 1), and 2/3rds (1338 tons) sent to the Peoria Disposal Company's hazardous waste facility in Peoria, Illinois. For Pile 2, composite sampling identified the following contaminants:

Northern 1/3 of Pile 2

- BaP potency equivalence =1.7 mg/kg
- Aroclor 1256 = 2.4 mg/kg
- TCDD TEQ = 126.3 ng/kg

Southern 2/3 of Pile 2

- BaP potency equivalence ranging from 7.4 - 8.6 mg/kg
- Aroclor 1256 concentration ranging from 0.2.- 1.2 mg/kg
- TCDD TEQ ranging from 83.9 - 87.2 ng/kg

Excavation Pile 3 (798 tons) was incinerated as hazardous waste at a Kimball, Nebraska facility.

- BaP potency equivalence ranging from 33 to 57 mg/kg
- Aroclor 1256 concentration ranging from 0.3 to 4.2 mg/kg
- TCDD TEQ range from 18.0 to 170.7 ng/kg

Confirmation soil sampling conducted during first soil excavation identified soils impacted by dioxin/furans in excess of their industrial SRVs in the southern portion of the excavation floor. Based on these results, additional soil sampling was conducted in September 2007, in accordance with the "Dissimilar Soil Remediation Investigation Work Plan," dated June 28, 2007, which was approved by the MPCA and MDA on July 31, 2007. Twelve additional soil borings were advanced and analyzed for 69 SVOCs and dioxins/furans. The TCDD TEQs ranged from 0.1 to 204 ng/kg. The BaP potency equivalence values ranged from 0.17 to 116 mg/kg.

Based on the results of additional soil characterization, more soil response actions were initiated in December 2007 and completed in early 2008 (see Table 1). The remedial objectives were to remove the soils impacted by dioxins/furans and SVOCs in excess of their respective Industrial SRVs in the top 12 feet of the site. The response action resulted in the removal of approximately 198 tons of soil that was incinerated, 609 tons of soil that was landfilled in a facility that accepts hazardous waste without pretreatment, and 773 tons of nonhazardous soil that was landfilled at a facility in Buffalo MN. The areas containing hazardous soils were excavated to a depth of 12 ft. and the nonhazardous soils were excavated to a depth of 6 ft (6). Figure 6 outlines the excavation areas. Areas that have not been investigated or remediated warrant further site contaminant of concern (COC) characterization if industrial land use changes or excavation occurs.

Table 1. McFarland/Dworsky Additional Remedial Action Soil Borings

Soil Boring	Contaminant	
	Dioxin Toxic Equivalence ng/kg	Benzo(a)Pyrene Potency Equivalence mg/kg
SB07-56-4-100	**204**	2.19
SB07-56-6-100	0.76	0.33

SB07-56-6-300	0.44	0.33
SB07-57-2-100	**116**	**19.25**
SB07-57-6-100	0.10	0.33
SB07-58-2-100	30	**95.07**
SB07-58-4-100	2.45	**93.67**
SB07-58-10-100	NA	**116.8**
SB07-59-2-100	5.19	0.62
SB07-59-4-100	0.3	0.3
SB07-59-6-100	NA	0.26
SB07-60-1-100	1.58	NA
SB07-60-3-100	0.28	NA
SB07-61-2-100	18.71	**3.38**
SB07-61-4-100	NA	0.26
SB07-63-4-100	3.90	0.27
SB07-64-0-100	14.43	0.27
SB07-64-2-100	0.11	0.27
SB07-66-2-100	0.24	0.25
SB07-66-4-100	1.0	1.1
SB07-67-1-100	13	0.35
SB07-67-4-100	0.89	0.17
SB07-68-1-100	3.0	1.4
SB07-68-4-100	3.0	0.17
SB07-69-1-100	**162**	2.8
SB07-69-4-100	8.8	0.27
SB07-69-10-100	0.19	**18**
SRV Criteria	35 ng/kg	3 mg/kg
Bold = Exceeds Minnesota Pollution Control Agency Soil Reference Values (SRVs) NA = Not Analyzed Benzo-a-pyrene (BaP) potency equivalence SRV site cleanup goal = 3 mg/kg; Tetrachlorodibenzo-p-dioxin toxic equivalence (TCDD TEQ) SRV= 35 ng/kg		

The Shoreham Yard Facility has had a long history of industrial use, and there remains a concern for residual contamination throughout the site. Railroad yards often have spills and leaks associated with transporting, loading and unloading various hazardous cargos over the years. Additionally, railroad operations are often associated with elevated heavy metals in soil such as lead along the railroad tracks.

B. Environmental Media

Groundwater

The review of the MF&D site file did show some groundwater impacts, but no active groundwater pump and treat systems have been installed. Natural attenuation is the selected remedy for the localized groundwater plume. The groundwater flow is to the southeast and there are no receptors (people or animals using the groundwater) down gradient of the site based on the well receptor survey (5). Tables 2, and 3 list all the November 2002 groundwater investigation geoprobe and groundwater monitoring well contaminant detections (5).

Site groundwater contaminant concentrations were compared the MDH Health Risk Limits (HRLs). The HRLs are promulgated in Minnesota Rules. When concentrations of chemicals in drinking water are at or below the HRLs, MDH does not recommend any restrictions of public consumption, including consumption by sensitive sub-populations including children, the elderly, and most people

with health problems. Although several VOCs did exceed HRLs (see Table 3), they are not a concern because the contamination is not migrating offsite and no one is exposed to the water.

Table 2 McFarland/Dworsky 2002 Groundwater Geoprobe Contaminants

Contaminant	Geoprobe Groundwater µg/l	
	SB 0087	SB 0089
Diethyl phthalate	15	24
acenaphthene	ND	ND
1,1,2-trichloroethane	ND	ND
1,2- cis-Dichloroethylene	ND	ND
1,1-Dichloroethane	ND	ND
1,1-Dichloroethylene	ND	ND
Chloroform	ND	ND
1,2-Dichloroethane	ND	ND
1,1,1-trichloroethane	ND	ND
Tetra-chloroethylene	ND	ND
Tri-chloroethylene	ND	ND
Vinyl Chloride	ND	ND
Napthalene	ND	3
1,3,5-trimethylbenzene	ND	ND
1,2,4-trimethylbenzene	ND	ND
Xylene o-	ND	ND
Xylene m & p	ND	ND
Manganese total	ND	ND
Nickel total	ND	ND

Table 3 McFarland/Dworsky 2002 Monitoring Well Contaminants

Contaminant	Minnesota Health Risk Limit µg/l	Monitoring Well µg/l				
		MW 201	MW 202	MW 01-03-I	MW 107	MW 301
Diethyl phthalate	-	ND	ND	ND	ND	ND
acenaphthene	400	ND	ND	3.2	ND	ND
1,1,2-trichloroethane	3	**32**	**38**	**14**	ND	ND
1,2- cis-Dichloroethylene	70	**12**	**11**	**6.6**	ND	ND
1,1-Dichloroethane	70	8.5	15	8.1	ND	ND
1,1-Dichloroethylene	6	3.6	3.8	1.6	ND	ND
Chloroform	60	1.8	13	ND	2.5	1.6
1,2-Dichloroethane	4	**23**	**73**	**43**	ND	ND
1,1,1-trichloroethane	600	6.9	27	ND	13	ND
Tetra-chloroethylene	7	**28**	**40**	1.8	ND	ND
Tri-chloroethylene	30	**64**	**59**	8.4	ND	ND
Vinyl Chloride	0.2	ND	ND	**1.5**	ND	ND
Napthalene	300	4	110	2.5	0.2	300
1,3,5-trimethylbenzene	-	ND	ND	ND	ND	ND
1,2,4-trimethylbenzene	-	ND	ND	ND	ND	ND
Xylene o-	1000	ND	4.6	ND	ND	ND
Xylene m & p	1000	ND	6.5	ND	ND	ND
Manganese total	0.3*	**5.73**	**1.49**	ND	ND	ND
Nickel total	0.1	**0.153**	**0.135**	ND	ND	ND
- = Not available; ND = Non-detectable						

Bold = Exceeds Minnesota Health Risk Limit (HRL)
* MDH risk assessment advice (www.health.state.mn.us/divs/eh/risk/guidance/gw/table.html#fm)

Soil

Site soil contaminant concentrations were compared to MPCA's soil reference values (SRVs). The SRVs are derived by MPCA staff using risk assessment methodology, modeling, and risk management policy. SRV's are soil contaminant-specific concentrations above which a risk to human health is predicted to exist.

The human exposure evaluation considers the risk posed by human contact with contaminated soil. MDH is concerned about the potential site soil residuals of polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), and polycyclic aromatic hydrocarbons (PAHs). The SVOCs and PAHs include compounds found in new and used petroleum products/mixtures such as oils, lubricants, creosote, diesel, and solvents. Many of these contaminants are very resistant to environmental degradation and can remain in the soil for many years.

With the exception of the presence of SVOCs at the excavation bottom at a depth of 12 feet, the soil cleanup goals were met at the site. Institutional controls for the site have not been finalized.

C. Past and Current Exposure Pathways

Exposure Routes

Most of the site is not accessible to the public and has been covered with fill. Workers have to come into physical contact or be exposed to residual hazardous materials/chemicals at the MF&D site for these toxic chemicals to cause adverse health effects. For workers to come into contact with these chemicals, there must be a completed exposure pathway. A completed exposure pathway consists of five main parts that must be present for exposure to the chemicals to occur. These include:

1. A source of the toxic chemicals of concern (chemical releases and spills);
2. Environmental transport which allows the chemical to move within the site or from the site and come into contact with people (soil, air, groundwater, surface water, subsurface gas);
3. A point of exposure which is the place where a person comes into direct contact with the chemical;
4. A route of exposure which is how a person comes into contact with the chemical (drinking it, eating it, breathing it, touching it); and
5. A population at risk (e.g.) workers or others at or near the site who come into physical contact with site-related chemicals.

Exposure pathways are also characterized by when the exposure occurred or might occur in the past, present, or future.

Physical contact with a chemical contaminant in and by itself does not necessarily result in adverse health effects. A chemical's ability to affect a person's health is also controlled by a number of other factors including:

- How much of the chemical a person is exposed to (the dose).

- How long a person is exposed to the chemical (duration of exposure).
- How often a person is exposed to the chemical (acute versus chronic).
- The chemical's toxicity and how it impacts the body.

Other factors affecting a chemical's likelihood of causing adverse health effects upon contact include the person's:

- History of past exposure to chemicals;
- Smoking, drinking alcohol, or taking certain medicines or drugs;
- Current health status;
- Sensitivity to certain substances;
- Age and sex; and,
- Family medical history.

Past Exposure Pathways

There may have been inhalation exposures to the onsite incinerator air emissions in the past. However, the past exposures are not quantifiable due to the lack of waste management practices information. For example, the operating conditions of the incinerator, what type of waste and the volume of waste incinerated are not known.

Current Exposure Pathways

Under present land use, there does not appear to be any current exposure to MF&D residual soil contamination. Most of the site appears to be capped with fill and there are no affected drinking water wells. On the basis of MDH's review and evaluation of environmental information collected from the MDA, MPCA site files, and environmental reports provided to MDH by CP, and site visits, MDH concludes that there are no current exposures to the contaminated soil or groundwater on site.

D. Contaminants of Concern

Contaminants of concern include polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and polychlorinated biphenyls (PCBs). Mixtures of PCDDs and PCDFs are referred to as dioxins throughout this document. Site contaminants also include semi-volatile organic compounds (SVOCs) and a group of compounds known as polycyclic aromatic hydrocarbons (PAHs).

For a more detailed discussion of dioxins, PCBs, and PAHs see Appendix 1 (Properties of the Contaminants of Concern). MDH screened the substances reported in soil sampling data to select those that require public health evaluation. Each substance was screened by comparing its concentration level in the environment with MPCA's Industrial Soil Reference Values (SRVs). The industrial SRV comparison values are set below the levels that would be expected to be a health threat to a worker using an exposure scenario in an industrial setting. MDH emphasizes that comparison values are screening tools for health assessments, and are not to be confused with health effect levels, or toxicity levels. Several contaminants of concern at the MF&D site found at levels above industrial SRVs were evaluated further (See the Appendix for a more detailed discussion).

- Polycyclic Aromatic Hydrocarbons (PAHs)

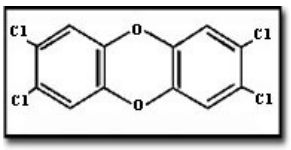
  Several PAHs found onsite are classified as probable or possible human carcinogens by U.S Environmental Protection Agency (US EPA) and the International Agency for Research on

Cancer (IARC) (11). MDH utilizes information developed by the California Environmental Protection Agency (CalEPA) to evaluate the carcinogenicity of an extended list of PAHs, which includes more chemicals than the US EPA list of carcinogenic PAHs. MDH's guidance appears on the MDH website (http://www.health.state.mn.us/divs/eh/risk/guidance/pahmemo.html).

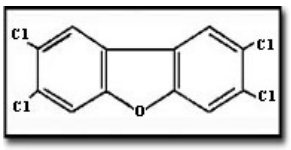
Carcinogenic PAHs (cPAH) are evaluated relative to the carcinogenicity of Benzo(a)Pyrene (BaP). Table 1 in the Appendix lists the BaP Relative Potency Equivalence Factors used to determine cancer risk associated with cPAH mixtures. Individual PAH contaminant concentrations are multiplied by a potency equivalence factor, and the total mixture is added and compared to the MPCA Industrial cleanup goal for BaP (3 mg/kg).

- Polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs)

A complex mixture of dioxins and furans has been identified in MF&D soil samples. The chemical structures of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and 2,3,7,8-tetrachlorodibenzo-p-furan (TCDF) are shown below:



TCDD



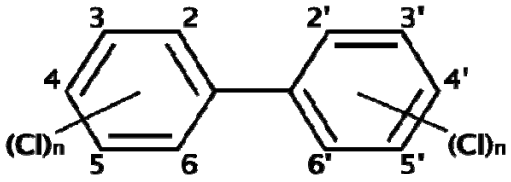
TCDF

The names of individual dioxin compounds denote both the number and position of the chlorine (Cl) atoms. Furans differ from dioxins structurally by the lack of one of the two oxygen (O) atoms between the benzene (six-carbon atom, circle-shaped) ring structures.

The dioxin and furan carcinogenic toxicity is calculated utilizing a methodology similar to the carcinogenic PAHs (see Appendix for a more detailed discussion of dioxin sources, environmental fate and transport properties). Not all dioxins and furans are as toxic as TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin), but all are thought to cause adverse effects through the same mechanisms. To estimate the toxicity of dioxin and furan mixtures, toxicity equivalency factors (TEFs) are used to compare the toxicity of other dioxin and furan congeners to TCDD. The overall toxicity of a mixture is calculated in terms of total TCDD equivalents (TEQ). The current WHO TEFs are listed in Table 2 of the Appendix. Note that MF&D remedial excavations utilized the 1998 TEQs instead of the more current 2005 values. The Tier II Dioxin SRV is 35ng/kg and is more restrictive than the United States Environmental Protection Agency's draft non-cancer based soil dioxin preliminary remedial goal of 72 (ppt TEQ). See MDH dioxin guidance for additional information (http://www.health.state.mn.us/divs/eh/risk/guidance/dioxinmemo1.html).

- Polychlorinated Biphenyls (PCBs)

PCBs are a class of chemical compounds in which 2–10 chlorine atoms are attached to the biphenyl molecule. The general chemical structure of chlorinated biphenyls is shown below.



PCB

The PCB chemical structure facilitates the formation of 209 different chlorinated compounds called congeners. Each congener has been assigned a number (1-209). The term “homolog” is used to refer to all PCBs with the same number of chlorines (e.g., trichlorobiphenyls). Homologs with different substitution patterns are referred to as isomers. For example, the trichlorobiphenyl homolog contains 24 isomers. PCBs were manufactured and sold as complex mixtures under the Aroclor trade name.

PCBs have similar fate and transport properties as dioxins and furans. They also have similar biological activity and toxicological outcomes as dioxins. Because of these similarities, 12 PCB congeners have been assigned toxic equivalence factors (TEFs) to calculate their dioxin equivalence (TCDD TEQ). Table 3 in the Appendix lists the PCB toxic equivalence factors (TEFs). The PCB toxic equivalence is added to the dioxin TEQ. PCBs were not included in the MF&D dioxin TEQ calculations. The analytical method used to detect Aroclors at the MF&D site did not speciate individual PCB congener concentrations. A more specific analytical method is needed for determining concentrations of the carcinogenic congeners.

The cancer risks of PAHs, dioxins, furans, and PCBs are additive.

E. Potential Future Exposure Pathways

There is potential for future exposure to contaminated soil if excavation occurs in unremediated areas. The site soils have not been fully characterized for contaminants of concern. Without proper controls, the following future potential exposures to workers are probable if excavation occurs onsite:

- Ingestion of contaminated soil
- Dermal (skin) exposure to contaminated soil
- Inhalation of airborne particulates

Soils contaminated with dioxins, furans and polycyclic aromatic hydrocarbons (PAHs) have been removed from the MF&D operational areas of the site. The sources of these contaminants include the wood treatment operations and the barrel reconditioning business. Since there is insufficient information to model potential stack emissions, it is prudent to consider the possibility of aerial deposition of dioxins and furans on surface soils within an city block radius based on an estimated furnace stack height of 30-50 feet.

Another possible source of surface soil dioxin contamination is the storage of treated lumber and the storage of leaking barrels. Site maps show that treated lumber was stored in most of the areas north

of the private access road (see Figure 3). Treated lumber often drips contaminants (pentachlorophenol, or creosote) until it dries. Potentially thousands of barrels were stored onsite and the contents and condition of these barrels is not known (see Figure 4).

Furthermore, the soil contaminants can be moved around a site with wind and water erosion, or by grading of the soil, or operation of heavy equipment. Also if enough contamination is present in the soil, it can leach down into the groundwater. However, groundwater monitoring on site has shown minor impacts.

Of concern is that an adjacent property to the north was part of a June 2009 Canadian Pacific request for residential development proposal (see Attachment 2). Based on site maps, this parcel was used for pole storage and it has not been characterized for COC impacts. The west side of the proposed development area is accessible to the public.

Furthermore, an adjacent property to the north was part of a June 2009 CP request for residential development proposal (see Attachment 2). Based on site maps, this parcel was used for pole storage and it has not been characterized for COC impacts. The west side of the proposed development area is accessible to the public.

IV. ATSDR Child Health Considerations

ATSDR and MDH recognize that the unique vulnerabilities of infants and children make them of special concern to communities faced with contamination of their water, soil, air, or food. Children are at greater risk than adults from certain kinds of exposures to hazardous substances. They are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are smaller than an adult, which means they breathe dust, soil, and heavy vapors closer to the ground. Children also weigh less, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most importantly, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care.

At this time children are unlikely to be exposed to contaminants at or from the site. There is little to attract children to the site, and children should avoid the site in any event due to the frequent truck and rail traffic.

V. Conclusions

1. MDH concludes that PAHs, dioxins, furans, and PCBs in soils on the former MF&D facility site will not harm people's health because people are not exposed to them. The onsite soils near the facility are not a public health hazard under current site conditions. The MF&D industrial site is currently used as a transfer station for cargo bins and is covered with fill.

2. MDH concludes that site related SVOCs in groundwater will not harm people's health because people are not exposed to them, and therefore the groundwater is not a public health concern. Onsite groundwater does not appear to be heavily contaminated, and the plume appears to be localized.

Natural attenuation is the selected remedy for the small plume. No current groundwater exposures were identified.

3. MDH cannot currently conclude whether people's health could be harmed by exposure to contaminants in soil next to the facility site. The reason for this is because areas of MF&D site outside of the facility location have not been fully characterized for site related contamination from wood treatment and barrel reconditioning businesses, including historical incinerator operations that may have contaminated land outside of the site.

- While remedial actions have addressed known areas of contaminated soil at the MF&D site that exceed MPCA commercial/industrial SRVs for site-related contaminants, other areas nearby have not been characterized for site contaminants.

- Burning of chlorinated compounds in the facility incinerator likely resulted in emissions of dioxins that contributed to dioxins in soil in areas not included in the MF&D site investigation and removal.

- In June 2009 Canadian Pacific Real Estate, U.S. issued a Request for Development Proposal for the Parkside site north of the tracts. The Canadian Pacific request for development proposal includes a land parcel that has not been fully characterized for contaminants and is outside the current boundaries of the Shoreham Facility. The parcel of land is accessible to the public but is not likely to be frequented much at present.
- However, any future excavation outside the remediated areas at the MF&D site could result in exposures to site related contaminants. It is possible that residual contamination exists within the parcel being considered for residential development.

VI. Recommendations

1. MDH recommends that institutional controls defining appropriate current and future land use and limitations be developed for the MF&D site. A more comprehensive approach to institutional controls for all of Shoreham yard operations should also be considered.

2. More site characterization is warranted if land use changes from industrial to another land use in the future.

- Any excavations outside remediated areas at the MF&D site and the Shoreham Yard warrant contaminant characterization and exposure mitigation.

- The Canadian Pacific residential development proposal area should be characterized for site-related PAHs, dioxins, furans, and PCBs before development proceeds. These data will help determine what institutional controls and or remediation are needed for the land parcel.

VII. Public Health Action Plan

MDH's Public Health Action Plan for the MF&D site consists of continued consultation with Minnesota Department of Agriculture (MDA) and MPCA staff as needed for environmental sampling and analysis, communication of the results to neighborhood residents near the site, and participation in any planned public outreach activities.

VIII. Preparer of the Report:

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2) Braun Intertec 1996. Phase I Environmental Site Assessment, CP Rail System Shoreham Yard Former Lease, Collector Pan and Waste Reclamation Building Areas 2800-2952 Central Avenue. Minneapolis, MN, February 22, 1996.

3) Barr Engineering Company 2008. Shoreham Area Advisory Committee Meeting October 13, 2008 Meeting Notes on the McFarland/Dworsky Site Barr Engineering Company 2008. Shoreham Area Advisory Committee Meeting October 13, 2008 Meeting Notes on the McFarland/Dworsky Site

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11) ATSDR 1995. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. Agency for Toxic Substances and Disease Registry, August 1995.

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19) ATSDR 1998. Toxicological Profile for Chlorinated Dibenzo-p-Dioxins. Agency for Toxic Substances and Disease Registry, Atlanta, GA. December 1998.

20) Canadian Pacific- Real Estate 2009, Request for Development Proposal, CP R/E Project MN-Henn-0019040, Parkside Site, Southside of St. Anthony Parkway West Central Avenue NE. 501 Marquette Avenue, Suite 1525, Minneapolis, MN 55402.

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24) Barr Engineering 1996. Remedial Investigation Report., Shoreham Yard Wood-Treating Report, Prepared for Canadian Pacific Rail System. January 1996.

25) MDH Soo Line Shoreham Yard East Side, Minneapolis, Hennepin County, Minnesota, September 2007.

CERTIFICATION

This McFarland and Dworsky Public Health Assessment was prepared by the Minnesota Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Public Health Assessment was begun. Editorial review was completed by the Cooperative Agreement partner.

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Trent D. LeCoultre
Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

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

_____

Alan Yarbrough
Team Lead, CAT, CAPEB, DHAC, ATSDR

Figures

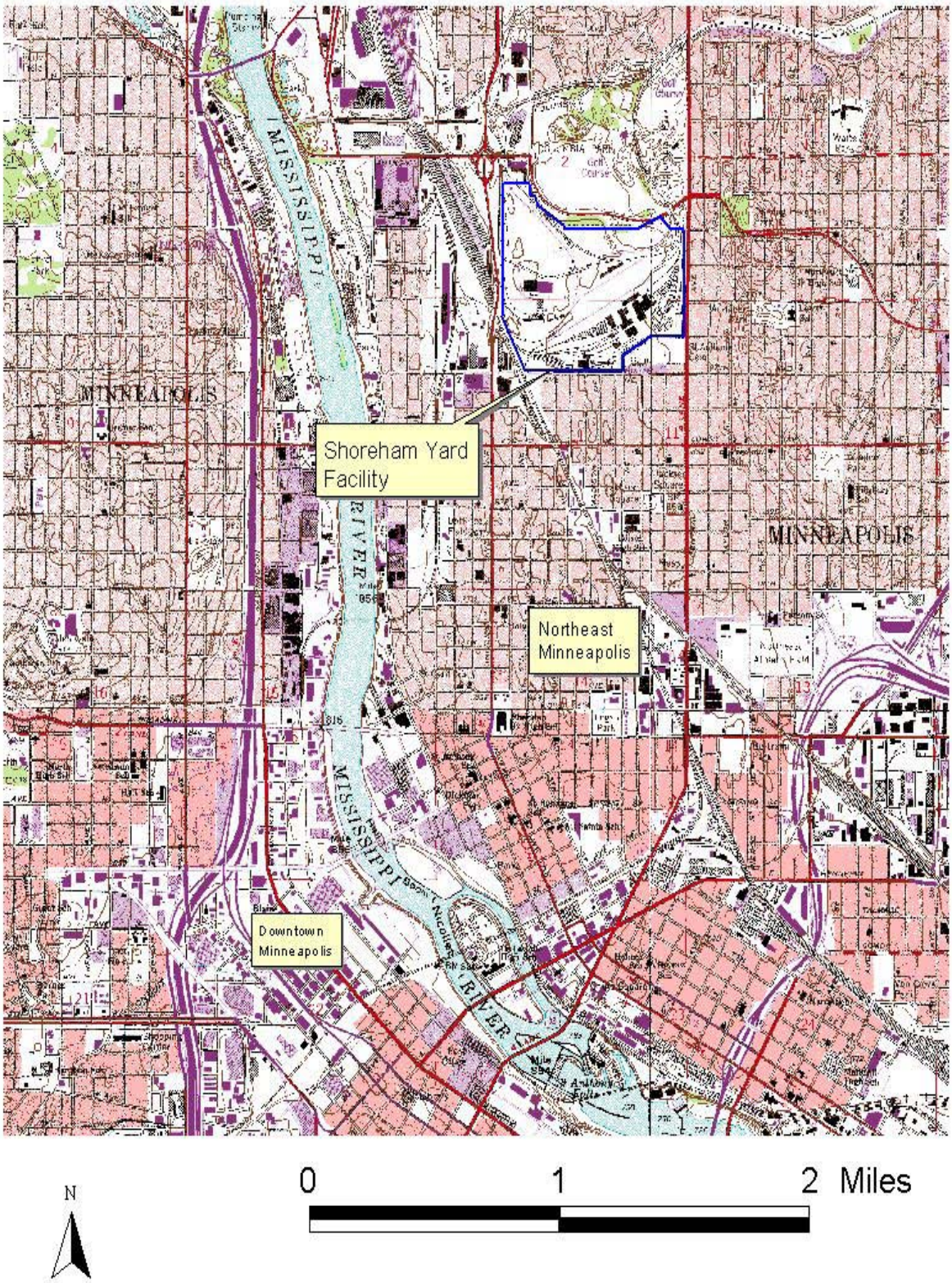
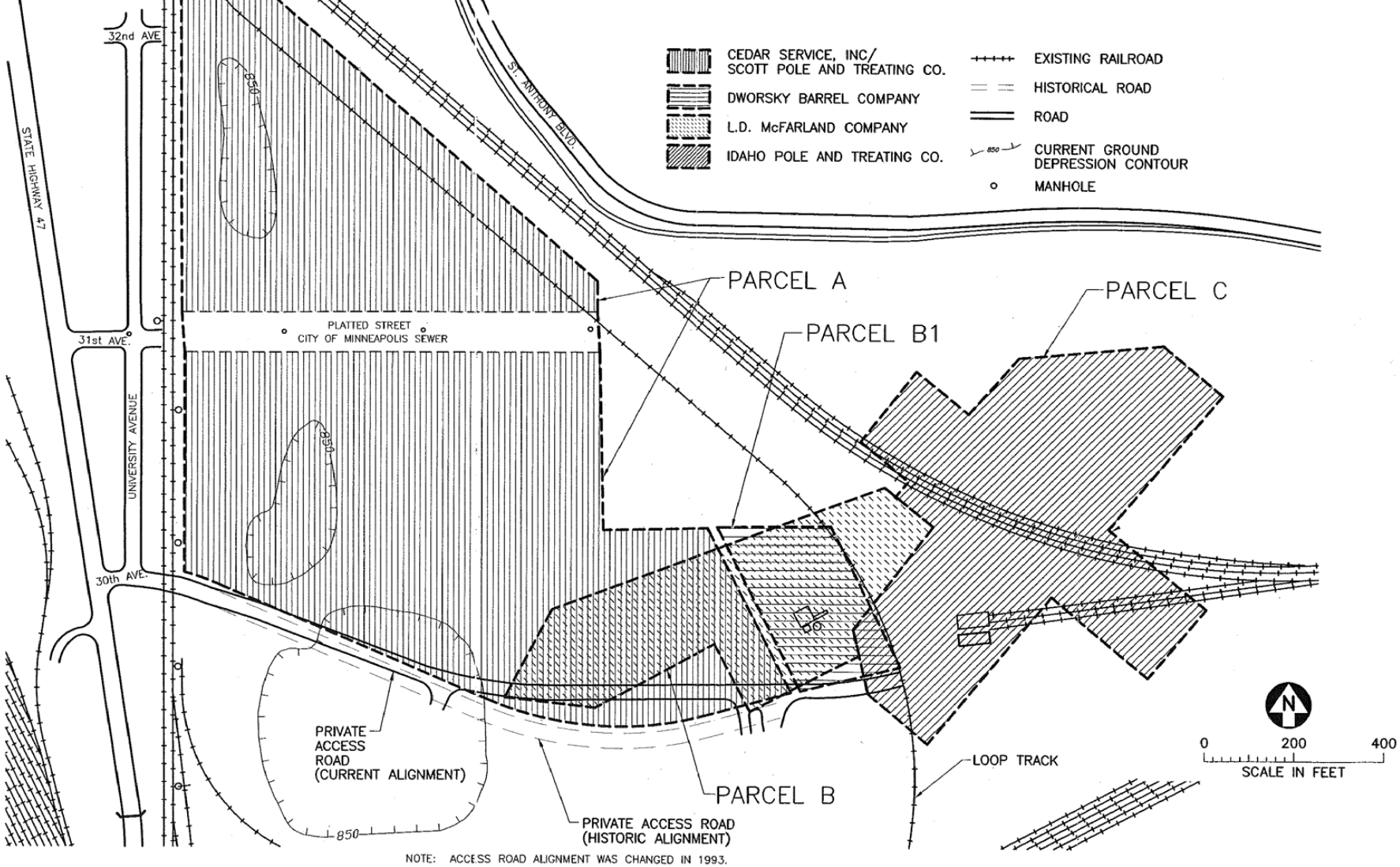


Figure 1: Shoreham Yard Facility Location
Minneapolis, MN

Figure 2: McFarland/Dworsky Site Location



NOTE: ACCESS ROAD ALIGNMENT WAS CHANGED IN 1993.

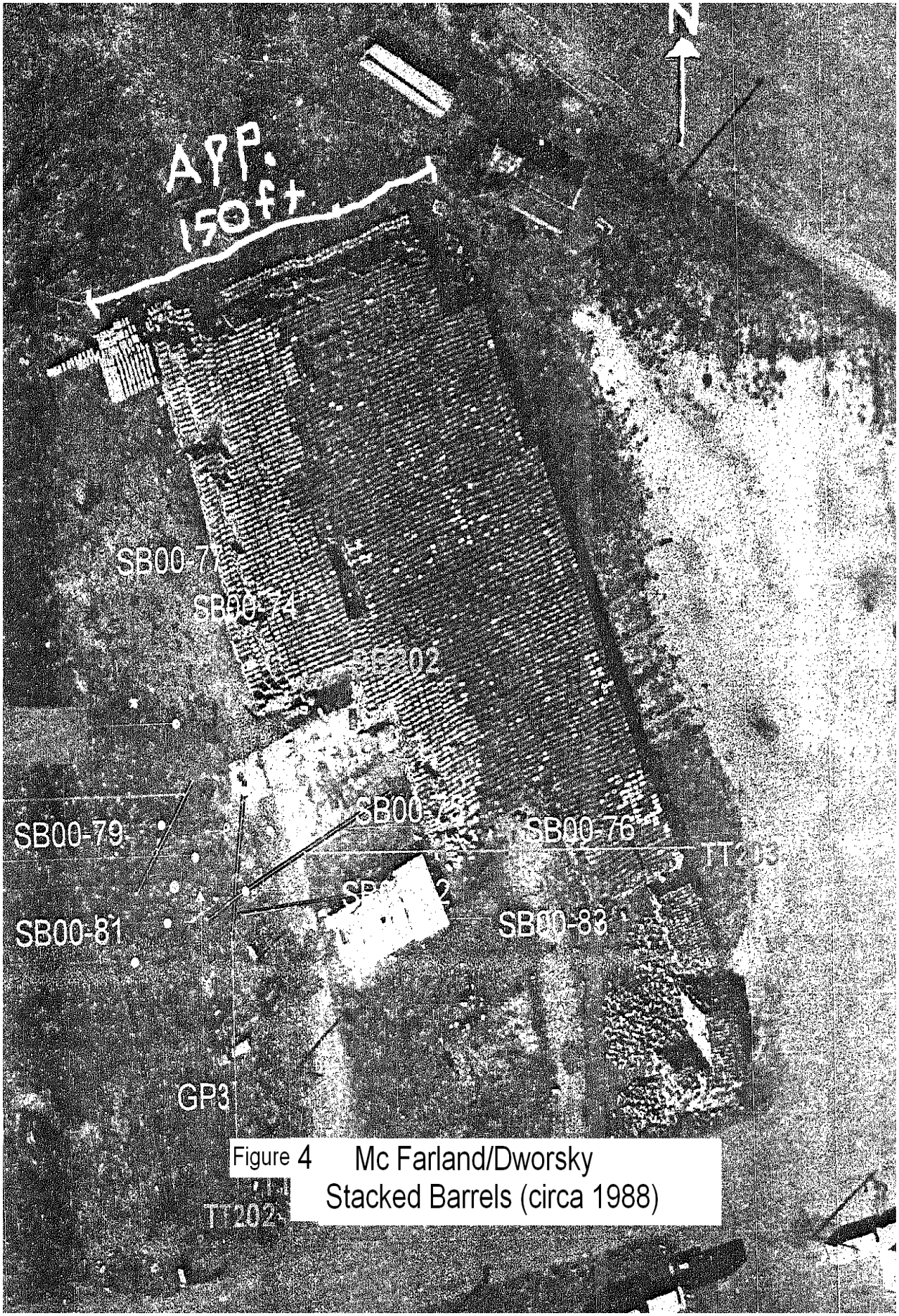
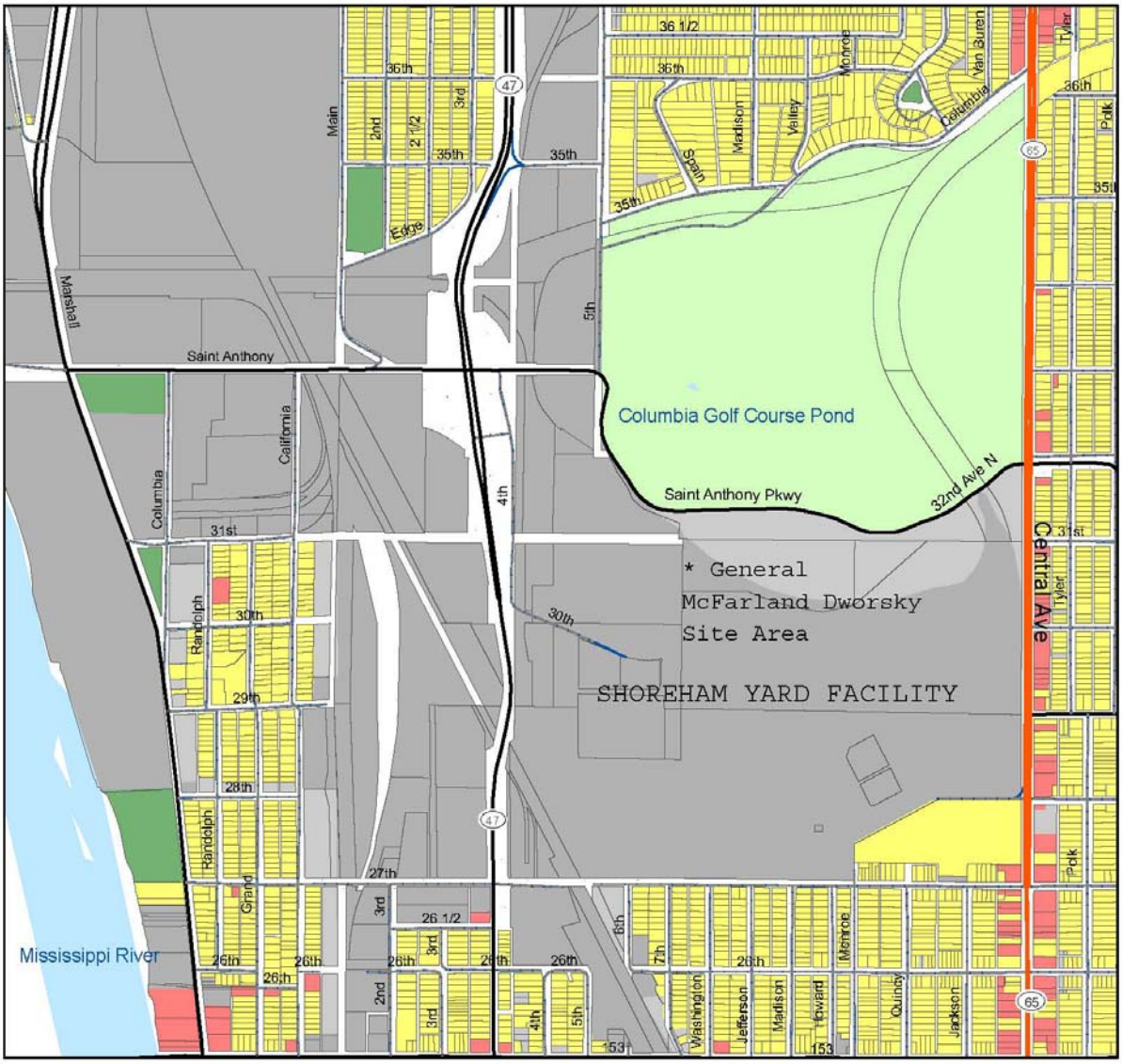


Figure 4 Mc Farland/Dworsky
Stacked Barrels (circa 1988)

Figure 5

Shoreham Yard Facility Zoning Map



Legend

Road Network
- Interstate
- State Highways
- Local Highway
- Major Road

Project Area Zoning
- Water Features
- Undeveloped Industrial
- Mixed Industrial
- Office; Retail Districts
- Residential
- Golf Course
- Parks-Recreational

N

0.25 0.125 0 0.25 Miles

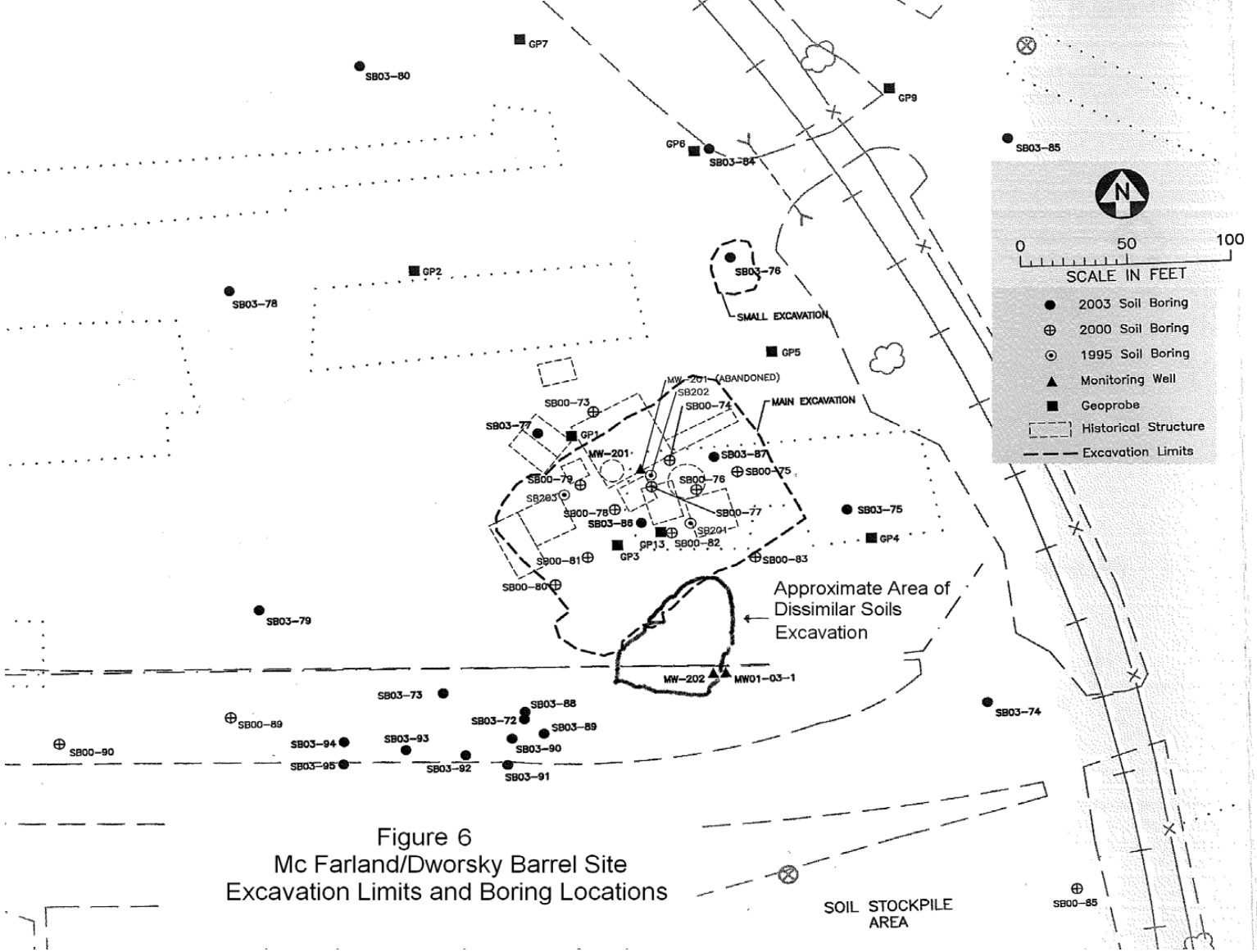


Figure 6
Mc Farland/Dworsky Barrel Site
Excavation Limits and Boring Locations

Appendix

1) Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs) are produced by the incomplete combustion of organic materials such as coal, oil, wood, tobacco, and even food products (ATSDR 1995). They are also found in petroleum products such as asphalt, coal tar, creosote, and roofing tar. As a result, they are very common in the environment from such processes as volcanic eruptions, forest fires, home wood burning, and vehicle exhaust. Hundreds PAHs are known to exist, and they are usually found in the environment as mixtures. PAHs generally fall into two groups based on their potential health effects: those that are carcinogenic (cancer causing, known as cPAHs), and those that are not (non-carcinogenic PAHs, or nPAHs). The PAHs found on site (a mixture of cPAHs and nPAHs) are likely present as a result of the use of creosote or diesel in wood treatment and the drips and spills from barrel reconditioning operations. Creosote itself is usually derived from coal tar, and is described as a thick, oily liquid that is amber or black in color, and contains hundreds or even thousands of different chemicals including PAHs and phenols (ATSDR 1996). It has been in use as a wood preservative and waterproofing agent for over 100 years.

PAHs tend to bind to soil particles, especially organic matter, and therefore tend to remain in soils and sediments. Because of their affinity for organic matter, PAHs can accumulate in aquatic and terrestrial organisms, but unlike PCP can become concentrated as they move up the food chain (ATSDR 1995). This effect is somewhat balanced by the ability of many organisms, such as fish, to metabolize PAHs. In soil, microorganisms can metabolize PAHs. Environmental factors like soil nutrients, types of microbes present, and the properties and concentrations of PAHs present influence the extent and rate of decomposition (ATSDR 1995).

Exposure to high levels of PAHs in general has also been associated in animals with reproductive difficulties and adverse effects on the skin and immune system. Adverse effects on the liver and gastro-intestinal tract have also been noted.

PAHs include hundreds of different chemicals that commonly occur as mixtures in the environment. Limited toxicological data are available on PAH mixtures; therefore, individual PAHs are typically evaluated as separate chemicals for risk characterization. Numerous PAHs have been classified as probable or possible human carcinogens by the International Agency for Research on Cancer (IARC) (ATSDR 1995). The MDH has guidance for a consistent approach for agencies and programs to assess health risks from exposures to carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in soil, and other media. MDH recommends the 25 PAHs identified by the California Environmental Protection Agency (CA EPA) be evaluated as probable or possible carcinogens at this time. Table 1 lists the Benzo(a)Pyrene (BaP) Potency Equivalency Factors (PEFs) used to determine cancer risk associated with carcinogenic PAH (cPAH) mixtures by the MDH (www.health.state.mn.us/divs/eh/risk/guidance/pahmemo.html).

Potency Equivalency Factors (PEFs) for cPAHs

The MDH has adopted the PEF methodology for assessing cancer risks associated with cPAH. To estimate the toxicity of cPAH mixtures, a series of PEFs have been developed that compare the toxicity of cPAHs to Benzo(a)Pyrene (BaP). The overall toxicity of a mixture can then be calculated

in terms of total BaP equivalents. PEFs are intended to be used pending additional research on specific PAH compounds. Unfortunately, many environmental investigations do not sample for all 25 cPAH compounds that have PEFs. Table 1 lists the cPAHs omitted from the MF&D investigations. Because MF&D land use remains industrial, and most of the site is covered with fill, parking lots and/or buildings, it is reasonable to not include all 25 cPAHs in the site investigation. However, should the property be used for residential development, addition work characterizing all the cPAH is warranted unless sufficient precautions are taken to prevent potential future exposures.

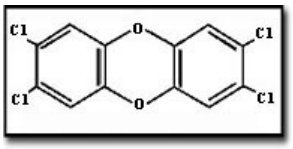
Table 1

Benzo(a)Pyrene (BaP) Potency Equivalence		
(Site Contaminant Concentration)(Relative Potency Factor) = BaP Equivalent		
Contaminant	Site Concentration (mg/kg)	Relative Potency Factor
Benzo(a)anthracene	*	0.1
Benzo(b)fluoranthene	*	0.1
Benzo(k)fluoranthene	*	0.1
Benzo(a)pyrene	*	1
Chrysene	*	0.01
Dibenz(a,h)anthracene	*	0.56
Indeno(1,2,3-cd) pyrene	*	0.1
Benzo[j]fluoranthene**		0.1
Dibenzo[a,l]pyrene**		10
Dibenz[a,j]acridine**		0.1
Dibenz[a,h]acridine**		0.1
Dibenzo[a,h]pyrene**		10
Dibenzo[a,e]pyrene**		1.0
Dibenzo[a,i]pyrene**		10
7H-Dibenzo[c,g]carbazole**		1.0
1,8-Dinitropyrene**		1.0
1,6-Dinitropyrene**		10
1-Nitropyrene**		0.1
2-Nitrofluorene**		0.01
4-Nitropyrene**		0.1
6-Nitrochrysene**		10
5-Methylchrysene**		1.0
* = For the Mc Farland and Dworsky site, use ½ the detection limit if parameter is not detected. ** = Not included in the Mc Farland and Dworsky investigations		

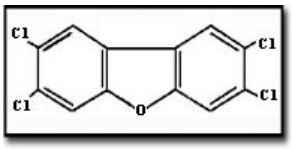
2) Polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs)

The polychlorinated dibenzo-p-dioxins (PCDDs) include 75 individual compounds, and the polychlorinated dibenzofurans (PCDFs) include 135 individual compounds. These individual compounds are technically referred to as congeners. Only 7 of the 75 congeners of PCDDs are thought to have dioxin-like toxicity; these are ones with chlorine substitutions in, at least, the 2,3,7, and 8 positions. Only 10 of the 135 possible congeners of PCDFs are thought to have dioxin-like toxicity; these also are ones with substitutions in the 2,3,7, and 8 positions. The 17 PCDD and PCDF congeners with dioxin like toxicity (i.e., chlorine in the 2,3,7, 8 positions) are collectively referred to as dioxins.

The names of individual dioxin compounds denote both the number and position of the chlorine (Cl) atoms. Furans differ from dioxins structurally by the lack of one of the two oxygen (O) atoms between the benzene (six-carbon atom, circle-shaped) ring structures. The chemical structures of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and 2,3,7,8-tetrachlorodibenzo-p-furan (TCDF) are shown below:



TCDD



TCDF

Dioxins and furans are formed as a result of the incomplete combustion of fossil fuels, organic matter, and chlorinated waste materials, during the bleaching of paper in pulp and paper mills, and as a by-product in the production of other chemicals such as the wood preservative PCP, and the herbicide 2,4,5-T (ATSDR 1998). In the environment, dioxins and furans always occur as various combinations of all the possible congeners. In soil, dioxins tend to bind to small particles or organic matter. They do not volatilize easily into air or dissolve in water (hydrophobic).

As a result, they tend to settle out of the air or water as they attach to organic particulate and end up in soils or sediments. In sediments, dioxins are taken up by aquatic microscopic organisms, animals through feeding, or direct contact. Dioxins can then pass through the food chain and become concentrated in the tissues of larger aquatic animals, especially in the fatty tissue. Dioxins accumulate in organisms (bioconcentration effect) because they do not metabolically breakdown and they are lipophilic (dissolve into fat). Dioxins in soil can be transported to surface water bodies via runoff, where humans and animals may be exposed to them through indirect ingestion or dermal contact. Plants do not efficiently take up dioxins through their roots, but may have dioxins on their surfaces as a result of particle deposition (ATSDR 1998). Animals (e.g., cows, chickens) or humans that eat the plants or ingest soils may then ingest the dioxins.

Environmental fate modeling of PCDDs and PCDFs requires knowledge of a number of fundamental physical and chemical parameters, such as water solubility, vapor pressures, Henry's law constants, octanol-water partition coefficients (Kow), and organic carbon partition coefficients (Koc). Dioxins are a class of high molecular weight, highly hydrophobic compounds, and solubility values are available for only a handful of dioxins (Doucette and Andren 1988). Dioxins have very low water solubilities, with solubility decreasing as chlorine substitutions increase (Doucette and Andren 1988).

On the surface of the soil, dioxins may be broken down by sunlight, a process known as photodegradation. The half-life of TCDD on soil may be on the order of 15 years at the soil surface (Paustenbach et al 1992). This process is only effective in the top few millimeters of soil where ultraviolet light can penetrate (EPA 2000). Burial in place (by the constant accumulation of airborne dust and dirt, erosion, and the buildup of organic matter) and or erosion to surface water bodies are likely the main environmental fate of dioxins in soil. Once buried (i.e. in the sub-soil), TCDD has been shown to have a half-life of up to 100 years, and becomes tightly bound to soil organic matter (EPA 2000).

As a result of natural and man-made processes, dioxins are found nearly everywhere in the environment. Dioxins have been found in the fat tissue of humans across the U.S., even in those who have no known exposure to dioxins. This indicates that exposure is widespread, and is likely occurring through the food supply. Foods containing animal fat, such as meat, fish, and dairy products are the most common dietary sources. Dioxins may also be passed from mother to fetus via maternal blood and the infant through breast milk.

According to an EPA summary of available studies, background levels of dioxins in soils in rural areas in North America average 2.5 parts per trillion (ppt, or 0.0025 ppb) as expressed using TEFs, with a range of between 0.1 to 6 ppt (EPA 2000). In urban areas, the average cited by EPA is 9.4 ppt (0.0094 ppb), with a range of between 2 and 21 ppt. Background levels in sediments average 5.31 ppt (0.00531 ppb) with a range of from less than 1 ppt to 20 ppt.

Toxic Equivalency Factors (TEFs) for Dioxin

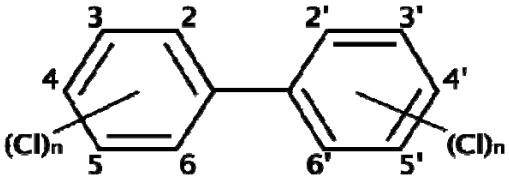
Not all dioxins and furans are as toxic as TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin), but all are thought to cause adverse effects through the same mechanisms. Penta- and hexachloro-dioxins with chlorine atoms in the 2,3,7 and 8 positions appear to have similar toxicities, while other dioxins that do not have chlorine atoms in those positions are relatively less toxic (ASTDR 1998). To estimate the toxicity of dioxin and furan mixtures, a series of toxicity equivalency factors (TEFs) have been developed that compare the toxicity of other dioxin and furan congeners to TCDD. The overall toxicity of a mixture can then be calculated in terms of total TCDD equivalents (TEQ). The TEFs used in this health consultation were published by the World Health Organization (WHO). The TEFs are based on existing toxicological data on individual dioxins and furans, or are estimated using a number of different methodologies. They are intended to be used pending additional research on specific dioxin and furan compounds. The current WHO TEFs are listed in Table 2**.** Note that 2006 MF&D remedial excavations utilized the 1998 TEQs instead of the more current 2005 values.

Table 2

Dioxin and Furan Toxic Equivalence (TEQ) Calculation			
Dioxin/Furan Congener	Site Sample Result (ng/kg)	1998 World Health Organization toxicity equivalency factors (TEFs)	2005 World Health Organization toxicity equivalency factors (TEFs)
2,3,7,8-TCDD	*	1	1
1,2,3,7,8-PeCDD	*	1	1
1,2,3,4,7,8-HxCDD	*	0.1	0.1
1,2,3,6,7,8-HxCDD	*	0.1	0.1
1,2,3,7,8,9-HxCDD	*	0.1	0.1
1,2,3,4,6,7,8-HpCDD	*	0.01	0.01
OCDD	*	0.0001	**0.0003**
2,3,7,8-TCDF	*	0.1	0.1
1,2,3,7,8-PeCDF	*	0.05	**0.03**
2,3,4,7,8-PeCDF	*	0.5	**0.3**
1,2,3,4,7,8-HxCDF	*	0.1	0.1
1,2,3,7,8,9-HxCDF	*	0.1	0.1
1,2,3,6,7,8-HxCDF	*	0.1	0.1
2,3,4,6,7,8-HxCDF	*	0.1	0.1
1,2,3,4,6,7,8-HpCDF	*	0.01	0.01
1,2,3,4,7,8,9-HpCDF	*	0.01	0.01
OCDF	*	0.0001	**0.0003**
TCDD TEQ + TCDF TEQ = Total TCDD equivalents			
* = Use ½ the detection limit if parameter is not detected; **Bold** = Change in equivalence value; ng/kg = Parts per Trillion (ppt)			

3) Polychlorinated Biphenyls (PCBs)

PCBs are a class of chemical compounds in which 2–10 chlorine atoms are attached to the biphenyl molecule. The general chemical structure of chlorinated biphenyls is shown below.



PCB

The PCB chemical structure facilitates the formation of 209 different chlorinated compounds called congeners. Each congener has been assigned a number (1-209). The term “homolog” is used to refer to all PCBs with the same number of chlorines (e.g., trichlorobiphenyls). Homologs with different substitution patterns are referred to as isomers. For example, the trichlorobiphenyl homolog contains 24 isomers. PCBs were manufactured and sold as complex mixtures under the Aroclor trade name.

PCBs have similar fate and transport and toxicological properties as dioxins and furans. Because of these similarities, 12 PCB congeners have been assigned toxic equivalence factors (TEFs) to

calculate their dioxin equivalence (TCDD TEQ). Table 3 list the PCB toxic equivalence factors (TEFs). The PCB toxic equivalence is added to the dioxin TEQ. Note that PCBs were not included in the MF&D dioxin TEQ calculations.

Table 3

PCB Toxic Equivalence Factors (TEF) for Dioxin Like Compounds			
Congener	TEF	Congener	TEF
PCB-77	0.0001	PCB-126	0.1
PCB-81	0.0003	PCB-156	0.00003
PCB-105	0.00003	PCB-157	0.00003
PCB-114	0.00003	PCB-167	0.00003
PCB-118	0.00003	PCB-169	0.03
PCB-123	0.00003	PCB-189	0.00003
(PCB Site Concentration)(TEF) = dioxin TEQ			

Attachment 1

Minnesota Pollution Control Memo:
Disposal of Dioxin Contaminated Soil in "Subtitle D" Landfills

SF-00006-05(4/86)

DEPARTMENT: POLLUTION CONTROL AGENCY

STATE OF MINNESOTA

Office Memorandum

DATE:	August 29, 2006
TO:	Remediation Division
FROM:	Stephen Thompson SCT Superfund and ER Section Remediation Division Elizabeth Gawrys EG Superfund and ER Section Remediation Division
PHONE:	(651) 297-8604 (651) 297-8376
SUBJECT:	Disposal of Dioxin Contaminated Soil in "Subtitle D" Landfills

Dioxin contaminated soils provide special remediation issues at remediation sites in Minnesota. Minnesota has several Superfund sites with hundreds to thousands of tons of dioxin (2,3,7,8 TCDD Equivalents) contaminated soils. Soil Reference Values (SRVs), which account for risk of human contact, for dioxins are very low. Options for disposal of dioxin contaminated soils are limited and extremely expensive. At times, the best alternative is to cap the contaminated soil on site. However, at other sites, on-site disposal is either not feasible or poses long-term risk situations. In those situations, the specific characteristics of dioxin make it appropriate to consider disposal of dioxin contaminated soil in a "Subtitle D" landfill. Some contaminated soils have multiple contaminants. If so, all other contaminants also need to be evaluated to determine if the dioxin contaminated soil can be managed at a Subtitle D landfill. MPCA RCRA staff will review all hazardous waste determinations, as allowed by EPA for authorized States, and make a case by case determination on soil management at cleanup sites which have MPCA oversight.

A. Factors that may make disposal of dioxin contaminated soils in Subtitle D landfills appropriate.

1. Characteristics of dioxin. Dioxins tend to adsorb to organic fraction in soil. Dioxin has high octanol water partition coefficients, suggesting that in the presence of sufficient amounts of organic matter, the dioxin would have a high propensity to remain adsorbed to the organic material rather than dissolve into and become mobilized by water.
2. Leachate analysis. Analysis of leachate/condensate from eleven different landfills, destined for disposal at MCES, shows all eleven analyses to be below detection limits for dioxins. This data lends support to the safety of allowing dioxin contaminated soil in certain instances described in this memo to be disposed of in "Subtitle D" landfills.

3. EPA precedence. In April 2004, the U.S. Environmental Protection Agency (EPA) gave approval to dispose of dioxin contaminated soil from an EPA lead Superfund site located in Cass Lake, Minnesota in a "Subtitle D" landfill located near Buffalo, Minnesota.
4. Cost and exposure risks. Hazardous waste disposal options are limited, or nonexistent in the United States for dioxin listed wastes. If soils are not allowed to be disposed of in a Subtitle D landfill, the only other viable option is to leave the contamination in place which makes for more potential future human exposure as compared to managing the soil in a landfill.

B. Standards and requirements

1. Soil with dioxin contamination levels of 10 parts per billion (ppb) or less of 2,3,7,8 TCDD equivalents may be considered for disposal in a Minnesota "Subtitle D" landfill. The 10 ppb value is based upon multiplying the Universal Treatment Standard for dioxin (1 ppb) by a factor of 10 as allowed for soils in EPA's Phase IV Land Disposal Restriction (LDRs).
2. Because of dioxin's specific characteristics discussed in paragraph A.1 above, dioxin contaminated soil which does not exceed 10 ppb, will be allowed to be disposed of in a Minnesota "Subtitle D" landfill under the conditions described below.
    a. The dioxin contaminated soil brought to the landfill must not be used as daily cover.
    b. The dioxin contaminated soil brought to the landfill must be placed together in a specific area and its location recorded. The soil should not be used as daily cover or placed in numerous locations.
    c. The landfill accepting the dioxin contaminated soil must have dioxin included in its waste acceptance plan.

This issue was brought before the Land Policy Forum on Tuesday, April 4, 2006. The Forum approved of this proposal.

Attachment 2

Request for Development Proposal, CP R/E Project MN-Henn-0019040,
Parkside Site, Southside of St. Anthony Parkway
West Central Avenue NE.
501 Marquette Avenue,
Suite 1525, Minneapolis, MN 55402

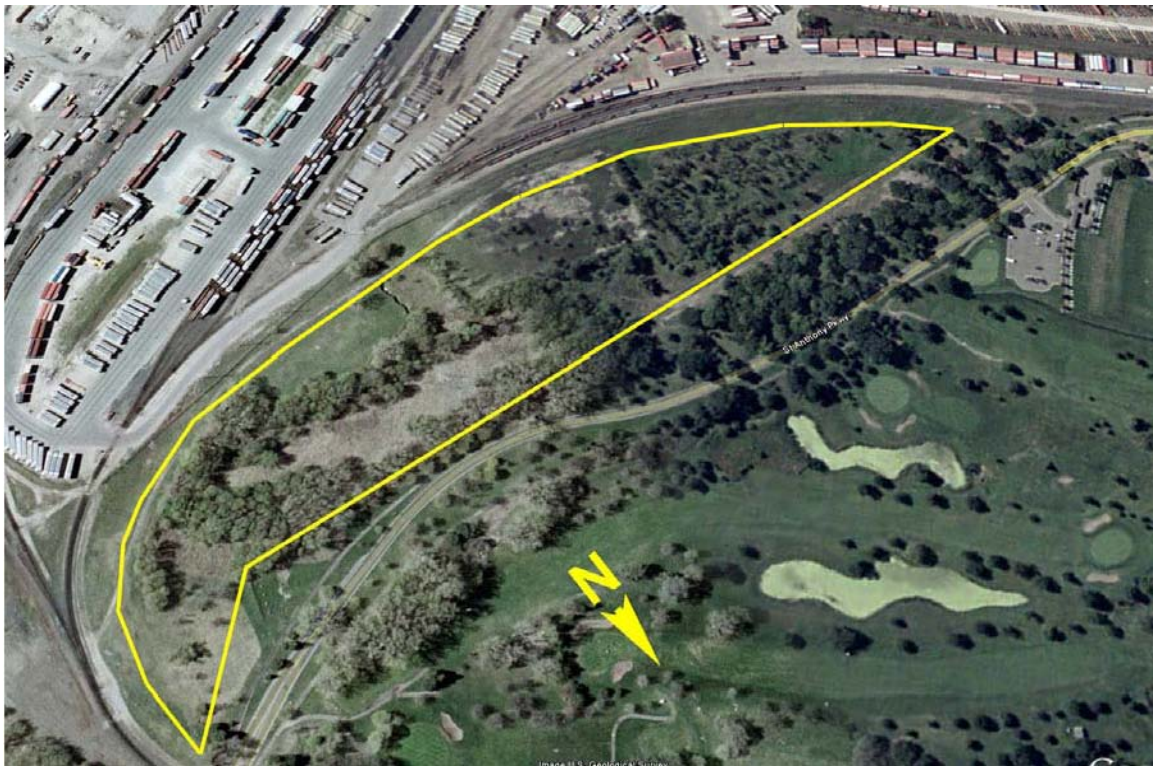
REQUEST FOR DEVELOPMENT PROPOSAL
CP R/E PROJECT MN-HENN-001940

PARKSIDE SITE

SOUTH SIDE OF ST. ANTHONY PARKWAY
WEST OF CENTRAL AVENUE NE

MINNEAPOLIS, MINNESOTA 55418

SUBMISSION DEADLINE – MONDAY JUNE 1, 2009



Canadian Pacific – Real Estate, U.S.
501 Marquette Avenue, Suite 1525
Minneapolis, MN 55402

Contact Nikol Daniels at nikol_daniels@cpr.ca
for issues specific to this RFP
An electronic version of this RFP is available on our website: cpr.ca

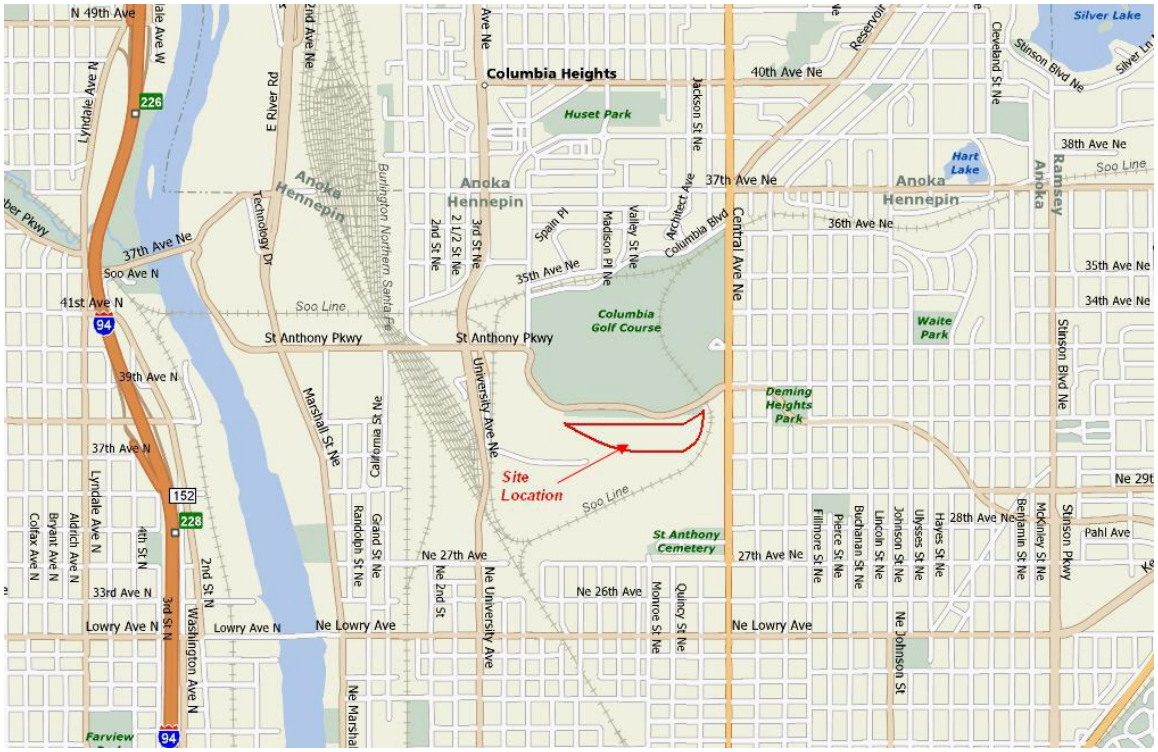
Table of Contents

I. Introduction

Canadian Pacific is seeking development proposals for certain property located on the south side of St. Anthony Parkway, west of Central Avenue NE in Northeast Minneapolis, MN, known as the Parkside Site. Canadian Pacific's development objectives for the property are set forth below.

II. Location

The approximately 18.5 acre property is located on the east side of the Mississippi River, south of St. Anthony Parkway, with the Columbia Park Golf Course and At. Anthony Parkway recreation areas and trail ways to the north. It is in the Columbia Park Neighborhood of Northeast Minneapolis.



III. Site Facts

Land Area
Approximately 18.50 Acres

Zoning
The parcel is zoned I1, Industrial District. This district is very broad and flexible in terms construction guidelines and allowable uses.

Historical
The site is southwest of the Columbia Park Golf Course, which was established in 1919, and is the second oldest golf course in the Minneapolis Park and Recreation Board system.

Access
The property is in close proximity to Hwy I-94, I-694, and I-35W, and the likely future use of the Parkside Site assumes that adequate access to this parcel from St. Anthony Parkway over frontage property owned by the Minneapolis Park Board will be established. Consistent truck traffic use is not allowed on St. Anthony Parkway.

Surrounding Uses/Development
To the south of the property is the Canadian Pacific Intermodal Rail Facility, with other areas around the subject property used for recreation. In addition to the aforementioned golf course, there is an off-leash recreation area, two tennis courts, picnic areas, a rugby field, and areas for archery, skiing, sledding, and tubing.

More information is provided on the MPRB website:
http://www.minneapolisparks.org/default.asp?PageID=4&parkid=260

Public Incentive
In the present economic climate, it appears that long established economic development funding services such as **Tax Increment Financing (T.I.F.)** and **Industrial Revenue Bond Financing (IRB)** may be applicable because they are oriented toward large-scale real estate development, social service provision, and job creation. Other programs that may help in funding the development are **The DEED Sponsored Redevelopment Grant Program**, **Metropolitan Council – Livable Communities Demonstration Account (LCDA)**, **The Common Bond Fund Revenue Bond Program**, and **The Capital Acquisition Loan Program (CAL.)**

Environmental
The site has encompasses a 2.54 acre region that previously was used as a debris landfill. Remediation of this area has been closed, but any activities that disturb the capping will have to manage any landfill materials that might be encountered. Reports detailing the materials encountered and the measures taken to close the site are available for review at Canadian Pacific offices on an appointment basis.IV. Estimated Value / Asking Price

A firm asking price has not been set. The amount offered and the time frame for payment will key considerations to Canadian Pacific in selection of a party to develop this site.

V. Mode of Ownership

Ownership of the site after the development is reasonably flexible and is based on the overall plan of the entire site and corporate approval. Canadian Pacific will consider the creation of a development partnershhip for the planning and development of the site.

VI. Development Goals

Canadian Pacific has initiated this request for development proposal to explore potential uses of the property. Proposals will be evaluated according to how well the plan integrates the use of the site, the activities of the community, and its financial feasibility.

Land Uses

The following land uses are considered opportunities for redevelopment of this site, but should not be considered as strict guidelines, as the redevelopment is not necessarily limited to these ideas:

- Senior Housing
- Mixed Senior Housing and Recreation Center
- Multi-family Residential
- Medium Density Residential
- Rental Housing

Circulation

Vehicular access to and from the site is assumed to be be allowed along St. Anthony Parkway. Access may also be possible from Central Avenue NE, but this would necessitate creating a new street and the assumption of construction costs related thereto.

Other Considerations

In order to properly evaluate all proposals, ideas should include, but should not be limited to:

- Existing zoning considerations
- Street Design
- Circulation
- Parking
- Pedestrian Access
- Sustainable and/or L.E.E.D Design
- Storm Water Management
- Green Space

VII. Proposal Guidelines

Proposal Submission

Proposals must be submitted as follows: four bound copies and one electronic version in Microsoft compatible or PDF format on CD. Proposals must be 20 pages or less and submitted on standard 8 ½" x 11" paper, with supporting materials on paper no larger than 11"x17". Proposals and supporting documentation must be submitted in a sealed envelope labeled **"Shoreham Parkside Site Redevelopment."** Presentation quality proposals can be given in person if invited to do so.

Proposals must be delivered on or before **June 1st, 2009 2:00 p.m. to:**

Canadian Pacific
Attn: Nikol Daniels
501 Marquette Ave, Suite 1525
Minneapolis, MN 55402

Proposals received after deadline will not be accepted. Canadian Pacific will acknowledge receipt of any proposal, and will not be responsible for proposals not received.

Proposal Contents

Proposals must include the items listed below.

- Cover page with the following information:
  - Developer's name and mailing address
  - Name and address of any proposed or potential partnerships
  - Developer's current legal status: corporation, sole proprietor, etc.
  - Contact person's name, title, phone number, fax number and e-mail address
  - Signature of authorized corporate officer for each entity proposing as a partnership or team
- Description of the proposed development including:
  - Narrative
  - Preliminary schematic plans and evaluations
  - Size of buildings and approximate square footage
  - Number of parking spaces
  - Anticipated materials
  - Design style
  - Circulation patterns
  - If commercial or industrial rental, information about the anticipated type of tenants should be provided
- Identification of entities that will be involved, i.e:
  - Developer
  - Architect
  - Building owner / Property Manager
  - Tenant
  - Professional Consultant
- A preliminary capital pro forma showing the detailed sources and uses of funds (debt, equity and other) to acquire the parcel and construct the development. **Note: Staged development and funding will be considered.
- For rental projects, a preliminary operating pro forma of at least 20 years for the building operation, including the assumptions underlying the income and expense projections.

- A description of any public benefits that will result from the development.
- A proposed time frame for the entire project, including time frame break-down for any staged development in the following format:
    - Detail for any stage of development
    - What will occur during each particular stage of development
    - Duration from breaking ground to completion
- Any other information that may be useful in understanding and evaluating the development proposal.

VIII. R.F.P. Inquiries

Any questions and/or requests for access to the site must be made in writing via fax, mail, or e-mail to:

Nikol Daniels
Canadian Pacific
501 Marquette Ave, Suite 1525
Minneapolis, MN 55402
Email: nikol_daniels@cpr.ca
Fax: 612-904-6147

IX. Evaluation Criteria

In reviewing potential development concepts, the following criteria are among those that will be considered:

- Experience and financial and organizational capacity of the developer in successfully planning and completing development projects of similar type and scale, on time and within budget
- The extent to which the project can move forward on an acceptable timetable
- The market and financial feasibility of the project
- Overall quality of the submission
- Review of related previous experience
- Timing and amount of financial benefit to Canadian Pacific.

Canadian Pacific may, in its sole discretion, expand or reduce the criteria upon which it bases its final decisions regarding selection of the developer for this site.

X. Review / Selection Process

Canadian Pacific, along with input from The City of Minneapolis Community Planning and Economic Development (CPED) division will review the proposals. Canadian Pacific and a CPED representative may ask to meet with developers for discussion of more detailed information, possible changes to plans, and/or to negotiate some the terms of the proposed cost or time frame of the project.

Canadian Pacific reserves the right to select any submitted idea (or none) for implementation.