FOURTH FIVE-YEAR REVIEW REPORT FOR **ST. LOUIS RIVER SUPERFUND SITE** ST. LOUIS COUNTY, DULUTH, MN

MINNESOTA POLLUTION CONTROL AGENCY

Prepared by

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List of abbreviations & acronyms

ACM	Activated carbon mat
ARAR	Applicable or Relevant and Appropriate Requirement
CAD	Confined aquatic disposal
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of concern
EM	Environmental media
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
ISRV	Industrial Soil Reference Values
LTM&M	Long Term Monitoring and Maintenance
MPCA	Minnesota Pollution Control Agency
NCP	National Contingency Plan
NPL	National Priorities List
0&M	Operation and Maintenance
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PLP	Permanent List of Priorities
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objectives
RD/RAP	Remedial Design/Response Action Plan
ROD	Record of Decision
SedOU	Sediment Operable Unit
SQG	Sediment Quality Guideline
SLRIDT	St. Louis River/Interlake/Duluth Tar Superfund Site
SOU	Soil Operable Unit
ТВС	To Be Considered
TSOU	Tar Seeps Operable Unit
UU/UE	Unlimited Use and Unrestricted Exposure
U.S. EPA	United States Environmental Protection Agency
USS	U.S. Steel
VOC	Volatile organic compound
yd ³	cubic yard(s)

Executive summary

This report presents the Fourth Five-Year Review performed for the United States Environmental Protection Agency (USEPA) at the St. Louis River Superfund Site (SLR Site), located in Duluth, St. Louis County, Minnesota.

The SLR Site is comprised of two state Superfund sites: U.S. Steel (USS) Site and St. Louis River/Interlake/Duluth Tar (SLRIDT) Site. The Fourth Five-Year Review addresses the following EPA Operable Units (OUs): EPA OU 02 (USS Site); EPA OU 01 (SLRIDT Tar Seep OU or TSOU); and EPA OU 03 (SLRIDT Soil OU or SOU). Although the two state Superfund sites are listed as one on the National Priorities List (NPL), they are separated by a distance of four river miles and they are listed separately on the State of Minnesota's Permanent List of Priorities (PLP).

Both sites are part of the USEPA Deferral Pilot Project and were placed under Minnesota Pollution Control Agency (MPCA) jurisdiction in 1995. The sites have separate project teams, are in different phases of investigation and remedy implementation, have different Responsible Parties (RPs), and different community group interests.

The remedial actions (RAs) performed in the 1990s addressed much of the gross contamination reducing the risk to human health and the environment. However, follow-up actions will be required for most of the completed RAs to ensure short-term and long-term protectiveness is maintained.

The report consists of two volumes. Volume 1 contains the five-year review report for the USS Site. Volume 2 contains the fve-year review report for the SLRIDT Site. Each volume details the issues and recommendations that must be addressed in response to the completed remedies and the protectiveness statements for each OU at the Sites.

Volume 1. Five-year review report for U.S. Steel Former Duluth Works Superfund Site, Duluth, MN

I. Introduction

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The MPCA, as delegated by the USEPA, is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fourth FYR for the U.S. Steel Former Duluth Works Superfund Site. The triggering action for this policy review is the completion date of the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site is designated as OU 02 of the St. Louis River Superfund Site by USEPA. MPCA has further subdivided the site into 18 OUs and several other remedial areas on the basis of waste stream, media impacted, and location at the Site. The OUs are grouped into three main areas, the Coke Plant Management Area, the Coke Plant Settling Basin Management Area, and the Wire Mill Settling Basin Management Area.

Coke Plant Management Area

Contaminated areas associated with the coke plant are referred to as the Coke Plant Management Area and includes the following OUs:

- OU-A (Tar and Tar Contaminated Soil)
- OU-B (Contaminated Water in Tanks and Pipelines)
- OU-C (Solids in Large and Small Gas Holders)
- OU-D (Tar and Coking By-Products in Tanks)
- OU-E (Tar and Coking By-Products in Pipelines)
- OU-F (Polychlorinated Biphenyl [PCB] Liquids)
- OU-G (Ammonium Sulfate)
- OU-H (Lubricants, Paints, Solvents, Fuel Oils)

Coke Plant Settling Basin Management Area

Contaminated water was routed from the settling basin on Steel Creek into the St. Louis River. The contaminated areas that were located within the watershed of Steel Creek were evaluated together and are referred to as the Coke Plant Settling Basin Management Area with the following OUs:

- OU-I (Non-Native Material in Settling Basin)
- OU-J (Tar and Tar Contaminated Soil)
- Area between Operable Units I and J
- OU-K (Dredge Spoil Material)

- OU-L (Creek Channel)
- OU-M (Delta and Creek Channel Area)
- OU-N (Unnamed Creek Estuary)
- OU-O (Spit of Land)
- OU-S (Concrete Disposal Area)

Wire Mill Settling Basin Management Area

Wastes from the "cold side" of the steel plant were discharged directly to the river through a small basin located adjacent to the St. Louis River. The contaminated areas that were located on the cold side were evaluated together and are referred to as the Wire Mill Settling Basin Management Area. OUs associated with the Wire Mill Settling Basin Management Area are as follows:

- OU-P (Wire Mill Pond)
- OU-Q (Dredge Spoil Area)
- OU-R (Wire Mill Pond Delta)

All of the upland OUs with implemented remedial actions will be addressed in this FYR. The OUs consisting of aquatic contaminated sediments will be discussed in this FYR, but will not be thoroughly evaluated. This includes OUs I, L, M, N, P, Q, R, Area between OUs I/J, and the Unnamed Pond. These OUs were removed from the 1995 EPA/MPCA Enforcement Deferral Pilot Project Agreement on February 28, 2018 at the request of the MPCA. EPA will be the lead agency for the contaminated sediment OUs at the Site, and MPCA will be the support agency. In addition, U.S. Steel has entered into a Project Agreement with EPA's Great Lakes National Program Office to conduct remedial action for the contaminated sediment OUs. Remedial design for the selected alternative is underway, and implementation of the remedial action should be completed prior to the next FYR. EPA anticipates that the cleanup for these areas will be protective under CERCLA.

The U.S. Steel Former Duluth Works Superfund Site FYR was led by Erin Endsley of MPCA, Project Manager for the Site. Participants included Mike Bares, MPCA Hydrogeologist, and contractor support from Donovan Hannu and Katie Larson of Bay West. The Potentially Responsible Party (PRP) was notified of the initiation of the five-year review on October 3, 2017. The review began on November 1, 2017.

Site Background

The U.S. Steel Plant Duluth Works Site, a former steel mill and coking operation, is on both the federal National Priorities List (NPL) and the State of Minnesota Permanent List of Priorities (PLP). The upland portion of the Site is approximately 550 acres, and there are also approximately 300 acres of impacted river sediment. It is located 4 miles southwest of the Duluth central business district. As shown in figure 1, the Site is bounded by the neighborhood of Morgan Park to the north, the St. Louis River (also called Spirit Lake) to the east, and CN rail property to the west. The Site is currently undeveloped and vacant, and is zoned for industrial use.

The Site was an integrated steel mill (USX Duluth Works) consisting of coke production, iron and steel making, casting, primary rolling and roughing, hot and cold finishing, and galvanizing. The steel mill and coke production facility operated from 1915 until 1979 and made steel products such as nails, wire, and steel sign posts. In 1979, the blast furnaces, open hearth furnaces, fuel oil storage tanks, and a portion of the rolling mill were demolished. By 1988, the material storage area and most of the remaining buildings were demolished.

The U.S. Steel Site has 18 Operable Units (OU) within the 1989 Record of Decision (ROD) for remedial action, as well several other components that were not identified as OUs (Figure 2). One additional OU was established for the Site as part of the 2013 FYR. Protectiveness Statements were developed for all OUs at the Site.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION			
Site Name: U.S. Steel Form	er Duluth Works, St.	Louis River Superfund Site	
EPA ID: MND039045430			
Region: 5	State: MN	City/County: Duluth, St. Louis County	
		SITE STATUS	
NPL Status: Final			
Multiple OUs? Yes	Has the No	e site achieved construction completion?	
		REVIEW STATUS	
Lead agency: State			
Author name (Federal or State Project Manager): Erin Endsley			
Author affiliation: State Project Manager, MPCA			
Review period: 11/1/2013 - 10/31/2018			
Date of site inspection: 5/10/2018			
Type of review: Policy			
Review number: 4			
Triggering action date: 10/	31/2013		
Due date (five years after t	riggering action dat	<i>e)</i> : 10/31/2018	

II. Response Action Summary

The remedial actions (RAs) performed in the 1990s addressed much of the gross contamination reducing the risk to human health and the environment. However, follow-up actions will be required for most of the completed RAs to ensure short-term and long-term protectiveness is maintained. In addition, remedial actions have yet to be implemented for the majority of the aquatic sediment OUs at the Site.

Basis for Taking Action

At the request of the MPCA, U.S. Steel completed a "Soil and Groundwater Investigation" report in 1981, and a "River Water Quality Impact Investigation" in 1983. In 1982, the Site was inspected by the EPA Field Investigation Team (FIT). Based on the studies and inspections, it was determined polycyclic aromatic hydrocarbons (PAHs) were moving toward and discharging to the St. Louis River via surface water drainage and groundwater discharge to surface water.

In 1983, the MPCA issued a Request for Response Action to U.S. Steel, and executed a Response Order by Consent with U.S. Steel in 1985. The final Remedial Investigation Report was completed in 1986, and identified 18 areas or contaminants that required remediation. The primary human health risks identified included ingestion of contaminated fish and dermal contact with or ingestion of contaminated Site soils. The primary ecological risks included potential impacts to fish and other aquatic organisms in the St. Louis River.

The remedial action objectives in the ROD were as follows:

- Eliminate or minimize contaminant releases to the St. Louis River and Steel Creek flowing into the St. Louis River;
- Control and prevent contact with exposed tar, tar contaminated soils and non-native material; and
- Eliminate contact with contaminants in drums, transformers and buildings.

Response Actions

Coke Plant Management Area (OUs A, B, C, D, E, F, G, H)

The Remedial Action (RA) for many of these areas involved excavation/removal of containerized wastes in drums, tanks, pipelines, etc., and has been completed; however, the ROD did not establish TCLs for soils. The RA for OU-A specified the excavation/removal of the tar, tar-contaminated soil, and coking by-products for use as fuel.

Coke Plant Settling Basin Management Area (OUs I, J, Tar Between I/J, K, L, M, N, O)

The RAs specified for the OUs in the Coke Plant Settling Basin Management Area are as follows:

- OU-J stabilization and solidification of coal tars and tar-contaminated soil.
- OU-I/J tar and tar-contaminated material were to be excavated and used as fuel, or placed with the material in OU-J.
- OU-K placement of a geotextile and a soil top-dressing over dredge spoil material.
- OU-I, OU-L, OU-M, OU-N, OU-O no action, subject to the completion of a PAH-treatability study to examine implementation of alternative and innovative treatment technologies; however, the ROD did not establish TCLs for soils or sediments. No action includes periodic inspections and routine water quality monitoring to verify the long-term effectiveness of the RAs.

Wire Mill Settling Basin Management Area (OUs P, Q, R)

The RA in the ROD for the Wire Mill Settling Basin Management Area specified no action, subject to the completion of a PAH-treatability study to examine implementation of alternative and innovative treatment technologies. No action includes periodic inspections to verify that no significant changes have occurred and routine water quality monitoring to verify the long-term effectiveness of the RAs.

Target Cleanup Levels

The ROD considered target cleanup levels (TCLs) for the main contaminant of concern at the Site, PAHs, for the following media: surface water, ground water, and soil. The TCLs identified for surface water were the lower of Water Quality Criteria for the protection of aquatic life (total cPAHs = $0.069 \ \mu g/l$; total nPAH = $17 \ \mu g/l$). RALs were identified as TCLs for groundwater (total cPAHs = $0.028 \ \mu g/l$; total nPAH = $0.280 \ \mu g/l$). Soil TCLs were discussed in the ROD, but no specific level was identified.

Status of Implementation

Coke Plant Management Area (OUs A, B, C, D, E, F, G, H)

Remediation of all OUs was completed as required by the ROD, other than OU-A. The RA in the ROD for OU-A specified the excavation/removal of the tar, tar-contaminated soil and coking by-products for use as fuel. There are some areas of the Site where these materials are still present. Institutional controls have not been implemented to date.

Coke Plant Settling Basin Management Area (OUs I, J, Tar Between I/J, K, L, M, N, O)

- OU-J the RA for this OU was completed in 1997. Approximately 10,000 cy of coal tar and tarcontaminated soil were solidified in place. This OU is subject to ongoing inspection and maintenance requirements. Institutional controls have not been implemented to date.
- OU-I/J The 2008 FYR concluded that it was not possible to verify if the tar and tar contaminated soils in this area were remediated. In addition, tar balls and oily sheens on the surface water have since been observed seasonally in this area. This OU is subject to ongoing inspection and maintenance requirements. Institutional controls have not been implemented to date.
- OU-K The RA was completed as required by the ROD, which included placement of a geotextile and soil topdressing over the dredge spoil area. This OU is subject to ongoing inspection and maintenance requirements. Institutional controls have not been implemented to date.
- OU-I, OU-L, OU-M, OU-N, OU-O The No Action RA was completed as required by the ROD. However, the PAH treatability study was not completed beyond a literature search. These OUs were included in a Remedial Investigation (2013) and Feasibility Study (2015) conducted by U.S. Steel in partnership with EPA's Great Lakes National Program Office, under the Great Lakes Legacy Act. Remedial design for the selected alternative is underway, and implementation of the remedial action should be completed prior to the next FYR.

Wire Mill Settling Basin Management Area (OUs P, Q, R)

- OU-P The RA in the ROD specified No Action. However, concern regarding the discharge of contaminated water to the river lead to subsequent investigations in 1994 and 1995, with remedy implementation completed by 1997. Approximately 6,500 tons of contaminated non-native material was excavated and disposed off-site. Site restoration included placement of geotextile over remaining contaminated material, and wetland construction. OU-P was also included in the 2013 Remedial Investigation and 2015 Feasibility Study. Remedial design for the selected alternative is underway, and implementation of the remedial action should be completed prior to the next FYR.
- OU-Q and OU-R The No Action RA was completed as required by the ROD. These OUs were also included in the 2013 Remedial Investigation and 2015 Feasibility Study. Remedial design for the selected alternative is underway, and implementation of the remedial action should be completed prior to the next FYR.

Other Remedial Areas Not Included in the 1989 ROD

- OU-S (Concrete Disposal Area) A crushed slag disposal and high pH area has been identified as an issue post-ROD. Soil contamination was identified and high pH values in surface water were recorded entering streams. A Response Action Plan is being developed to address these concerns.
- Unnamed Pond This area was also included in the 2013 Remedial Investigation and 2015 Feasibility Study. Remedial design for the selected alternative is underway, and implementation of the remedial action should be completed prior to the next FYR.

 Petroleum Contamination (Leak Site #18199) – The RA consisted of excavation and thin-spreading and/or land-farming contaminated soil on-site. The work was completed in accordance with the work plans and subsequent sampling and headspace testing of the thin-spread soils indicated the soils were no longer contaminated. Further investigation identified additional contaminated soil from petroleum storage tanks; this soil remains on site and was referred to the MPCA Petroleum Remediation Program (PRP) for investigation and cleanup oversight.

Institutional Controls

The 1989 ROD specified institutional controls for several OUs. However, no ICs have been implemented to date. An IC evaluation is needed to determine what institutional controls need to be implemented, and for what portions of the Site. ICs are needed to ensure the protectiveness of the implemented remedial actions, and to ensure the protectiveness of the upcoming remedial actions.

Systems Operations/Operation & Maintenance

Site-wide inspection, monitoring, and maintenance activities are summarized and submitted annually in an Annual Monitoring and Inspection Report. O&M requirements for the Site have been established through Response Action Approvals for various OUs, a Monitoring Plan from 2000, and from various revisions to the plan and additional requirements added as issues have been identified. These additional requirements have largely been documented as conditions in MPCA approval letters of the Annual Monitoring and Inspection Reports.

Semi-annual groundwater and surface water monitoring is required at the Site. For surface water, results since 2008 have showed PAHs detected above the Evaluation Criteria (TLC for surface water) for one monitoring station, CP-2, located near the OU-I and Tar Between OU-I&J. Groundwater sampling showed a continued zinc exceedence at one monitoring well W-10 over the last five years reported as 120 and 110 micrograms per liter. Check on results.

In the Unnamed Creek area, the berm and cap at OU-J are inspected monthly, and were noted as being in good condition in the 2017 report. Bi-weekly inspection and maintenance of absorbent booms occurs at OU-I/J, and tar blooms are recovered in this area (approximately 1 gallon recovered in 2017).

Tree saplings have been observed growing in the soil cover at OU-K. Annual maintenance of the OU-K cap has included spraying for woody vegetation, application of basal bark herbicide and brush clearing when necessary. No erosion of the cap was noted in 2017.

In the Wire Mill Pond area, inspections in 2017 indicated the area was stable and the vegetation appeared healthy. Bi-weekly inspection and maintenance of absorbent and containment booms at Wire Mill Pond occurred as required.

pH surface water monitoring for the Unnamed Creek and OU-S (concrete disposal area) areas began in 2012 after a new culvert was installed on the northern edge of the property. High pH is associated with the cement slag material and several sampling locations are routinely between pH 11-12.

III. Progress since the last review

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

Table 1: Protectiveness Determinations/Statements from the 2013 FYR

OU #	Protectiveness Determination	Protectiveness Statement		
OU-A	Not Protective	The remedy at OU-A is not protective because of tar pits, tar seeps, tar-contaminated soil, areas with oily liquids, and areas with contaminants exceeding ISRVs throughout the Site (including areas around and under building foundations. In addition, mercury and lead were also identified after the ROD was enacted. Also ICs such as Environmental Covenants and ordinances are needed to protect future users of the Site.		
OU-B	Protective	The remedy at OU-B is protective of human health and the environment, as intended by the ROD. The materials associated with this OU were removed and disposed.		
OU-C	Protective	The remedy at OU-C is protective of human health and the environment, as intended by the ROD. The materials associated with this OU were removed and disposed.		
OU-D	Protective	The remedy at OU-D is protective of human health and the environment, as intended by the ROD. The materials associated with this OU were removed and disposed.		
OU-E	Short-term Protective	The remedy at OU-E currently protects human health and the environment because of the activities conducted to date; however, in order for the remedy to be protective in the long term, an investigation of pipeline and surrounding soils is needed and a response action plan. Also ICs area needed such as Environmental Covenants and ordinances to protect future users of the Site		
OU-F	Protective	The remedy at OU-F is protective of human health and the environment, as intended by the ROD. The materials associated with this OU were removed and disposed.		
OU-G	Protective	The remedy at OU-G is protective of human health and the environment, as intended by the ROD. The materials associated with this OU were removed and disposed.		
OU-H	Protective	The remedy at OU-H is protective of human health and the environment, as intended by the ROD. The materials associated with this OU were removed and disposed.		
OU-I	Not Protective	The remedy at OU-I is not protective because the contaminants present an unacceptable risk to benthic organisms and this area receives contaminants from upgradient sources.		
L-UO	Short-term Protective	The remedy at OU-J currently protects human health and the environment because the contamination remains sequestered; however, in order for the remedy to be protective in the long term, the cover requires monitoring and repair as needed. Also ICs such as Environmental Covenants and ordinances to protect future users of the Site are needed.		
OU-I/J	Not Protective	The remedy at the Area Between OU-I and OU-J is not protective because of reoccurring oil sheens and tar globules; contaminants found present an unacceptable risk to the benthic community.		
OU-K	Short-term Protective	The remedy at OU-K currently protects human health and the environment because of the limited cover installed over the contaminated soil; however, in order for the remedy to be protective in the long term, vegetative control is needed. Also ICs such as Environmental Covenants and ordinances to protect future users of the Site are needed.		
OU-L	Not Protective	The remedy at OU-L is not protective because the contaminants present an unacceptable risk to benthic organisms.		
OU-M	Not Protective	The remedy at OU-M is not protective because the contaminants present an unacceptable risk to benthic organisms.		
OU-N	Not Protective	OU-N is not protective as contamination presents an unacceptable risk to benthic organisms.		
0U-0	Protective	The remedy at OU-O is protective of human health and the environment, as intended by the ROD.		
OU-P	Not Protective	The remedy at OU-P is not protective because free product and oil sheens are visible throughout the wetlands, source material is uncontrolled, and dredge material presents an unacceptable risk to human health.		
OU-Q	Not Protective	The remedy at OU-Q is not protective because free product and oil sheens are visible throughout the wetlands, source material is uncontrolled, and dredge material presents an unacceptable risk to human health.		
OU-R	Not Protective	OU-R is not protective as contamination presents an unacceptable risk to benthic organisms.		
Soil Contaminated by Above and Below Ground Petroleum Storage Tanks	Short-term Protective	Additional soil that is contaminated by above and below ground petroleum storage tanks has been identified at the site. Investigation of this soil is on-going; however, exposures have not been determined.		
OU-S/Concrete Disposal Area	Not Protective	The remedy at the OU-S is not protective because soil with high pH levels exists in soils and surface water. The contamination presents an unacceptable risk to human health		

		risk through contact, inhalation or ingestion of high pH soil. Water with high pH is running off into a stream. The source material is uncontrolled.
Unnamed Pond	Not Protective	The remedy at the Unnamed Pond is not protective because contaminants an
		unacceptable risk to benthic organisms and an oil sneen has been previously observed.

Table 2: Status of Recommendations from the 2013 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date
OU-A	While some excavation has occurred, there are still tar pits, tar seeps, tar- contaminated soil, areas with oily liquids, and areas with contaminants exceeding the Tier 2 ISRVs throughout the Site. In addition, mercury and lead have also been identified after the ROD at concentrations exceeding the Tier 2 ISRVs. All of these areas of soil contamination are designated as OU-A.	Complete assessment of these materials, then develop and implement a remedial action plan.	Ongoing	Some of these areas have been addressed since the last FYR, and others will be addressed by the upcoming sediment remedy.	2023
OU-E	A manhole was identified during site inspection with product in it; soil surrounding this piping has not been assessed.	Remove product and manhole, assess surrounding soil. For any future pipe excavations, evaluate soil to screening levels and remediate as necessary.	Ongoing	Manhole has been abandoned. For any future pipe excavations, evaluate soil to screening levels and remediate as necessary.	2023
OU-I	Contaminants exceed screening criteria; cover material thickness unknown.	Complete feasibility study; implement remedial action.	Ongoing	This area will be addressed by the upcoming sediment remedy.	2023
OU-J	Significant (more than 3') of slumping noted on sidewall of cell.	Develop additional cell stability plan for the side of OU-J adjacent to the creek.	Ongoing	SWPPP inspections completed. This area will be addressed by the upcoming sediment remedy.	2023
0U-I/J	Oil sheens and tar globules observed; contaminants exceed screening criteria.	Inspect and maintain booms. Complete feasibility study; implement remedial action.	Ongoing	SWPPP inspections and boom maintenance ongoing. This area will be addressed by the upcoming sediment remedy.	2023
OU-K	Tree saplings are growing in the soil cover.	Improve vegetation control procedures. Complete feasibility study; implement remedial action.	Ongoing	Annual maintenance ongoing, including herbicide applications and brush clearing.	Ongoing
OU-L	Contaminants present a risk to the benthic community.	Complete feasibility study; implement remedial action.	Ongoing	This area will be addressed by the upcoming sediment remedy.	2023
OU-M	Contaminants present a risk to the benthic community.	Complete feasibility study; implement remedial action.	Ongoing	This area will be addressed by the upcoming sediment remedy.	2023
OU-N	Contaminants present a risk to the benthic community.	Complete feasibility study; implement remedial action.	Ongoing	This area will be addressed by the upcoming sediment remedy.	2023
OU-P	Oil sheens regularly observed in pond.	Complete feasibility study; implement remedial action.	Ongoing	This area will be addressed by the upcoming sediment remedy.	2023
OU-Q	Free product and oil sheens visible throughout wetlands; contaminants present a risk to human health.	Complete feasibility study; implement remedial action.	Ongoing	This area will be addressed by the upcoming sediment remedy.	2023

OU-R	Contaminants present a risk to the benthic community.	Complete feasibility study; implement remedial action.	Ongoing	This area will be addressed by the upcoming sediment remedy.	2023
OU-S/ Concrete Disposal Area	Soil with high pH levels exists and evidence of trespassing, including dust- generating activities such as motorcycling and four-wheeling was noted.	Complete remedial investigation and risk assessment, including for soil with high pH levels, then develop and implement a remedial action plan for these materials as appropriate.	Ongoing	A response action plan for this area is in development.	2023
Unamed Pond	Contaminants present a risk to the benthic community.	Complete feasibility study; implement remedial action.	Ongoing	This area will be addressed by the upcoming sediment remedy.	2023
Utility Structures	A manhole was identified during site inspection with product in it. Other utility structures remain on the site.	Evaluate, remediate and remove.	Complete	All remaining identified manholes have been removed.	
Soils from Tanks	Additional soil has been identified that is contaminated from storage tanks. These investigations are ongoing.	Complete investigations; implement remedial action.	Complete	Leak Site 18199 was approved for closure in August 2018 after excavation of impacted soils.	
Site wide	Signage has improved; however, trespassing was noted during site inspection. Open excavations (especially those with contaminated soil exposed) and manholes represent significant safety issues to trespassers.	Install and maintain fencing around excavations that cannot be backfilled immediately. Replace covers on all open manholes. Improve trespassing controls and signs.	Ongoing	All manholes have been abandoned, and there are no excavations with contaminated soil exposed. Signage and site security have been improved but trespassing continues to be an issue.	2023
Site wide	Institutional controls have not been established to protect future users of the Site.	Establish ICs such as Environmental Covenants	Not complete	Not yet started.	2023

IV. Five-year review process

Community Notification, Involvement & Site Interviews

A public notice was made available by a published notice in the local newspaper, the Duluth News-Tribune, on April 24, May 1, and May 8, stating that there was a FYR and inviting the public to submit any comments to MPCA. The results of the review and the report will be made available at the Site information repository located at the Duluth Public Library, West Duluth Branch, 5830 Grand Avenue, Duluth, MN, and will also be available at are also available at <u>https://www.pca.state.mn.us/waste/st-louisriver-us-steel-superfund-site</u>.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. Interviewees included interested parties impacted by the Site, including nearby residents, owners of businesses located on the Site, and regulatory agencies involved in Site activities or aware of the Site. Interviews were conducted between April 11, 2018 and April 18, 2018. Interviews are summarized in Table 3; documentation of the complete interviews is included in Appendix D.

Table 3: Interview Summary

Interviewee	Organization	Date	Key Comments
Bill Majewski	Former City Planner,	4/11/2018	• Aware of the past problems on the upland portion of the site where the
	Nearby Resident,		MPCA has returned for repairs and adjustments to the cleanup.
	member of St. Louis		• Frustrated with the slow progress of cleanup and redevelopment.
	River Alliance and		• Aware of occasional trespassing, but does not know if any vandalism at the
	Morgan Park		site.
	Community Club		• Feels well informed. Reasonable information is available to the community
			via the five year review process and the MPCA website.
Deb Deluca	Duluth Seaway Port	4/13/2018	• Because the ROD was waste stream based vs. geographically based, closing
	Authority		out the site has taken a long time.
			• The Superfund investigation and cleanup has been a thorough process that
			has had many opportunities for public input.
			• Because the land has been vacant for so long, the community views it as a
			park. Trespassing is an on going problem.
Jim Filby-	City of Duluth	4/18/2018	• The site cleanup has created a cautious sense of hope that a blight on the
Williams			community can be cleanup up and put to good use.
			• Feels it is enormously important to implement the remedy and finish the
			cleanup without delay so that the site is returned to productive use.

Data Review

This five-year review consisted of a review of relevant documents, including O&M records and monitoring data. Documents reviewed are presented in the following Table 4.

Date	Title	General Contents
3/30/2018	2017 Annual Monitoring and Inspection	Summarizes semi-annual surface and groundwater monitoring and site
	Report	inspection events for 2017.
3/31/2017	2016 Annual Monitoring and Inspection	Summarizes semi-annual surface and groundwater monitoring and site
	Report	inspection events for 2016.
3/31/2016	2015 Annual Monitoring and Inspection	Summarizes semi-annual surface and groundwater monitoring and site
	Report	inspection events for 2015.
12/23/2015	Addendum to the Revised Feasibility Study.	Summarizes the updated recommended project alternative (Alternative
	Former Duluth Works and Spirit Lake	8B- Shallow Sheltered Bay with Delta Sediment CDF above OHWL and
	Sediment Site, St. Louis River, Duluth, MN	Upland CDFs)
7/16/2015	Revised Feasibility Study, Former Duluth	Presents remedial alternatives that may be feasible for addressing
	Works and Spirit Lake Sediment Site	potential risks to human health and the environment posed by impacts
		present at both the Duluth Works Site and the Spirit Lake Sediment Site.
3/2/2015	2014 Annual Monitoring and Inspection	Summarizes semi-annual surface and groundwater monitoring and site
	Report	inspection events for 2014.
2/27/2014	2013 Annual Monitoring and Inspection	Summarizes semi-annual surface and groundwater monitoring and site
	Report	inspection events for 2013.
March	Sediment Remedial Investigation Report	Summarizes the results of the sediment investigation conducted under
2013		the Great Lakes Legacy Act.

Table 4: Documents Reviewed

During the last five years, site wide monitoring activities have occurred in accordance with the approved site Monitoring Plan. This includes semiannual surface water and annual groundwater monitoring, and site inspection activities. Surface water and groundwater results have largely been consistent with past results during this time period. Groundwater concentration trends have been stable or decreasing, with the exception of MW-5, which has had fluctuating concentations of various PAHs. MW-10 has also had concentrations of Zinc at or above the evaluation criteria, although the overall trend has been fairly consistent. Site inspection activities have consisted of monthly inspections of OU-J and Wire Mill Pond, recovery of tar blooms in Unnamed Creek, maintenance of the OU-K cap, and sheen and tar inspections and recovery at Wire Mill Pond. These activities will be ongoing until completion of the sediment remedy addresses these issues. A new site wide monitoring plan will be developed at that time.

Additional work during the last five years has been focused on the investigation of the contaminated sediments, and development of remedial alternatives to address the risks to human health and the environment posed by the contaminated sediments. MPCA issued approvals for the Sediment Remedial Investigation Report in 2013 and the Revised Feasibility Study in 2015. U.S. Steel and EPA have since partnered under Great Lakes Legacy Act for design and implementation of the sediment remedy. The remedial design for the project is in progress, and expected to be complete by the end of 2018. Remedy implementation is expected to occur during the 2020-2022 construction seasons.

Site Inspection

The inspection of the Site was conducted on May 10, 2018. In attendance were Erin Endsley (MPCA Project Manager), Mike Bares (MPCA Hydrogeologist), Donovan Hannu and Katie Larson (Bay West), Mark Rupnow (U.S. Steel) and Mary Canino (AECOM). The purpose of this inspection was to assess the protectiveness of the remedy. In addition, the inspection followed up on issues identified during the 2013 Site Inspection.

A summary of key issues noted during the Site Inspection is as follows:

- Site Wide Trespassing: Signage has improved; open excavations and manholes noted during the 2013 FYR have been remedied; bollards, jersey barriers and gates have been improved. However, trespassing was noted during site inspection.
- OU-E: A manhole and pipeline was identified during 2013 FYR site inspection. The manhole (FOSA-2) has been abandoned. The manhole is within Leak Site 18199. A corrective action plan has been submitted and corrective action plan is in progress.
- OU-I: Sediment contamination was noted in the 2013 FYR site inspection. The Feasibility Study is complete and Remedial Design is in progress.
- Area Between OU-I & OU-J: Oil sheens and tar globules observed in the 2013 FYR site inspection; the Feasibility Study is complete and Remedial Design is in progress.
- OU-J: Significant (more than 3') of slumping was noted on sidewall of storage cell in the 2013 FYR site inspection. SWPPP inspections have been completed periodically. Remedial Design has been completed incorporating OU-J stability.
- OU-L and OU-M: Sediment contaminants was noted in the 2013 FYR site inspection. The Feasibility Study is complete and Remedial Design is in progress.
- OU-N and OU-R: Sediment contaminants was noted in the 2013 FYR site inspection. The Feasibility Study is complete and Remedial Design is in progress.
- OU-P: Oil sheens regularly observed in pond noted in the 2013 FYR site inspection. The Feasibility Study is complete and Remedial Design is in progress.
- OU-Q: Free product and oil sheens were noted throughout wetlands in the 2013 FYR site inspection. The Feasibility Study is complete and Remedial Design is in progress.
- OU-S/Concrete Disposal Area: Soil with high pH levels exists and evidence of trespassing, including dustgenerating activities such as motorcycling and four-wheeling, was noted. Unacceptable risk exists from direct contact, inhalation or ingestion of soil with high pH levels. Surface water has high pH and enters Steel Creek. The Concrete Disposal Area Development Response Action Plan is under preparation.

- Other Unnamed Pond: Sediment contamination presents an unacceptable risk to benthic organisms; sheen previously observed in 2013 FYR. Remedial Design is in progress.
- Other Soils Contaminated by Above and Below Ground Petroleum Storage Tanks soil was identified that is contaminated from storage tanks in the 2013 FYR. Soil was excavated from CSHP-A, B and C to levels below MPCA Industrial SRVs. A corrective action plan has been submitted.
- Site Wide: Institutional controls have not been established to protect future users of the Site.

V. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Yes and no. Many of the original remedies for several OUs were removal actions, and those are functioning as intended. Remedies at several other OUs are not functioning as intended. Seven of the nineteen OUs are considered protective. There are no ICs established for the site.

<u>General</u>: Adequate access and institutional controls are not in place to prevent exposure. U.S. Steel has attempted to tighten security by maintaining fences, patrolling, gates, blockades and changes to lessen the attraction to recreational activities. Maintenance of fences, patrolling, gates and jersey barriers must be ongoing to deter trespassing onto the Site, which affects all remedies. Effective Institutional Controls, such as Environmental Covenants, need to be identified and implemented for portions of the site.

<u>Coke Plant Management Area</u>: Evaluations of individual OUs within the Coke Plant Management Area are as follows:

- OU-B through OU-H within the Coke Plant Management Area are functioning as intended by the ROD; however, the remedy for OU-E calls for removal of contaminated soil associated with piping. As additional piping is removed, contaminated soil must be addressed.
- In OU-A, 15 separate areas of tar/fuel and tar-contaminated soil have been noted across the Site. Others may exist in areas not traversed. Tar areas T-10 and T-11 will be addressed during the upcoming sediment remediation. In addition, lead and mercury contamination has been detected during a recent Phase II Investigation, on a 132-acre area encompassing the southern portion of the site. The Duluth Seaway Port Authority has entered into a purchase agreement with U.S. Steel for future commercial/industrial redevelopment of this area. Tar area T-15 is within this area. To date, no Response Action Plan has been submitted for this area. Because impacted soil throughout the site is assigned to OU-A, these areas indicate that the RAs for OU-A have not been completed as intended by the ROD.

<u>Coke Plant Settling Basin Management Area</u>: The ROD specified a no action response for OU-I, OU-L, OU-M, OU-N, OU-O, OU-K, OU-P, OU-Q, and OU-R, subject to the completion of the PAH Treatability Study examining implementation of alternative and innovative treatment technologies. The PAH treatability study consisted only of a literature search. The report concluded that the top-dressing at OU-K and no action at the other OUs were the best alternatives, based upon the lack of demonstrated treatment technologies, adverse site conditions, high cost, lack of site characterization and because of the potential for the adverse environmental impacts associated with a remedial action. The PAH field treatability study was not completed in accordance with the ROD. Since the 1989 ROD, additional actions outside of the ROD were taken at OU-K (1998) and OU-P (1996) due to concerns regarding the ongoing releases to the St. Louis River. In addition, contaminated non-native

sediments in Unnamed Creek (OU-N) have been evaluated as part of a Remedial Investigation and Feasibility Study for contaminated aquatic sediments at the site. Remedial Design for these areas is in progress.

<u>Wire Mill Settling Basin Management Area</u>: Evaluations of individual OUs within the Wire Mill Settling Basin Management Area are as follows:

- OU-P: Sheens were continually observed in the pond; one possible origin of these sheens was found along the sides of the pond. Underlying source materials in OU-P may also be producing sheens. The remedy is not functioning as intended. This area has been evaluated as part of a Remedial Investigation and Feasibility Study for contaminated aquatic sediments at the site. Remedial Design for this area is in progress.
- OU-Q: Oil sheens and free product have been noted throughout the wetlands of OU-Q. Contaminants were detected in the soil, sediment and surface water at concentrations exceeding sediment, soil and surface water and pose an unacceptable risk to human health and the environment. The remedy is not functioning as intended by the ROD. This area has been evaluated as part of a Remedial Investigation and Feasibility Study for contaminated aquatic sediments at the site. Remedial Design for this area is in progress.
- OU-R: This area has been evaluated as part of a Remedial Investigation and Feasibility Study for contaminated aquatic sediments at the site. Remedial Design for this area is in progress.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Question B Summary:

Several concerns have been raised including current land use, new ARARs and TBCs. The MPCA is reviewing the exposure assumptions, toxicity data, and cleanup levels for all media at the Site for the purpose of a ROD Amendment. In summary, the following concerns have been raised:

- A site specific bioactive zone thickness has not been established for the river, creeks and wetland sediments included in the Site. Because these are shallow water environments where aquatic vegetation should grow and harbor a benthic community, an uncontaminated bioactive zone is necessary to be protective, which was not considered in the 1989 ROD. This affects OUs with aquatic environments.
- OU-S/Concrete Disposal Area this area was not included in the original ROD, but does affect
 protectiveness at the site. Soil with high pH levels exists and trespassing, including dust-generating
 activities such as motorcycling and four-wheeling, occurs in this area. Unacceptable risk exists from
 direct contact, inhalation or ingestion of soil with high pH levels. Surface water has high pH and enters
 Unnamed Creek. U.S. Steel is preparing a Concrete Disposal Area Development Response Action Plan to
 address this area.
- Unnamed Pond this area was not included in the original ROD, but does affect protectiveness at the site. Sediment contaminants present an unacceptable risk to benthic organisms, and sheens have previously been observed here. This area has been evaluated as part of a Remedial Investigation and Feasibility Study for contaminated aquatic sediments at the site. Remedial Design for this area is in progress.
- There were no TCLs developed for soil in the 1989 ROD. Previous FYRs presented potential To-Be-Considered (TBCs) based on the MPCA Industrial Soil Reference Values (SRVs). TCLs should be developed

for all contaminants of concern (COCs) as high levels of soil contamination have been found. This issue was raised during the last FYR.

- Exposure to contaminants not addressed in the ROD in several OUs such as mercury, lead, zinc and pH. Non-tar related soil contamination was not included in the ROD and TCLs will be proposed in a ROD amendment.
- Many surface water standards (ARARs) have changed since the 1989 ROD. These issues were raised during the last FYR.
- There are potential land use changes at the site, as the City of Duluth is proposing development of a recreational pedestrian trail along the waterfront at the site, and the Duluth Seaway Port Authority is pursuing a potential redevelopment of the southernmost 132 acres of the site. The proposed changes in future land use will require a re-evaluation of appropriate TCLs for those areas of the site.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No new information has come to light since the last FYR; however, there are still previously discussed issues that have not been addressed. These issues have already been presented in previous portions of this remedy evaluation.

VI. Issues/Recommendations

Issues/Recommendations

OUs without Issues/Recommendations Identified in the Five-Year Review:

OU-B, OU-C, OU-D, OU-F, OU-G, OU-H, and OU-O

Issues and Recommendations Identified in the Five-Year Review:

OU: OU-A	Issue Category: Reme	Issue Category: Remedy Performance				
Issue: While some excavation has occurred, there are still tar pits, tar seeps, tar-contami soil, areas with oily liquids, and areas with contaminants exceeding the Industrial SRVs throughout the Site. In addition, mercury and lead have also been identified after the RC concentrations exceeding the Industrial SRVs. All of these areas of soil contamination are designated as OU-A.				ar seeps, tar-contaminated the Industrial SRVs lentified after the ROD at pil contamination are		
	Recommendation: Some areas will be addressed during the upcoming sediment remedy, and others will be addressed as part of a Response Action at the Duluth Seaway Port Authority subject area. Others will need to be addressed through future remedial actions.					
Affect Current Protectiveness	Affect Future ProtectivenessParty ResponsibleOversight PartyMilestone Date					
Yes	Yes	PRP	State	2023		

OU: OU-E	Issue Category: Remedy Performance

	Issue: A manhole was identified during the 2013 site inspection with product in it, and has since been removed. Soil surrounding this piping has not been removed.Recommendation: For any future pipe excavations, evaluate soil to screening levels and remediate as necessary.						
Affect Current Protectiveness	Affect Future Party Responsible Oversight Party Milestone Date Protectiveness						
No	Yes	es PRP State 2023					

OU: OU-I	Issue Category: Remedy PerformanceIssue: Contaminants exceed screening criteria; cover material thickness unknown. However, aFeasibility Study has been completed for this area and remedial design of the proposed sedimentresponse action is in progress.					
	Recommendation: Implement the proposed response action.					
Affect Current Protectiveness	Affect Future Party Responsible Oversight Party Milestone Date Protectiveness					
Yes	Yes	PRP	EPA	2023		

OU: OU-I/J	Issue Category: Remedy Performance					
	Issue: Oil sheens and tar globules observed; contaminants exceed screening criteria. A Feasibilit Study has been completed for this area and remedial design of the proposed sediment response action is in progress.					
	Recommendation: Implement the proposed response action. Continue to inspect and maintain booms until response action implementation is complete.					
Affect Current Protectiveness	Affect FutureParty ResponsibleOversight PartyMilestone DateProtectiveness					
Yes	Yes	PRP	EPA	2023		

OU: OU-J	Issue Category: Remedy Performance Issue: Significant (more than 3') of slumping noted on sidewall of cell. Stability plans for the side of OU-J adjacent to the creek have been incorporated into the remedial design for the proposed sediment response action.						
	Recommendation: Implement the proposed response action.						
Affect Current Protectiveness	Affect Future Party Responsible Oversight Party Milestone Date Protectiveness						
Yes	Yes	'es PRP EPA 2023					

OUs: OU-L, OU-M,	Issue Category: Remedy Performance
OU-N, OU-R	Issue: Contaminants present a risk to the benthic community. A Feasibility Study has been completed for this area and remedial design of the proposed sediment response action is in progress.

	Recommendation: Implement the proposed response action.					
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date		
Yes	Yes	PRP	EPA	2023		

OU: OU-P	Issue Category: Remedy Performance				
	Issue: Oil sheens regularly observed in pond. A Feasibility Study has been completed for this area and remedial design of the proposed sediment response action is in progress.				
	Recommendation: Implement the proposed response action. Continue to inspect and maintain booms until response action implementation is complete.				
Affect Current Protectiveness	Affect Future Party Responsible Oversight Party Milestone Date Protectiveness				
Yes	Yes	PRP	EPA	2023	

OU : OU-Q	Issue Category: Remedy Performance				
	Issue: Free product and oil sheens visible throughout wetlands; contaminants present a risk to human health. A Feasibility Study has been completed for this area and remedial design of the proposed sediment response action is in progress.				
	Recommendation: Implement the proposed response action. Continue to inspect and maintain booms until response action implementation is complete.				
Affect Current Protectiveness	Affect Future Party Responsible Oversight Party Milestone Date Protectiveness				
Yes	Yes	PRP	EPA	2023	

OU: OU-S/Concrete	Issue Category: Changed Site Conditions				
Disposal Area	Issue: This area was not included in the original ROD, but does affect protectiveness at the site. Soil with high pH levels exists and trespassing, including dust-generating activities such as motorcycling and four-wheeling occur at this area. Unacceptable risk exists from direct contact, inhalation or ingestion of soil with high pH levels, and surface water has high pH and enters Unnamed Creek. U.S. Steel is preparing a Concrete Disposal Area Development Response Action Plan to address this area.				
	Recommendation: Develop and implement the response action plan.				
Affect Current Protectiveness	Affect FutureParty ResponsibleOversight PartyMilestone DateProtectiveness				
Yes	Yes	PRP	State	2023	

OU: Unnamed Pond	Issue Category: Changed Site Conditions				
	Issue: This area was not included in the original ROD, but does affect protectiveness at the site. Sediment contaminants present an unacceptable risk to benthic organisms, and sheens have previously been observed here. This area has been evaluated as part of a Remedial Investigation				

	and Feasibility Study for contaminated aquatic sediments at the site. Remedial Design for this areas is in progress. Recommendation: Implement the proposed response action.				
Affect Current Protectiveness	Affect Future Party Responsible Oversight Party Milestone Date Protectiveness				
Yes	Yes	PRP	EPA	2023	

OU: Sitewide	Issue Category: Site Access/Security Issue: Signage has improved; however, trespassing was noted during site inspection and was reported during interviews.					
	Recommendation: Continue maintaining trespassing controls and signs.					
Affect Current Protectiveness	Affect Future Party Responsible Oversight Party Milestone Date Protectiveness					
Yes	Yes	PRP	State	2023		

OU: Sitewide	Issue Category: Institutional Controls			
	Issue: Institutional controls have not been established to protect future users of the Site.			
	Recommendation: Identify and implement effective Institutionals Controls, such as Environmental Covenants, for appropriate areas of the site.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	2023

VII. Protectiveness statements

	Protectiveness Statement	
<i>Operable Units:</i> OU-B, OU-C, OU-D, OU-F, OU- G, OU-H, OU-O	<i>Protectiveness Determination:</i> Protective	
Protectiveness Statement: The remedies at OU-B, OU-C, OU-D, OU-F, OU-G, OU-H and OU-O are protective of human health and the environment, as intended by the ROD. The materials associated with these OUs were removed and disposed.		

Protectiveness Statement		
Operable Unit: OU-A	Protectiveness Determination: Not Protective	
Protectiveness Statement:		

The remedy at OU-A is not protective because of tar pits, tar seeps, tar-contaminated soil, areas with oily liquids, and areas with contaminants exceeding Industrial SRVs throughout the Site (including areas around and under building foundations. In addition, mercury and lead were identified after the ROD was enacted. ICs such as Environmental Covenants and ordinances are also needed to protect future users of the Site.

Protectiveness Statement

Operable Unit:	Protectiveness Determination:
OU-E	Short-term Protective

Protectiveness Statement:

The remedy at OU-E currently protects human health and the environment because of the activities conducted to date; however, in order for the remedy to be protective in the long term, an investigation of pipelines and surrounding soils is needed and a response action plan. ICs such as Environmental Covenants and ordinances are also needed to protect future users of the Site.

Protectiveness Statement			
<i>Operable Unit:</i> OU-I	Protectiveness Determination: Not Protective		
Protectiveness Statement:			

The remedy at OU-I is not protective because of the contaminants present an unacceptable risk to benthic organisms and this area receives contaminants from upgradient sources. This OU is incorporated into the upcoming sediment response action.

	Protectiveness Statement
<i>Operable Unit:</i> Area Between OU-I and OU-J	Protectiveness Determination: Not Protective
Protectiveness Statement:	

The remedy at the Area Between OU-I and OU-J is not protective because of reoccurring oil sheens and tar globules, and contaminants found present an unacceptable risk to benthic community. This area is incorporated into the upcoming sediment response action.

Protectiveness Statement

Operable Unit:	Protectiveness Determination:
OU-J	Short-term Protective

Protectiveness Statement:

The remedy at OU-J currently protects human health and the environment because the contamination remains sequestered; however, in order for the remedy to be protective in the long term, the cover requires monitoring and repair as needed. This OU is incorporated into the upcoming sediment response action. ICs such as Environmental Covenants and ordinances are also needed to protect future users of the Site.

Protectiveness Statement			
Operable Unit:	Protectiveness Determination:		
OU-K	Short-term Protective		

Protectiveness Statement:

The remedy at OU-K currently protects human health and the environment because of the limited cover installed over the contaminated soil; however, in order for the remedy to be protective in the long term, ongoing vegetative control is needed. ICs such as Environmental Covenants and ordinances are also needed to protect future users of the Site.

Protectiveness Statement Operable Units: Protectiveness Determination: OU-L, OU-M, OU-N, OU-R Not Protective Protectiveness Statement: Vertice Statement:

These OUs are not protective as contamination presents an unacceptable risk to benthic organisms. These OUs are incorporated into the upcoming sediment response action.

Protectiveness Statement			
<i>Operable Units:</i> OU-P and OU-Q	Protectiveness Determination: Not Protective		
Protectiveness Statement:			

The remedy at these OUs is not protective because free product and oil sheens are visible throughout the wetlands, source material is uncontrolled and dredge material presents an unacceptable risk to human health. These OUs are incorporated into the upcoming sediment response action.

Sitewide Protectiveness Statement

Protectiveness Determination: Not Protective

Not i lotective

Protectiveness Statement:

In order for the site to be protective, the proposed response action for the aquatic sediment operable units needs to be implemented. Also, for the implemented remedies to be protective in the long term, ICs are needed.

VIII. Next Review

The next FYR report for the U.S. Steel Former Duluth Works, St. Louis River Superfund Site is required no less than five years from MPCA's signature date of this review.

Appendix A – Reference List

AECOM, 2015 Annual Monitoring and Inspection Report, Former U. S. Steel Duluth Works Site, March 2016

AECOM, 2016 Annual Monitoring and Inspection Report, Former U. S. Steel Duluth Works Site, March 2017

AECOM, 2017 Annual Monitoring and Inspection Report, Former U. S. Steel Duluth Works Site, March 2018

Barr Engineering, Sediment Remedial Investigation Report, Great Lakes Legacy Act Project, Spirit Lake Sediment Site, Former U. S. Steel Duluth Works, Saint Louis River, Duluth, Minnesota, March 2013

Barr Engineering, Revised Feasibility Study, Former Duluth Works and Spirit Lake Sediment Site, July 2015

Barr Engineering, Addendum to the Revised Feasibility Study, Former Duluth Works and Spirit Lake Sediment Site, St. Louis River, Duluth, MN, December 2015

URS, 2013 Annual Monitoring and Inspection Report, Former U. S. Steel Duluth Works Site, February 2014

URS, 2014 Annual Monitoring and Inspection Report, Former U.S. Steel Duluth Works Site, March 2015

Appendix B – Site Figures

Figure 1. USS Site Location Map, U.S. Steel 5 Year Review, Bay West, March 2018Figure 2. USS Operable Units/Areas of Concern, U.S. Steel 5 Year Review, Bay West, March 2018Figure 3. USS Photo Location Map, U.S. Steel 5 Year Review, Bay West, March 2018





Figure 2 USS Operable Units / Areas of Concern US Steel 5 yr Review

Date Drawn/Revised: 3/6/2018 Project No. J170684

	NEW DISCHARGE WITH A STREET AND A
	(DL-1) - Demolition Landfill No. 1
	(DL-2) - Demolition Landfill No. 2
	(DL-3) - Demolition Landfill No. 3
	(HG) - Mercury Cleanup
	(OU-A) - Tar & Tar Contaminated Soil
	(OU-B) - Contaminated Water In Tank & Pipelines
	(OU-C) - Soilds in Large & Small Gas Holders
	(OU-D) - Tar & Coking By Products in Tanks
	(OU-E) - Tar & Coking By Products in Pipeline
	(OU-F) - PCB Liquids
	(OU-G) - Sulfate Storage Room
	(OU-H) - Lubricants, Paints, Solvents, Fuel Oil, Water, Metal Shavings
	(OU-I) - Non-Native Material in Settling Basin
	(OU-J) - Tar & Tar Contaminated Soils
	(OU-K) - Dredge Spoil Material
	(OU-L) - Stream Channel
	(OU-M) - Delta & Stream Channel Area
	(OU-N) - Unnamed (Steel) Creek Estuary
	(OU-O) - Spit Of Land
	(OU-P) - Wire Mill Pond
	(OU-Q) - Dredge Spoil Area
	(OU-R) - Wire Mill Pond Delta
	(OU-S) - Crushed Slag
	(AST-UST) Soil Contaminated By Above And Below Ground Petoleum Tanks
	(Tar Between I&J) - Tar & Tar Contaminated Soil in the Coke Plant Settling Basin Located Between (But not included in) OU-I&J
-	Coke Plant Settling Basin Management Area
	Wire Mill Settling Basin Management Area
	Land OU's Including Coke Plant Managment Area
	Areas of Concern
	NOTE: All Soil On Site is OU-A





Appendix C – Site Inspection Photos



1a: OU-J: Areas of slumping noted in 2013. No issues noted.



1c: OU-J: Areas of slumping noted in 2013. No issues noted.



1b: OU-J: Areas of slumping noted in 2013. No issues noted.



2: OU-S: No change from 2013.



3 OU-S: No change from 2013.



5: OU-K: Vegetation control area from 2013.



4 OU-S: Isolated areas of iron material, slated for treatment and disposal.



6a: OU-A: Tar pits, trench and fuel oil storage area remediated since 203.



6b:: OU-A: Tar pits, trench and fuel oil storage area remediated since 203.



7: OUA: Manhole removed since 2013 inspection.



6c: OU-A: Tar pits, trench and fuel oil storage area remediated since 203.



8: Improved site securing since 2013.



9a: OU-A: Manhole removed since 2013.



9c: OU-A: Manhole removed since 2013.



9b: OU-A: Manhole removed since 2013.



9d: OU-A: Manhole removed since 2013.



10: OU-A: Manhole removed since 2013.



11: Main gate: Access control improved since 2013.

Appendix D – Interview Record

Interview	Information Sought
Community Representatives*	 members of the community may provide a broader view of site activities and issues than can be obtained during the site inspection
Nearest Neighbors	 neighbors may provide insight into the enforcement of institutional controls, changes in land use, trespassing, and unusual or unexpected activity at the site

Interview		Information Sought
State Contacts (including those responsible for State water quality, hazardous waste, and	-	changes in State laws and regulations that may impact protectiveness
environmental health issues)	-	whether the site has been in compliance with permitting or reporting requirements
	-	information on site activities, status, and issues
Local Authorities (such as police, emergency response or fire departments, and local environmental or planning offices)	_	status of institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed, and unusual activities at the site

INTERVIEW DOCUMENTATION FORM

The following is a list of individuals interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

		Morgan Park Community Club and St. Louis River	04/44/2040
	Resident	Alliance	04/11/2018
Name	Title/Position	Organization	Date
Deb Deluca	<u>Government &</u> <u>Environmental Affairs</u> <u>Director</u> Title/Position	<u>Duluth Seaway Port</u> <u>Authority</u> Organization	<u>4/13/2018</u>
Name		Organization	Date
	_ <u>Director of Public</u>		
Jim Filby Williams	Administration	City of Duluth	4/18/2018
Name	Title/Position	Organization	Date

INTERVIEW RECORD					
Site Name: USS	Site ID Number:				
Subject: 4th Five-Year Review	Date: 4/11/2018				
Type: <u>Visit</u>	Incoming Outgoing				
Contact Made By:					
Name: Kathryn Larson	Organization: Bay West, Inc.				
Title: Project Manager					
Individual Contacted:					
Name: Bill Majewski		Organization: Neighborhood resident, President of the Morgan Park Community Club and Chair of the St. Louis River Alliance			
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Titl	e:				
Tel	ephone Number: 218-626-2638	Street Address: 834 87 th Ave W			
E-N	1ail Address:	City, State, Zip: Duluth, MN 55808			
Sur	nmary of Conversation				
1.	What is your overall impression of the project? (general sentiment)			
	Bill has been a resident in the community since 1972 and has watched progress on the site since USS ceased operations to present. On the upland portion of the site, he is aware of past problems where the MPCA has returned for repairs and adjustments to the cleanup. Overall, he is frustrated with the slow progress of cleanup and redevelopment				
2.	What effects have site operations had on the sur	rounding community?			
	Bill is not aware of negative effects of the investi	gation and cleanup to the surrounding community.			
3.	Are you aware of any community concerns regar details?	ding the site or its operation and administration? If so, please give			
	The site is gated off and there is no access to the site by the community, so there are no community concerns regarding the site or its operation and administration.				
4.	Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.				
	Bill is aware of occasional trespassing on the site, but there has been no vandalism as a result of the trespassing that he is aware of.				
5.	Do you feel well informed about the site's activit	ies and progress?			
	Bill is on a stakeholder list as part of the St. Louis River Alliance, so he feels he is well informed. Reasonable information is available to the community via the five year review process and the MPCA web site.				
6.	5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?				
	No additional comments.				
7.	Do you have any other concerns or comments about the site?				
	No additional concerns.				

INTERVIEW RECORD					
Site Name: USS	Site ID Number:				
Subject: 4th Five-Year Review	Date: 4/13/2018				
Type: Telephone	Incoming Outgoing				
Contact Made By:	Contact Made By:				
Name: Kathryn Larson	Organization: Bay West, Inc.				
Title: Project Manager					
Individual Contacted:					
Name: Deb Deluca	Organization: Duluth Seaway Port Authority				
Title: Government & Environmental Affairs Director					
Telephone Number: (218) 727-8525	Street Address: 1200 Port Terminal Drive				
E-Mail Address: ddeluca@duluthport.com	City, State, Zip: Duluth, MN 55802				
Summary of Conversation					

- What is your overall impression of the project? (general sentiment) The ROD was implemented early in the process. Because the ROD is waste stream based vs. geographically based, closing it out has been a challenge. Though the process has taken a long time, it has been a thorough process that has allowed for public input.
- 2. What effects have site operations had on the surrounding community?

Because the land has been vacant for so long, the community views the area as a park.

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details?

Not aware of concerns, other than the historic railroad wanting to continue to use the land.

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

It is obvious from site visits that trespassing is occurring.

- Do you feel well informed about the site's activities and progress?
 Information is available via public information meetings and on the website.
- 6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? No comments.
- 7. Do you have any other concerns or comments about the site?

Deb hopes that Superfund cleanup occurs quickly so the land is available for redevelopment.

INTERVIEW RECORD				
Site Name: USS	Site ID Number:			
Subject: 4th Five-Year Review	Date: 4/18/2018			
Type: Telephone	Incoming Outgoing			
Contact Made By:				
Name: Kathryn Larson	Organization: Bay West, Inc.			
Title: Project Manager				
Individual Contacted:				
Name: Jim Filby Williams	Organization: City of Duluth			
Title : Director of Public Administration				
Telephone Number: 218-730-5000	Street Address: 411 W 1st Street			
E-Mail Address: jfwilliams@duluthmn.gov	City, State, Zip: Duluth, MN 55802			
Summary of Conversation				

- What is your overall impression of the project? (general sentiment) Jim has observed steady progress on the project to a satisfactory remedy.
- 2. What effects have site operations had on the surrounding community?

The site cleanup has created a cautious sense of hope that a blight on the community could be cleaned up and put to good use.

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details?

Jim has seen significant mixed feelings from long-time residents about the slag point component of the remedy.

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Jim has seen evidence of trespassing on his visits to the sites including ATV tracks. He is concerned about damage to the site from ATV access. But has no other specific concerns regarding trespassing.

- Do you feel well informed about the site's activities and progress?
 He is well informed about site activities through the MPCA website.
- 6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? No comments.
- Do you have any other concerns or comments about the site?
 Jim feels it is enormously important to implement the remedy and finish the cleanup without delay so that the site is returned to productive use.

Appendix E – Site Chronology and Background

E.1 Site Chronology

Event	Date
Beginning of US Steel operations	1915
Contaminants were found while a survey was conducted by Minnesota State Board of Health, the	1020
Minnesota Commission of Game and Fish, and Wisconsin State Board of Health.	1929
Coke plant basin was constructed.	1954
Survey conducted by Minnesota Pollution Control Agency (MPCA) found high Biological Oxygen Demand	1973
(BOD), high pH, and high concentrations of phenols, cyanide, and ammonia in coke plant basin.	1973
Steel making activities stopped.	1975
MPCA requested hydrogeological study of the USS site (Site).	1979
Coke plant operations stopped.	1979
Old basement full of oily waste found and excavated out-of-state shortly after.	1981
Site was inspected by the United States Environmental Protection Agency (USEPA)	1982
Site was placed on the National Priorities List (NPL) under Comprehensive Environmental Response,	1092
Compensation and Liability Act (CERCLA).	1985
A Request for Response Action (RFRA) was issued.	1983
Site was placed on the Minnesota Permanent List of Priorities (PLP).	1984
Response Order By Consent (Consent Order) between USS and the State of Minnesota was approved by MPCA.	1985
Final phase of Remedial Investigation (RI) began.	1985
The wire mill discontinued operations.	1986
The Record of Decision (ROD) was signed.	1989
Remedial construction began on the coke plant.	1989
Clean up and demolition of the coke plant and appurtenant facilities was completed.	1992
A free liquid mercury spill that was under a meter storage shed was reported and cleaned up.	1992
Response Action Plan (RAP) for implementing the remedy at OU-J was submitted to the MPCA.	1996
RAP for implementing the remedy at the wire mill pond (OU-P) was prepared and submitted.	1996
Solidification of OU-J was started and completed.	1997
Field activities on the OU-P were completed, as required in the RAP.	1997
The wire mill was removed.	1999
Underground coke oven gas lines were removed.	1999
Remedial work on the slumps that developed in OU-J perimeter berm adjacent to Steel Creek was completed.	2001
First Five-Year Review was completed.	2003
Five-Year Review Recommendation Implementation Report.	2005
Minnesota Power installation of seven power line towers on-site.	2005
Installation of slope stability stakes in OU-J.	2007
Monitoring and site inspection activities.	Annual
Second Five-Year Review was completed.	2008
QAPP and Investigation Workplan for estuary sediments was prepared.	2011
Supplemental Five-Year Review Investigation Report was prepared in response to MPCA comments from	2011
Second Provented Review.	
Supplemental Five-Year Review Investigation Report.	2012
First Remedial Investigation completed for estuary sediments.	2012
Workplan for Final Feasibility Study for estuary sediments prepared.	2012

Continued creek monitoring reports		
SAP for additional estuary sediment investigation was prepared	2012	
Phase II Investigation of 132 acres of upland property conducted	2012	
Remedial Investigation completed for estuary sediments		
Feasibility Study completed and approved		
Remedial Design for sediment response action commenced		
Project Agreement for \$75 million Great Lakes Legacy Act Project sediment cleanup		

E.2 Background

General

The Site is bounded by the residential and light-industrial neighborhood of Morgan Park to the north, the St. Louis River (also called Spirit Lake in this area) to the east, and Duluth Missabe and Iron Range Railroad property to the west and south. The site covers approximately 500 acres of land and 300 acres of sediment. Parts of the site are steep and hilly. A stream drains the northern part of the site near the former coke plant and empties into the St. Louis River.

The St. Louis River and estuary is the largest tributary on the U.S. side of Lake Superior, the largest freshwater lake by area in the world, providing a wealth of natural resources. Resource management goals for the estuary are to protect, preserve, restore, and enhance natural resources, and to provide opportunities for public use for this and future generations. More specifically, natural resource managers have identified priority needs of conserving and enhancing near shore shallow water fishery habitat, nesting and rearing habitat for shorebirds, and wetlands.

Site Geology

A U.S. Geological Survey (USGS) topographic map (USGS – West Duluth, 1954 – Photo revised 1969) indicates the Site elevation ranges from 600 to 670 (National Geodetic Vertical Datum of 1929) feet above mean sea level (amsl). The majority of the Site is fairly flat, and sits on a bluff above the St. Louis River and Steel Creek. Surface storm water at the Site drains to Steel Creek and to the St. Louis River. Steel Creek flows in a northeasterly direction.

The majority of the Site rests on thick lacustrine silt and clay deposits associated with Glacial Lake Duluth (USGS, 1979; MGS, 1982). A subsequent period of lower lake levels in the ancestral Lake Superior resulted in deep incising of these lake deposits by both Steel Creek and St. Louis River. As lake levels rose to current surface evaluations, approximately 200 feet of reworked glacial sediments were deposited under these surface water bodies. The bedrock geology of the Site consists of the Duluth Complex; a complex of early Precambrian rocks that include multiple intrusions of gabbroic anorthosite, troctolite, gabbro, anorthosite and felsic rocks (Sims, 1970).

Fill material encountered during subsurface investigation at the Site consists of sand, clay, gravel, cinders, fragments, and other materials. The characteristics and depth of the fill material vary throughout the Site. While fill depths are restricted to a few feet over most of the Site, portions of the bluff area south of Steel Creek have been historically extended with 30 to 40 foot layers of fill. The native soils present beneath the fill material generally consist of deposits of sandy and clayey soil layers.

The Site is underlain by two distinct Quaternary hydrogeologic units (Barr, 1981). Groundwater monitoring wells installed in the main upland area show the water table at elevations of 620 to 625 feet within 1000 feet of the riverbank, with the water table sloping steeply toward the river (Geraghty and Miller, 1995). An upward vertical hydraulic gradient exists at most areas of the Site. The upward vertical hydraulic gradient and Site-specific geological conditions cause seeps and artesian flow at several locations along the lower portion of the Site near

the river. The upward vertical hydraulic gradient also creates the potential for groundwater to dis-charge into Steel Creek.

Land and Resource Use

The Site was an integrated steel mill (USX Duluth Works) consisting of coke production, iron and steel making, casting, primary rolling and roughing, hot and cold finishing, and galvanizing. The steel mill and coke production facility operated from 1915 until 1979 and made steel products such as nails, wire, and steel sign posts. In 1979, the blast furnaces, open hearth furnaces, fuel oil storage tanks, and a portion of the rolling mill were demolished. By 1988, the material storage area and most of the remaining building were demolished.

The Site is currently owned and managed by US Steel Realty and remains unused. Access is marginally restricted by a main gate at the entrance to the property and a few posted no trespassing signs. The Site is bounded on the west by the DM&IR Railroad. A former USS cement plant was located to the west of the Site which has recently been purchased and is under redevelopment. The area to the northwest is primarily industrial land use, which includes a gravel mining operation. Areas further northwest are primarily undeveloped due to steep grades. The area to the north is residential. Areas west and southwest of the Site are residential or undeveloped.

History of Contamination

In its 64 years of operation, the mill produced a variety of solid, semi-solid and liquid wastes. Contaminated areas associated with the coke plant are referred to as the Coke Plant Management Area.

The mill discharged a variety of wastes to portions of the surrounding land surface and into waterways. Steel Creek flows through the northern portion of the Site and discharges to the St. Louis River. During operations at the site, much of the waste from the coke plant and the "hot side" of the steel plant were discharged to a settling basin formed by a control structure in the stream. Contaminated water was routed from the settling basin on Steel Creek into the St. Louis River. The contaminated areas that were located within the watershed of Steel Creek were evaluated together and are referred to as the Coke Plant Settling Basin Management Area.

Wastes from the "cold side" of the steel plant were discharged directly to the river through a small basin located adjacent to the St. Louis River known as the Wire Mill Settling Basin. The contaminated areas that were located on the cold side were evaluated together and are referred to as the Wire Mill Settling Basin Management Area

Initial Response Pre-Record of Decision

In 1979, the MPCA requested a hydrogeological study of the Duluth Works Site. In response to this request, USS submitted two reports - one titled "Soil and Ground Water Investigation," in 1981, and one titled "River Water Quality Impact Investigation", in 1983. In 1982, the USEPA Field Investigation Team inspected the Site. Based on the studies and inspection it was revealed that polycyclic aromatic hydrocarbons (PAH) compounds were moving toward and being discharged to the St. Louis River by the routes of both surface water drainage and ground water flowing beneath the Site.

The Site was placed on the National Priorities List (NPL) under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1983. On October 3, 1983, USS received a Request for Response Action (RFRA) from the MPCA for the Site. The Site was placed on the State of Minnesota's Superfund listing in 1984. The MPCA executed a Consent Order with US Steel Corporation, a division of USS Corporation, on March 26, 1985. During the summer of 1985, the final phase of the Remedial Investigation (RI) began. The RI included completion of more than 150 soil borings and test holes, chemical analysis of more than 50 soil and sediment samples, installation and monitoring of 13 piezometers and monitoring wells, and monitoring of two seeps and four surface water stations. The MPCA Commissioner signed a ROD in February 1989 that set forth the clean-up actions USS needed to take.

Basis for Taking Action

The RI characterized the contaminants and contaminated areas of the Site as identified in the Consent Order. The RI identified 18 areas that required remediation. The ROD delineated 18 Operable Units (OUs) for remediation, as well several other components that were not identified with those OUs. Since then, two additional OUs have been established for the Site.

The primary potential impact of the on-site contamination, including PAH compounds, was to the St. Louis River. The most significant contaminant pathways were surface flow to the St. Louis River by Steel Creek flowing through the Coke Plant Settling Basin Management Area in the northern portion of the Site and/or flow from the Wire Mill Settling Basin Management Area in the southern portion of the Site.

Remedial Actions

The RA objectives in the ROD were as follows:

- Eliminate or minimize contaminant releases to the St. Louis River and Steel Creek flowing into the St. Louis River;
- Control and prevent contact with exposed tar, tar contaminated soils and nonnative material; and
- Eliminate contact with contaminants in drums, transformers and buildings.

The ROD presented a wide variety and large number of alternatives to deal with the various re-leases or potential releases. The alternatives were divided in the following categories:

- Coke Plant Management Area;
- Coke Plant Settling Basin Management Area; and
- Wire Mill Settling Basin Management Area.

The management areas will be presented in this report in a similar format.

Coke Plant Management Area:

The Coke Plant Management Area includes the following OUs:

- OU-A (Tar and Tar Contaminated Soil)
- OU-B (Contaminated Water in Tanks and Pipelines)
- OU-C (Solids in Large and Small Gas Holders)
- OU-D (Tar and Coking By-Products in Tanks)
- OU-E (Tar and Coking By-Products in Pipelines)
- OU-F (Polychlorinated Biphenyl [PCB] Liquids)
- OU-G (Ammonium Sulfate)
- OU-H (Lubricants, Paints, Solvents, Fuel Oils)

Previous Five-Year Review Reports provided a summary of each individual OU within the Coke Plant Management Area, including the remedy selection, remedy implementation and System Operation and Operation/Maintenance (O&M). The Remedial Action (RA) for many of these areas involved excavation/removal, which was completed in accordance with the ROD; however, the ROD did not establish TCLs for soils. There are also issues remaining for OU-A. The RA in the ROD for OU-A specified the excavation/removal of the tar, tar-contaminated soil, and coking by-products for use as fuel; however, these materials are still present in several areas throughout the site.

Coke Plant Settling Basin Management Area:

The Coke Plant Settling Basin Management Area includes the following OUs:

- <u>OU-I (Non-Native Material in Settling Basin)</u>: The Coke Plant Settling Basin was constructed directly in the channel area of Steel Creek. In the RI dated December 1986, it was estimated that there was approximately 140,000 cubic yards (yd3) of non-native material in the Coke Plant Settling Basin. The primary contaminant was PAH compounds with reported concentrations as high as 35,000 milligrams per kilogram (mg/kg). The thickness of the non-native material varied, but averaged approximately 10 feet in thickness. The native soils below the non-native material consisted of red-brown clay.
- <u>OU-L (Creek Channel)</u>: OU-L is the creek channel located between the Coke Plant Settling Basin control structure (near the access road) and the railroad tracks that parallel the St. Louis River. The streambed and former open water area, as delineated in 1907, indicates approximately 10 acres have been impacted by non-native materials. The RI soil borings indicate 5-9 feet of non-native materials are present in the area. It was estimated that 82,000 to 148,000 yd3 of non-native material are present in the streambed and former open water area.
- <u>OU-M (Delta and Creek Channel Area) and OU-N (Unnamed Creek Estuary)</u>: OU-M is the creek channel and delta area located riverward of the railroad tracks. This delta was created by flows carrying sediment from the Coke Plant Settling Basin into the St. Louis River estuary. A 1940 aerial photo shows that the St. Louis River estuary extends to the former Burlington Northern Railroad tracks, while the 1983 aerial photo shows a 28-acre land area between the railroad tracks and the estuary. Soil borings conducted as part of the RI showed approximately 10 feet of coke/flue dusts in most areas of the delta. It was estimated in the RI and stated in the ROD that the delta (OU-M) and estuary (OU-N) adjacent to the delta contain 600,000 to 900,000 cy (total for both OU-M and OU-N) of non-native material and contaminated soil. OU-N is now being managed as part of the estuary sediments, not as part of the Coke Plant Settling Basin Management Area.
- <u>OU-O (Spit of Land)</u>: The Spit of Land was reportedly constructed to dispose of slag from operations at the Site. Coke was found to be at a maximum depth of 5 feet. Sediment samples taken adjacent to the Spit of Land and water samples taken from two temporary wells established in the auger borings did not reveal any contamination of concern.

The RA in the ROD for OU-I, OU-L, OU-M, OU-O specified no action, subject to the completion of a PAHtreatability study to examine implementation of alternative and innovative treatment technologies; however, the ROD did not establish TCLs for soils or sediments. No action includes periodic inspections to verify that no significant changes have occurred and routine water quality monitoring to verify the long-term effectiveness of the RAs. The ROD also called for appropriate institutional controls to be implemented to minimize future disturbance of the OUs.

 <u>OU-J (Tar and Tar Contaminated Soil)</u>: OU-J has been estimated to contain about 10,000 yd3 of nonnative material (tar and tar-contaminated soil containing coke fines, flue dust, and mill scales). The RA in the ROD for OU-J specified the construction of a containment (slurry) wall and capping the area of tar and tar-contaminated soil. In addition, water collected in a pump out system was to be discharged to a sanitary sewer system for treatment. The ROD stated that this RA shall be taken only if it can be demonstrated that the quality, thickness and continuity of the underlying low permeability layer is acceptable. USS retained Geraghty & Miller, Inc. to re-evaluate four alternatives for OU-J, including a slurry wall containment system, a slurry wall system with in-situ treatment, in-situ cement stabilization, or a funnel and gate system. Stabilization/solidification was selected as the recommended RA for OU-J (Geraghty & Miller, 1995). In 1997, remedial actions for OU-J were completed. Contaminated material was consolidated, stabilized and protected from erosion. A surface water diversion structure was designed to withstand the 100-year, 24-hour recurrence storm event and a perimeter berm was built. Approximately 10,000 yd³ of coal tar and tar-contaminated soil were solidified in-place and an engineered cap with a thickness of seven feet was placed over the unit, designed to reject 90% of precipitation. The cap began slumping in 2000; some repair activities were conducted in 2001. Additional slumping was noted in the recent site inspection. The monitoring schedule and requirements for OU-J were updated in an April 2000 "Monitoring Plan" and approved with modifications by the MPCA on May 26, 2000. Current requirements call for visual inspections, semi-annual surface water sampling and annual groundwater sampling. Visual inspections are to be made of the berm and cap integrity, and for sheens at CP-3 and 4, the OU-J shoreline and the Coke Settling Basin area. Water quality is to be sampled at CP-3 and 4. No inspection reports were submitted during this reporting period.

- <u>OU-K (Dredge Spoil Material)</u>: The Coke Plant Settling Basin was dredged at various times during coke plant operations and the dredge spoil material was placed in an area northwest of the Coke Plant Settling Basin. The non-native material identified in the dredge spoil material area consists of fine to coarse coke. The volumes of dredge spoil material in Cells A, B and C are estimated to be 62,000, 23,000 and 4,000 yd3, respectively. The RA in the ROD for OU-K specified top dressing of the dredge spoil in Cells A, B, and C, subject to the completion of a PAH-treatability study to examine implementation of alternative and innovative treatment technologies. In addition, the culvert beneath Cell A was to be rehabilitated as a preventative maintenance measure. A geotextile fabric and Soil soil topdressing was placed over the dredge spoil area (Cells A, B and C); this work was summarized in the Final RAP (Barr, 1994)..
- <u>Area between Operable Units I and J:</u> Sheen and balls of tar-like substances have been observed in the southeast corner in the area identified as "Area between Operable Units I and J". The RA in the ROD stated that this contaminated material was to be excavated and used as fuel. Any tar or tar contaminated soil not suitable for use as a fuel will be placed in an on-site containment vault. It could also be included with the containment wall for OU-J. The First Five-Year Review concluded that it was not possible to verify if the tar and tar contaminated soils in this area were remediated. In addition, tar balls and oily sheens on the surface water have since been observed seasonally in this area. Institutional controls have not been implemented to date.
- <u>OU-S (Crushed Slag Area)</u>: A crushed slag disposal and high pH area has been identified as an issue post-ROD. High pH values in surface water were recorded entering streams; an off-white precipitate was observed in a stream bed. Soil contamination was also identified also. Little to no vegetation exists in this area, which is designated as OU-S.

Wire Mill Settling Basin Management Area:

Wastes from the "cold side" of the steel plant were discharged directly to the river through a small basin located adjacent to the St. Louis River. The contaminated areas that were located on the cold side were evaluated together and are referred to as the Wire Mill Settling Basin Management Area. OUs associated with the Wire Mill Settling Basin Management Area are as follows:

• <u>OU-P (Wire Mill Pond)</u>: During operations, the Wire Mill Pond was used as a treatment basin, holding wastewater to allow oil and greases to be removed prior to discharge to the St. Louis River. Heavy materials in the influent waste streams settled in the pond and lighter materials were captured with an active skimming process prior to discharge to the St. Louis River. The pond was estimated to contain 10,000 yd3 of non-native sediments containing PAHs, oil and grease. The RA in the ROD for OU-P (same remedy as for OU-Q and OU-R) was originally specified to be no-action. After additional concerns and investigation, an RA plan was approved and completed. Major components of the RA included: modification of watershed drainage patterns; gross pond dewatering and temporary water treatment; excavation, treatment (dewatering and drying), and disposal of 6,487 tons of non-native material; placement of geotextile filter above remaining contamination; site restoration including backfilling and

wetlands construction. Additional inspections in OU-P continue to identify oil and sheens on the surface water.

- <u>OU-Q (Dredge Spoil Area)</u>: A comparison of current aerial photographs and the 1907 topographic map of the Site suggest that the Wire Mill Settling Basin has changed shape since production began1907. The basin was apparently dredged and reshaped between 1953 and 1969. Dredged materials from the settling basin were placed on both sides of OU-P. It was estimated there could be 40,000 yd3 of non-native material in the north pile and 19,000 yd3 in the south pile.
- <u>OU-R (Wire Mill Pond Delta)</u>: Non-native sediments exist in the St. Louis River estuary adjacent to the outlet of the Wire Mill Settling Basin at thicknesses up to approximately seven feet. These materials are currently being investigated under sediments, not as part of the Wire Mill Settling Basin Management Area.

The RA in the ROD for the OU-P, OU-Q and OU-R specified no action, subject to the completion of a PAHtreatability study to examine implementation of alternative and innovative treatment technologies. No action includes periodic inspections to verify that no significant changes have occurred and routine water quality monitoring to verify the long-term effectiveness of the RAs. The ROD also called for appropriate institutional controls to be implemented to minimize future disturbance of the OU. Post-ROD sampling of estuary sediments showed that sediments were being re-worked by wave and storm events, resulting in a continuing source of contamination to the St. Louis River. USS agreed to address the non-native sediments in both Steel Creek and Wire Mill Pond estuaries. Significant investigation is occurring in these areas to determine the volume of impacted sediments and to develop a feasibility study for future remediation.

Sediments: <u>OU-N and OU-R.</u> USS agreed to address the non-native sediments in both Steel Creek and Wire Mill Pond estuaries. A Focused Feasibility Study (FFS) was submitted to the MPCA in July 1998. It was found that more information was required to determine extent and magnitude of contaminated sediments. In March 2002, a laser-induced florescence tool was used to survey sediments for coal tar. On March 11, 2008, USS submitted the Former Duluth Works Sediment Remedial Investigation and Tier I Risk Assessment. Significant investigation regarding OU-N and OU-R is currently on-going to determine the volume of impacted sediments and to develop a feasibility study for future remediation. The Feasibility Study is being prepared that will present remedial options; this FS is overdue.

Additional Components Not Identified by an Operable Unit:

<u>Soils Contaminated by Above and Below Ground Petroleum Storage Tanks</u>: This issue falls outside of the three general areas. The RA consisted of excavation and thin-spreading and/or land-farming contaminated soil onsite. The work was completed in accordance with the work plans and subsequent sampling and headspace testing of the thin-spread soils indicated the soils were no longer contaminated. Further investigation has identified additional contaminated soil from petroleum storage tanks; this soil remains on site and was referred to the MPCA Petroleum Remediation Program for investigation and cleanup oversight.

<u>On-site Demolition Landfills:</u> MPCA issued Permit No. SW-201 on March 27, 1979 for the construction and operation of Demolition Landfills No. 1 and No. 2 at the Site. Demolition Landfill No. 1 was permitted to accept building masonry from the demolition of the Atlas Ce-ment Plant. No map showing the permitted location of Demolition Landfill No. 1 could be found in the literature search. Plant Demolition Landfill No. 2 was permitted to accept building masonry from the demolition of the steel facility. Uncertainty regarding the location or existence of the demolition landfills remains such that a literature search was recommended during the last Five-Year Review.

In August 1982, a permit application was submitted to the MPCA for the construction and operation of Demolition Landfill No. 3 at the Duluth Works site. In response to the application, the MPCA replied, in a letter

dated October 11, 1982, that the permit could not be issued until a few concerning issues were clarified. These concerns were due, in part, to a buried basement that contained oily waste. The material was eventually disposed of in an out-of-state facility. This area was never used as a demolition landfill. Despite the multi-purpose use of this area, it was not evaluated during the RI or ever investigated. Please see the First Five-Year Review for additional details.

Volume 2. Five-year review report for St. Louis River/Interlake/Duluth Tar Superfund Site, Duluth, MN

I. Introduction

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fourth FYR for the St. Louis River/Interlake/Duluth Tar (SLRIDT) Superfund Site. The triggering action for this policy review is the completion date of the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site is designated as OU1 (Tar Seeps OU), OU3 (Soil OU), and OU4 (Sediment OU) of the St. Louis River Superfund Site by USEPA. Each OU has a separate ROD, and all OUs will be addressed in this FYR.

The SLRIDT Superfund Site FYR was led by Erin Endsley of MPCA, Project Manager for the Site. Participants included Mike Bares, MPCA Hydrogeologist, and contractor support from Donovan Hannu and Katie Larson of Bay West. The Potentially Responsible Parties (PRP) were notified of the initiation of the FYR on October 3, 2017. The review began on November 1, 2017.

Site Background

The SLRIDT Site is within the West Duluth neighborhood of the city of Duluth, on the north bank of the St. Louis River, approximately four river miles upstream of Lake Superior. The Site is located in the Western Port Area Neighborhood of Duluth, and current and anticipated future use is commercial and industrial. The Site includes approximately 255 acres of land, and river bays, wetlands, and boat slips.

The Site has been used for industrial purposes since the late 1800s. From the 1880s to the early 1960s, Site operations included coking, coal tar refining, tar product manufacturing, byproduct recovery gas production, and iron production. During the years of operation, filling of the river was conducted to create the land on the 59th Avenue Peninsula. Fill was also used to form the 54th Avenue Peninsula. Discharges from the coking and pig iron operations flowed from the outfall pond/ditch of Keene Creek Bay to a southerly ditch, and finally to a 48-inch pipe at the southern end of the 54th Avenue Peninsula. Coking and pig iron industrial operations produced waste products such as coke, pig iron, coal tar, slag, sodium nitrate, and coal gas, while the tar waste products included coal tar, pitch, and oils.

Based on these industrial operations and waste products, the following three operable units of contamination were identified:

• Tar Seeps Operable Unit (TSOU): The tar seeps can be defined as amorphous, black residues from the coking process and other industrial activities characterized by high concentrations of Polycyclic Aromatic Hydrocarbons (PAHs). The selected remedy for the TSOU involved the targeted excavation and removal of four large tar seeps for fuel recycling, completed in March 1994. Because tar in Areas A and E could

not be recycled, remediation in these areas was deferred for treatment in the Soil Operable Unit (SOU).

- Soil Operable Unit (SOU): The RAOs for the SOU, as summarized in the ROD dated September 27, 1995, are to prevent current or future exposure to the contaminated soils and reduce the contaminant migration to groundwater. To achieve this objective, the ROD established soil cleanup levels based on contaminant leachability to groundwater and direct exposure to contaminant residue in the soil. Areas A and E were the locations of former tar distillation operations. In 1996 and 1997, approximately 14,700 cubic yards (yd³) of contaminated soil were excavated from 16 areas within Areas A and E and transported for off-site disposal. In 1997, approximately 30,400 yd³ of contaminated soil and debris were excavated and remediated from Areas B, C, D, and F. An additional area referred to the Maurice's Parking Lot had identified VOC soil contamination and was biovented until 2001. Additional soil gas sampling in 2013 determined that vapor intrusion does not represent a significant risk to the building occupants in this area. The remedy was not protective during the last Five Year Review, based on the discovery of coal tar in Area E, tar seeps in Area B and tar layers found adjacent to the Southwest shoreline of Stryker Bay. The coal tar in Area E and the tar seeps in Area B have been addressed.
- Sediment Operable Unit (SedOU): There are three geographically separated areas of concern in the river within the Site impacted by contaminated sediments. A remedy for the SedOU was selected and presented in the August 2004 ROD for the SedOU. The selected remedy consists of a combination of environmental dredging, in situ capping, dredged sediment containment and institutional controls. The response action was completed in 2011. The SedOU remedy has had ongoing inspections and monitoring since remedy completion.

SITE IDENTIFICATION					
Site Name: St. Louis Superfund S	Site – St. Lou	is River/Interlake/Duluth Tar (SLRIDT)			
EPA ID: MND0390454	30				
Region: 5	State: MN	City/County: Duluth, St. Louis County			
		SITE STATUS			
NPL Status: Final					
Multiple OUs? Yes	Multiple OUs? Has the site achieved construction completion? Yes Yes				
REVIEW STATUS					
Lead agency: State	Lead agency: State				
Author name (Federal or State Project Manager): Erin Endsley					
Author affiliation: State Project Manager, MPCA					
Review period: 11/1/2017 - 10/31/2018					
Date of site inspection: 5/9/2018					

FIVE-YEAR REVIEW SUMMARY FORM

Type of review: Policy

Review number: 4

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Triggering action date: 10/31/2013
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Due date (five years after triggering action date): 10/31/2018

II. Response Action Summary

Basis for Taking Action

The contaminated environmental media at the Site includes soil, groundwater, sediment and surface water. PAHs were detected in surface and subsurface soils during investigation of the peninsulas and in sediments from the embayment, boat slip, and outfall areas.

- Waste discharged from the outfall spread and hardened resulting in a tar blanket extending across a considerable area into the open waters of the St. Louis River.
- Large tar seeps were present on the 59th Avenue Peninsula in Area A, Area B near the north end of the Hallett Boat Slip, and Northern Area D.
- Black contaminated native sand and clay were present north of the peninsulas (Maurice's parking lot).
- Elevated concentrations of inorganics were identified in groundwater, sediment and soil samples collected at the Site.
- Groundwater contamination appeared to be localized and correlated to the contamination seen in soils in the vicinity of the monitoring wells.
- VOCs were detected in groundwater, in outfall sediments and in the boat slip sediments.
- Floating wastes were periodically present in the open waters as a hydrocarbon sheen or solid material composed of compounds associated with coal tar wastes.

The Human Health Risk Assessment, developed in 1993 by the MPCA, identified carcinogenic PAHs, noncarcinogenic PAHs, VOCs, cyanide, and lead as the Contaminants of Concern (COCs) for the Site. Potential pathways for human exposure to Site contaminants include inhalation, ingestion, and skin contact.

The RIs indicated that PAHs were found in every sample taken at the Site (Retec 1993). Of the 278 samples collected and analyzed for Total cPAHs and EnSys field screening, 237 (85 percent) were higher that the MPCA preliminary cleanup goal of 0.8 parts per million (ppm) Total cPAHs. Non-cPAH compounds were always detected in association with cPAHs. In all areas, if the preliminary clean-up goal was exceeded for any compound, it was also exceeded for Total cPAHs. VOCs were found only in association with high concentrations of PAHs.

For the SedOU, human health risk evaluations performed by the MPCA and MDH indicated that additional action was warranted based on elevated risk estimates due to direct and/or indirect contact with the sediments. PAHs in the site sediments were likely causing widespread adverse effects to organisms exposed directly and indirectly to them. Because these organisms comprise an important part of the aquatic ecosystem, remedial action was determined to be necessary to eliminate or minimize the impacts of the sediment contaminants to the environment.

Early investigations indicated that groundwater contamination did not represent a risk pathway at this site. However, the SedOU investigations indicated there is a potential for discharge of contaminated ground water from the Site to surface water. The groundwater at the Site is not a source of drinking water but does discharge to the St. Louis River.

Response Actions

TSOU:

The tar seeps can be defined as amorphous, black residues from the coking process and other industrial activities characterized by high concentrations of PAHs. The selected remedy for the TSOU targeted four large tar seeps and was completed in March 1994. The remedy included excavation of approximately 192 tons of fuel-grade tar waste and transportation of the wastes to be burned off-site for energy recovery at the Missouri Fuel Recycler/Continental Cement Company of Hannibal, Missouri. However, 14 rolloff boxes of nonfuel-grade material were stored at the SLRIDT site and subsequently addressed along with the remediation of the SOU. In addition, the tar associated with the TSOU in Areas A and E was not of a quality to allow its use as a recyclable/burnable fuel. Therefore, remediation of tar in Areas A and E was deferred for treatment in the SOU. The first FYR provided a detailed summary of the RAOs, Selected Remedy, Remedy Implementation, and System Operations/O&M.

<u>SOU</u>:

The RAOs, as summarized in the September 27, 1995, ROD for the SOU, are to prevent current or future exposure to the contaminated soils and reduce the contaminant migration to groundwater. The ROD established soil clean-up levels based on contaminant leachability to groundwater and direct exposure to contaminant residue in the soil. These clean-up levels were included in the first FYR.

The SOU ROD specified the following RAs:

- Excavation of tarry soils and tar impacted soils to a maximum depth of 12 feet below the ground surface or to the water table to satisfy the soil clean-up levels established in the ROD. The excavated material will be treated by on-site thermal treatment of the tarry soils in combination with off-site landfill disposal that includes the tar-impacted soils excavated during the TSOU remediation. As an added precaution, any area where contamination is left in place below groundwater and the water table is less than 8 feet below ground surface; clean fill will be added to a depth of 8 feet above the water table.
- Structure decontamination. Structures above the water table that will be decontaminated by scraping contaminated material from the surface include but are not limited to: piping, sumps, tanks, footings, building foundations, settling basins, and lift stations.
- Air Sparging for Area C naphthalene to remediate the entire thickness to the soil clean-up levels presented in Table 1 of the ROD.
- Bioventing for Maurice's Parking Lot to achieve the soil clean-up levels in the ROD.
- Groundwater monitoring. Two rounds of monitoring will be performed prior to implementation of the soil remedy to establish a baseline to evaluate the remedy performance. The monitoring network existing at the time of the ROD and the ten new wells proposed as part of the SedOU work will be monitored in accordance with a MPCA staff approved plan on a quarterly basis.
- Institutional Controls, as follows:
 - Zoning designation. This Site will be used for industrial development only.
 - Excavation will not occur below twelve feet or groundwater, whichever is most shallow. In addition, any soil removed below a depth of 3.5 feet must be placed back below 3.5 feet or disposed of in accordance with a MPCA staff approved plan.

• Wells will not be constructed within the uppermost aquifer at the Site.

In 1996, the Area C pilot study demonstrated that air sparging would not effectively remediate the Area C naphthalene deposit that is present below the water table. Based on this information, the MPCA staff recommended that the contamination be left in place. This recommendation is consistent with the SOU ROD that allows contamination to remain in place below the water table. An ESD, dated February 10, 1997, documents this significant change from the September 1995 ROD. The ESD specified:

- Additional groundwater monitoring wells will be installed and groundwater monitoring will be conducted to determine groundwater and surface water impacts.
- The contaminated area will be covered with a minimum of eight feet of clean soil above the water table to allow for future industrial development.
- Institutional controls will be used to minimize risk to human health and the environment.

Interlake, Domtar, and Allied excavated soil from their respective areas to meet the soil clean-up levels presented in the SOU ROD. Excavation of contaminated material could not be completed under existing operational structures without damaging the structures. Therefore, soil contamination above the subsurface clean-up levels remains under these structures. Contaminated material that exceeded the clean-up levels specified in the ROD, but which is either beneath the water table or deeper than 12 feet, also remains in place at the Site. This information is provided in a Technical Memorandum on Residuum in Appendix A to the "Documentation of Operable Unit Completion, Soil Operable Unit, St. Louis River/Interlake/Duluth Tar Site, Duluth, MN, October 1997."

The MPCA concurred with the remedy completion in documented in "Documentation of Operable Unit Completion, Soil Operable Unit, St. Louis River/Interlake/Duluth Tar Site, Duluth, MN, October, 1997" and the addendum "Addendum to the Documentation of OU Completion Report, Soil Operable Unit, St. Louis River/Interlake/Duluth Tar Site, Duluth, MN, December 2002."

SedOU:

The SedOU addressed contaminated sediment impacted by discharges from the industrial operations into the water at Stryker Bay, Slip 6, the 48-inch outfall area, Keene Creek Bay/Slip 7, and the basal tarry unit south of the 1885 shoreline, underlying 59th Avenue Peninsula. the MPCA determined that all areas of the SLRIDT site containing sediments with a bulk sediment TPAH concentration exceeding 13.7 mg/kg must be addressed by the SedOU remedy, either by dredging or capping or containment. This cleanup level of 13.7 mg/kg TPAH was determined to be reasonably necessary to protect both public health and the environment from releases of PAHs, the primary contaminants of concern at the SedOU.

The selected remedy consisted of a combination of environmental dredging, in-situ capping, and dredged sediment containment. Other elements required in order to implement the selected remedy included long-term monitoring, O&M, contingency action, financial assurance, institutional controls and property acquisition and relocation. The remedy required by WDNR for the portion of the SedOU which is located in the waters of the State of Wisconsin included dredging of sediments in exceedance of the cleanup level.

Status of Implementation

Since the 2013 FYR, the following activities have been completed at the SOU and SedOU.

<u>SOU – Area B</u>

In November 2016, Barr Engineering, on behalf of XIK, conducted a limited site investigation to assess the tar seeps at Area B, identified as a follow-up item in the 2013 FYR. Area B is a former tar seep area, identified in the TSOU ROD. A response action was conducted in November 2017, and consisted of soil and tar excavation in the

area south of the concrete pad where the shallow tar layer was encountered. Thin layers of tar and buried unused piping were encountered and removed, and soil was removed to depths of approximately 2-3' bgs. Approximately 174 tons of soil, tar, and debris were removed and disposed of at an off-site landfill. MPCA approved the Area B Tar Seeps Response Action Technical Memorandum in August 2018, and no further action is anticipated for this area.

<u>SOU – Area E</u>

In September 2017, Summit Envirosolutions, on behalf of Domtar, conducted a limited site investigation to assess remaining areas of tar and tar-contaminated soil at Area E, identified as follow-up items in previous FYRs. In November and December 2017, the following remedial activities were completed.

- Approximately 62 cy of tar-contaminated soil from a soil pile were excavated and disposed of at an offsite landfill.
- An approximately 1 foot thick layer of dark soil near the former lunch room and office buildings, approximately 46 cy, was excavated and disposed of at an off-site landfill.
- A tar-filled pit and tank from former tar paper operations, located within the floor of a site building, was cleaned and the contents removed for disposal. Approximately 1400 gallons of water and tar and tarry sludge were removed and disposed of at an off-site landfill.
- Vapor intrusion assessment was conducted, consisting of sub-slab and crawlspace vapor sampling in the
 office building.

MPCA approved the Supplemental Remediation Report for Area E in February 2018. The approval noted that no additional work was needed to address soil contamination, tarry materials, or vapor intrusion. However, an Environmental Covenant and Easement still needs to be recorded for the Area E property, to document the presence of contamination and the restrictions outlined in the ROD that are in place for the remainder of the Site properties. This Covenant is currently being drafted but has not been recorded yet.

63rd Avenue Peninsula/Radio Tower Peninsula

In 2007, during the Sed OU construction, a tar layer was identified along the southwestern shoreline of Stryker Bay, along the Radio Tower/63rd Avenue Peninsula. Hard Hat, Inc. and Service Engineering, on behalf of XIK, provided results of a preliminary assessment of the tar layer to MPCA in September 2007. MPCA requested a Response Action Work Plan to address the tar-contaminated sediment layer on September 17, 2007. Additional investigation results were provided to MPCA in October 2007, and on October 20, 2007, MPCA approved the additional investigation and requested a response action. Hard Hat, on behalf of XIK, submitted a Response Action Work Plan on October 20, 2007, but on October 25, clarified that the proposed response action would only address a portion of the tar layer that was accessible using the dredging equipment on site for the Sed OU construction. The remaining tar layer areas would be addressed through a future response action. On October 26, 2007, MPCA approved the Response Action Work Plan for additional dredging along the southwestern shore of Stryker Bay, with the understanding that the remaining tar layers not addressed by this work plan would be addressed at a later time. This tar layer has been identified in previous FYRs as an issue needing follow-up action. Barr Engineering, on behalf of XIK, submitted a Work Plan for additional characterization of the tar layer in April 2018, which was approved by MPCA in May 2018.

<u>SedOU</u>

No additional response actions have occurred since the last FYR, other than repairs made in 2016 to address erosional areas near the head of Stryker Bay and the CAD. Ongoing annual inspection, maintenance, and monitoring activities have been occurring in accordance with the Long-Term Monitoring Plan for the site, and the results are summarized below. Institutional controls for this OU have yet to be implemented.

Institutional Controls

Table 1: Summary of Planned ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Soil	Yes	Yes	010-4500- 06950, 010- 4500-07270	These 2 parcels that compose the EBI property in Area E still need an environmental covenant to restrict the land to industrial use; restrict excavation below 12' bgs or the water table, whichever is shallower; any soil removed below a depth of 3.5 ft must be placed back below 3.5 ft, or disposed of in accordance with a MPCA staff approved plan; and to restrict well construction within the uppermost aquifer at the Site.	Planned
Sediment	Yes	Yes	010-0130- 00291, 010- 0130-00256	A conservation easement or environmental covenant for the riparian buffer zone area (54 th Avenue Peninsula) depicted on Figure 11-2, Post- Response Action Habitat Plan, Final RD/RA Plan, SLRIDT Site Remediation, Sediment Operable Unit, 2005, Service Engineering	Planned
Sediment	Yes	Yes	Several, as depicted on Figure 4-6, Institutional Controls & Post- Response Use Restrictions, Final RD/RA Plan, SLRIDT Site Remediation, Sediment Operable Unit, 2005, Service Engineering	An Environmental Covenant and Easement for areas where contaminated sediments have been covered, capped, or contained, containing the following use restrictions: - Prohibitions on anchoring or other activities that could disturb the CAD or the in situ capped areas. - Docks, piers, or other temporary or permanent structures cannot be constructed within the footprint of the CAD or in the in situ capped areas without a construction plan approved by the MPCA. - Dredging is prohibited within the sediment remedy site boundaries, with the exceptions of: (1) approved maintenance activities that are part of the remedy, (2) maintenance dredging in the Minnesota Channel to a depth of 23 feet, or (3) maintenance dredging in Slip 7 should it be opened to barge traffic. - If, in the future, Dock 7 is converted to a barge docking facility or other marine use that could create new potential for erosion of the remedial cap, an armoring plan that protects the cap under the new planned condition must be submitted to, and approved by, the MPCA. This plan must then be implemented prior to the change in dock use so that the cap remains in place and protective.	Planned

A map showing the area in which the institutional controls (ICs) apply is included in Appendix F.

Status of Access Restrictions and ICs:

The majority of the ICs required by the SOU ROD are in place and are effective, with the exception of the EBI property, where an environmental covenant needs to be recorded. As redevelopment of parts of the site has

occurred, potential purchasers/redevelopers are made aware of the restrictions, which are then incorporated as conditions in the planned redevelopment. For the SedOU, the majority of the ICs specified in the ROD and further developed in the RD/RA Plan have not been implemented. Once these ICs are in place, annual review of IC effectiveness will need to be included in the long-term monitoring for the SedOU.

Systems Operations/Operation & Maintenance

There are no long-term operation, monitoring, or maintenance activities required for the TSOU or the SOU. A 2013 Long Term Monitoring and Maintenance (LTM&M) Plan for the SedOU identifies monitoring and maintenance requirements, as required by the ROD, RD/RAP and the Minnesota Army Corp of Engineers/Department of Natural Resources (MDNR) Permit. The intent of the plan is to confirm that the constructed caps are properly containing the contaminants of concern (COCs) at the SLRIDT site and that the aquatic plant and benthic communities at the SLRIDT site have recovered to be consistent with other areas within the St. Louis River estuary. Monitoring activities have included pore water sampling, bulk sediment sampling, cap stability monitoring, benthic invertebrate assemblage and abundance, vegetation monitoring, and benthic bioaccumulation monitoring. Results from monitoring activities are reported in annual Long-Term Monitoring Reports, and key findings are summarized in following sections.

III. Progress since the last review

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

OU #	Protectiveness Determination	Protectiveness Statement
TSOU	Protective	The remedy at TSOU is protective of human health and the environment, as intended by the ROD. The material from four tar seeps was removed and disposed. At that time, additional tar seep material was determined to be associated with the SOU. This remedy is complete and applies to the current use of the property; future development may require additional work as documented in the ICs.
SOU	Not Protective	The remedy at SOU is not protective because of the tar seeps and tar contaminated soils found in several areas across the site. Remedial investigations and response actions are required. ICs exist for all but one parcel and are effective.
SedOU	Short-term Protective	The remedy at SedOU currently protects human health and the environment because of the activities conducted to date; however, in order for the remedy to be protective in the long term ICs and erosion control is needed.

Table 2: Protectiveness Determinations/Statements from the 2013 FYR

Table 3: Status of Recommendations from the 2013 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
SOU	There is a tar seep, a stockpile of tar/soil	Assess these materials, then develop and implement a	Completed	Remediation of tar seeps, tar-	Click here to enter a
	generated during a utility excavation, and a tar-	remedial action plan.		contaminated soil, and tarry wastes in	date

	filled pit remaining on the EBI property in Area E. There is also a tar seep located near the northwest corner of Slip 6, within Area B.			Areas B and E have been completed.	
SOU	Institutional controls exist for a majority of the site; however, no ICs have been developed for the EBI property within Area E.	Develop and execute ICs for the EBI property.	Ongoing	An Environmental Covenant and Easement is still required for the EBI property.	2019
SOU	A tar layer and miscellaneous drums exist west of Stryker Bay near the Radio Tower. Because these materials were identified after ROD, they were not included in the original OUs. The tar layer has been delineated; however, remedial action is needed.	Develop and implement a remedial action plan for these materials.	Ongoing	A response action is still needed for the tar layer on the southwest shoreline or Stryker Bay on the Radio Tower/63 rd Ave Peninsula.	2019
SedOU	Erosion channels have formed and are worsening in the northeast corner of Stryker Bay, in the northeast corner of Slip 6, and along the east side of Slip 6. The channels primarily exist in the native materials, but are beginning to impact the surface of the caps in these areas.	Develop and implement appropriate erosion controls for these areas to provide long-term protection of cap integrity.	Completed	The damage from erosion has been repaired, and better erosion controls are in place. Ongoing long-term monitoring inspections will be done to ensure protectiveness.	
SedOU	ICs are not in place for capped aquatic areas or for conservation/buffer zones.	Develop and execute ICs to the capped aquatic areas to restrict sediment and cap disturbance, limiting activities such as anchoring, dredging or docking. Record conservation/buffer zones on appropriate deeds.	Ongoing	Appropriate institutional controls such as environmental covenants and easements are still needed for these areas.	2023

IV. Five-year review process

Community Notification, Involvement & Site Interviews

A public notice was made available by a published notice in the local newspaper, the Duluth News-Tribune, on April 24, May 1, and May 8, stating that there was a FYR and inviting the public to submit any comments to MPCA. The results of the review and the report will be made available at the Site information repository located at the Duluth Public Library, West Duluth Branch, 5830 Grand Avenue, Duluth, MN, and will also be available at are also available at <u>https://www.pca.state.mn.us/waste/st-louis-river-interlakeduluth-tar-site</u>.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. Interviewees included interested parties impacted by the Site, including nearby residents, owners of businesses located on the Site, and regulatory agencies involved in Site activities or aware of the Site. Interviews were conducted in May and June of 2018. Interviews are summarized in Table 4; documentation of the complete interviews is included in Appendix D.

Table 4. Interview Summary

Interviewee	Organization	Date	Key Comments
Bill Majewski	Former City Planner	5/10/18	Impressed by outreach by MPCA, contractor and RP
	Nearby Resident		
Terry Anderson	Owner – Earth Burners	6/21/18	He feels the project was well run despite how long it took,
	Inc, located on Site.		especially for the property he owns.

Data Review

This five-year review consisted of a review of relevant documents, including O&M records, monitoring data, and recent investigation and response action reports. Documents reviewed are presented in the following Table 5.

Date	Title	General Contents
8/2018	Area B Tar Seeps Response Action Techical Memorandum	Summarizes the results of a response action consisting of soil and tar excavation of the tar seeps at Area B, near the north end of Hallett Dock 6, completed in November 2017.
1/2018	Supplemental Remediation Report, SLRIDT Site Area E	Summarizes the results of the supplemental remediation activities completed at Area E, including removal of soil, tar, tarry wastes and sludge, and vapor intrusion assessment activities.
11/2017	Long-Term Monitoring Report, Year Five SLRIDT Project	Summarizes methods, procedures and results from cap stability, pore water and bioaccumulation monitoring in 2017
10/2017	Work Plan for Remedial Activities at SLRIDT Site Area E	Summarizes the results of limited site investigation activities conducted in September 2017, including soil, water, and tar samples from several site locations, and included a work plan to address the remaining remedial areas at Area E.
1/2017	Area B Tar Seeps Investigation Technical Memorandum	Summarizes the results of investigation of the source and extent of the tar seeps at Area B, near the north end of Hallett Dock 6, completed in November 2016.
11/2016	Long-Term Monitoring Report, Year Four SLRIDT Project	Summarizes methods, procedures and results from the fourth year of cap stability and pore water monitoring, and the second year of benthic invertebrate sampling, completed in 2016.

Table 5. Documents Reviewed

11/2015	Long-Term Monitoring Report, Year Three SLRIDT Project	Summarizes methods, procedures and results from the third year of cap stability and pore water monitoring, and the fifth year of vegetation monitoring at SLRIDT in 2015.
2/2015	Long-Term Monitoring Report, Year Two SLRIDT Project	Summarizes methods, procedures and results from the second year of cap stability and pore water monitoring, and the fourth year of vegetation monitoring at SLRIDT in 2014.
12/2013	Long-Term Monitoring Report, Year One SLRIDT Project	Summarizes methods, procedures and results from the first year of cap stability, pore water and bulk sediment monitoring, and the third year of vegetation monitoring at SLRIDT in 2013.

SOU:

<u>Area B</u>

A response action was conducted in November 2017, and consisted of soil and tar excavation in the area south of the concrete pad where the shallow tar layer was encountered. Thin layers of tar and buried unused piping were encountered and removed, and soil was removed to depths of approximately 2-3' bgs. Approximately 174 tons of soil, tar, and debris were removed and disposed of at an off-site landfill. MPCA approved the Area B Tar Seeps Response Action Technical Memorandum in August 2018, and no further action is anticipated for this area.

<u>Area E</u>

A response action was conducted in November and December 2017, and included the removal and disposal of approximately 62 cy of tar-contaminated soil from a soil pile, approximately 46 cy of a dark soil layer near the former lunch room and office buildings, and cleaning and disposal of a tar-filled pit and tank from former tar paper operations, located within the floor of a site building. Approximately 1400 gallons of water and tar and tarry sludge were removed and disposed of at an off-site landfill. Vapor intrusion sampling of sub-slab and a crawlspace area in the office building was also conducted, and vapor intrusion risk was ruled out based on the results. MPCA approved the Supplemental Remediation Report for Area E in February 2018. The approval noted that no additional work was needed to address soil contamination, tarry materials, or vapor intrusion.

SedOU:

Five years of response monitoring and reporting have been completed since the last FYR. This has included cap stability, pore water, bulk sediment, vegetation, benthic invertebrate sampling, and bioaccumulation sampling. Pore water monitoring of the contained aquatic disposal (CAD) facility cap was also conducted in 2011 and 2012 for the EPA's Great Lakes National Program Office (GLNPO) project. The EPA-required monitoring indicated the CAD cap is performing as designed with respect to pore water migration. Vegetation and benthic monitoring indicates the site flora and fauna are on a good recovery trajectory and are expected to recover to provide ecosystem services consistent with other areas of the St. Louis River estuary with similar conditions and characteristics.

Pore water samples collected in 2017 confirmed that the SLRIDT site caps are performing as designed. Two areas (one in Stryker Bay and one in the wet meadow portion of Slip 7) that have had PAH concentrations above the post-remedial action objectives (PRAOs) in pore water at the base of the bioactive zone (BAZ) in past years were more fully delineated in 2016, confirming that the exceedances are isolated to relatively small areas. Benthic bioaccumulation monitoring was conducted in 2017. The Stryker Bay area was added to the planned bioaccumulation testing program and detectable concentrations of PAHs were not found in biota exposed to the surficial sediment sample collected from this location. PAH concentrations in tissue samples from organisms grown in surficial site sediment were less than PRAOs for all locations except for one area in Slip 7.

Based on monitoring completed in accordance with the Long-Term Monitoring & Maintenance (LTM&M) Plan, the results indicate the SLRIDT caps are performing as designed to contain contaminated sediment, in accordance with the Remedial Design/Response Action Plan and the ROD. For the next five-year monitoring period, annual pore water sampling will continue in the Stryker Bay exceedance area, in order to establish a trend. One more round of ex-situ bioaccumulation testing will be completed using sediments from the sample location in the northern portion of Slip 7. Additional sampling is not scheduled until 2022, unless warranted by results or by changing conditions at the site.

Site Inspection

The inspection of the Site was conducted on May 8, 2018. In attendance were Erin Endsley (MPCA Project Manager), Mike Bares (MPCA Hydrogeologist), Donovan Hannu and Katie Larson (Bay West, Inc.), Guy Partch and Eric Hedblom (Barr) and Andrea Pampanelli, XIK/GKN. The purpose of this inspection was to assess the protectiveness of the remedy, and to follow up on issues identified during the 2013 Site Inspection.

Key issues noted during the Site Inspection include:

- Erosion channels identified in the native materials at the northeast corner of Stryker Bay and along the east side of Slip 6, and erosion channels around the riprap in the northeast corner of Slip 6 have been repaired since the 2013 inspection.
- Tar seeps, tar stockpiles and a pit reportedly containing approximately nine feet of tar identified on the EBI property in Area E during the 2013 inspection were remediated in 2017.
- A tar seep identified near the northwest corner of Slip 6, within Area B in the 2013 inspection, was excavated. A stockpile of soil from that excavation was awaiting transport and disposal at the time of the 2018 Site Inspection.
- The tar layer near the Radio Tower Peninsula/63rd Avenue Peninsula was identified and is still exposed in areas along the Southwestern shore of Stryker Bay; however, these areas no longer include the beaches directly adjacent to the residences. The previously identified tires and four drums identified on the Radio Tower property have been removed.
- A portion of the sea wall along Slip 6 was observed to be failing. The failure of the sea wall would not result in a failure of RAs. However, the condition of the sea wall along Slip 6 should continue to be monitored.

Photographs taken during the two Site Inspections that highlight these issues are located in Appendix C. A map depicting the photograph locations is presented by Figure 3.

V. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Yes for TSOU, SedOU, and SOU.

<u>TSOU</u>: Previous FYRs concluded that the TSOU remedial action is complete and is protective of human health and the environment as intended by the ROD.

<u>SOU</u>: The remedial action components of the selected remedy were excavation, treatment, and removal of contaminated soils and tar-impacted soils to cleanup levels, air sparging for the Area C naphthalene deposit, and bioventing for Maurice's Parking Lot. Due to the results of a later pilot study, the Area C pond naphthalene deposit was left in place and covered with a minimum of 8 feet of clean fill. According to the first FYR, the excavation of soil as specified by the ROD has been completed. At that time, all known soil contamination above action levels within 12 feet of the ground surface was removed or treated, with the exception of the inaccessible soil underlying two existing buildings in Area D and the Duluth Auto Wrecking Garage in Area E. This soil could not be removed without damage to the structures. If these structures were demolished, remediation of the soil to the cleanup levels stated in the ROD would be necessary.

The following issues/concerns were identified during the fourth FYR that calls into question the long-term protectiveness of the SOU remedy:

- The EBI property does not have an environmental covenant on record.
- Dredging operations performed in 2007 identified a layer of tar extending into the upland near the radio towers on the southwestern side of Stryker Bay. This tar layer was not identified until after the ROD was implemented. The tar layer near the western shore of Stryker Bay residences was included in the SedOU remediation activities and has been addressed. The tar layer near the Radio Towers represents a potential risk to human health and the environment. Further evaluation and remedial action is recommended.

<u>SedOU</u>: Five years of response monitoring and reporting have been completed since the last FYR, including cap stability, pore water, bulk sediment, vegetation, benthic invertebrate sampling, and bioaccumulation sampling. Results indicate the SLRIDT caps are performing as designed to contain contaminated sediment, in accordance with the Remedial Design/Response Action Plan and the ROD.

The following issues/concerns were identified during the fourth FYR that calls into question the long-term protectiveness of the SedOU remedy:

- ICs should be applied to the capped aquatic areas to restrict sediment and cap disturbance, limiting activities such as anchoring, dredging or docking, to provide long-term protection of cap integrity.
- A conservation easement or environmental covenant for the riparian buffer zone areas (54th Avenue Peninsula) also needs to be recorded on deeds.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Question B Summary:

Inhalation of particulates or vapors was not addressed in the 1993 Baseline Risk Assessment. This was previously discussed in the first and second FYRs. In 2013, a soil vapor assessment was conducted in the VOC area where the highest soil vapors would be expected. The soil vapor levels were below the risk value guidelines used by the MPCA. Additional vapor intrusion assessment was done on the Area E property in 2017, and the levels were also below applicable MPCA Industrial Intrusion Screening Values. Further assessment maybe required by future landowners in order to receive liability assurances.

The City of Duluth has identified the area surrounding the SLRIDT Site as the Western Port Area Neighborhood, and is focusing on redevelopment opportunities within this neighborhood. They also have an interest in advancing redevelopment on parcels within or adjacent to the SLRIDT Site. The City has received assistance from the EPA Region 5 Brownfields program, and in 2016 EPA conducted a reuse assessment for the Site. As

redevelopment occurs, there will be a need to reevaluate exposure assumptions and cleanup levels, depending on the proposed redevelopment and the anticipated future use.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No new information has come to light since the last FYR; however, there are still previously discussed issues that have not been addressed. These issues have already been presented in previous portions of this remedy evaluation.

VI. Issues/Recommendations

Issues/Recommendations

OUs without Issues/Recommendations Identified in the Five-Year Review:

Tar Seeps OU

Issues and Recommendations Identified in the Five-Year Review:

OU: Soil OU	Issue Category: Institutional Controls			
	Issue: Institutional controls exist for a majority of the site; however, no ICs have been developed for the EBI property within Area E.			
	Recommendation: Develop and execute an Environmental Covenant and Easement for the EBI property parcels.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	2019

OU: Soil OU	Issue Category: Remedy Performance			
	Issue: A tar layer exists on the southwest of Stryker Bay on the Radio Tower/63 rd Avenue Peninsula. Because this material was identified after the ROD, it was not included in the original OUs. The tar layer has been delineated; however, remedial action is needed.			
	Recommendation: Develop and implement a remedial action plan for the tar layer.			or the tar layer.
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	2019

	Issue: ICs are not in place for capped aquatic areas.			
	Recommendation: Develop and execute ICs for the capped aquatic areas to restrict sediment and cap disturbance, limiting activities such as anchoring, dredging or docking.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
NI -	N	000	State	2020

OU: Sediment OU	Issue Category: Institutional Controls			
	Issue: ICs are not in place for conservation/riparian buffer zones.			
	Recommendation: Develop and execute ICs for the conservation/riparian buffer zones on appropriate deeds.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	2019

VII. Protectiveness Statements

	Protectiveness Statement
<i>Operable Unit:</i> Tar Seep OU	Protectiveness Determination: Protective
Protectiveness Statemen	nt: protective of human health and the environment, as intended by the ROD. The material from

The remedy at TSOU is protective of human health and the environment, as intended by the ROD. The material from four tar seeps was removed and disposed. At that time, additional tar seep material was determined to be associated with the SOU. This remedy is complete and applies to the current use of the property; future development may require additional work as documented in the ICs.

	Protectiveness Statement
<i>Operable Unit:</i> Soil OU	Protectiveness Determination: Short-term Protective
Protectiveness Statement	: art-term protective because of the tar seeps and tar contaminated soils previously found in

several areas across the site have been addressed. ICs exist for all but one property in Area E and are effective. In order for the remedy to be protective in the long term, ICs for all parcels are needed and the tar layer near the Radio Tower/63rd Avenue Peninsula needs to be remediated.

Protectiveness Statement			
Operable Unit:	Protectiveness Determination:		
Sediment OU	Short-term Protective		

Protectiveness Statement:

The remedy at SedOU currently protects human health and the environment because of the activities conducted to date. The first five years of post-construction monitoring indicate the remedy is performing as intended by the ROD. Long-term monitoring activities will continue in order to ensure remedy protectiveness. However, in order for the remedy to be protective in the long term, ICs are needed.

Sitewide Protectiveness Statement

Protectiveness Determination: Short-term Protective

Protectiveness Statement:

In order for the implemented remedies to be protective in the long term, ICs are needed.

VIII. Next Review

The next FYR report for the SLRIDT Superfund Site is required no less than five years from MPCA's signature date of this review.

Appendix A – Reference List

Barr Engineering, Long-Term Monitoring Report, Year One SLRIDT Project, December 2013 Barr Engineering, Long-Term Monitoring Report, Year Two SLRIDT Project, February 2015 Barr Engineering, Long-Term Monitoring Report, Year Three SLRIDT Project, November 2015 Barr Engineering, Long-Term Monitoring Report, Year Four SLRIDT Project, November 2016 Barr Engineering, Area B Tar Seeps Investigation Technical Memorandum, January 2017 Barr Engineering, Long-Term Monitoring Report, Year Five SLRIDT Project, November 2017 Barr Engineering, Area B Tar Seeps Response Action Technical Memorandum, August 2018 Summit Envirosolutions, Work Plan for Remedial Activities at SLRIDT Site Area E, October 2017 Summit Envirosolutions, Supplemental Remediation Report, SLRIDT Site Area E, January 2018

Appendix B – Site Figures

Figure 1. SLRIDT Site Location Map, Five-Year Review, Bay West, March 2018 Figure 2. SLRIDT Operable Units/Areas of Concern, Five-Year Review, Bay West, March 2018 Figure 3. SLRIDT Photo Location Map, 5 Year Review, Bay West, March 2018









Appendix C – Site Inspection Photos



1a: View of Stryker Bay, towards radio tower



1c: Stryker Bay cap. Area of erosion noted in 2013



1b: Stryker Bay



2: Stryker Bay cap. Area of erosion noted in 2013



3: Area of erosion noted in 2013



4b: Area of erosion noted in 2013



4a: Area of erosion noted in 2013



4c: Area of erosion noted in 2013



5: Area of erosion noted in 2013



7a: Arrowhead Point, good condition



6: Stryker Bay



7b: Stryker Bay from Arrowhead Point


7c: St. Louis River from Arrowhead Point.



9: Looking down slip 6, good condition.



8: Near the end of Slip 6, good condition.



11a: Area excavated in Area B of tar seeps noted in 2013



11b: Area excavated in Area B of tar seeps noted in 2013



12a: Area of erosion noted in 2009 and 2013



11c: Stockpile of area excavated in Area B



12b: Area of erosion noted in 2009 and 2013



12c: Area of erosion noted in 2009 and 2013



12b: Area dammed by trespassers at the corner of Slip 6



12a: Area dammed by trespassers at the corner of Slip 6



12c: Area dammed by trespassers at the corner of Slip 6



13a: Slip 6 dock wall



14: Graffiti on building on Slip 6



13b: Slip 6 dock wall



15: Slip 6 dock wall



16: Slip 6 dock wall



18a: Area E coal tar area observed in 20013



17: Slip 6 dock wall



18b: Area E inside Earth Burners fence



19a: Tar pit observed in 2013, excavated and backfilled



19b: Tar pit observed in 2013, excavated and backfilled



20: View of Radio Tower Bay

Appendix D – Interview Record

Interview	Information Sought
Community Representatives	 members of the community may provide a broader view of site activities and issues than can be obtained during the site inspection
Nearest Neighbors	 neighbors may provide insight into the enforcement of institutional controls, changes in land use, trespassing, and unusual or unexpected activity at the site

Interview		Information Sought
State Contacts (including those responsible for State water quality, hazardous waste, and	-	changes in State laws and regulations that may impact protectiveness
environmental health issues)	-	whether the site has been in compliance with permitting or reporting requirements
	-	information on site activities, status, and issues
Local Authorities (such as police, emergency response or fire departments, and local environmental or planning offices)	-	status of institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed, and unusual activities at the site

INTERVIEW DOCUMENTATION FORM

The following is a list of individuals interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Bill Majewski	local resident	Former City Planner	<u>5/10/2018</u>	
Name Title/Position		Organization	Date	
Terry Anderson	Owner	<u>EBI, Inc</u>	<u>6/21/2018</u>	
Name	Title/Position	Organization	Date	

INTERVIEW RECORD			
Site Name: SLRIDT	Site ID Number:		
Subject: 4th Five-Year Review	Date: 5/10/2018		
Type: <u>Visit</u>	Incoming Outgoing		
Contact Made By:			
Name: Kathryn Larson	Organization: Bay West, Inc.		
Title: Project Manager			
Individual Contacted:			
Name: Bill Majewski	Organization: Neighborhood resident, President of the Morgan Park Community Club and Chair of the St. Louis River Alliance		
Title: Former Duluth City Planner			
Telephone Number: 218-626-2638	Street Address: 834 87 th Ave W		
E-Mail Address:	City, State, Zip: Duluth, MN 55808		
Summary of Conversation			

1. What is your overall impression of the project? (general sentiment)

Bill's impression is that has been a well-organized and planned project. A team of stakeholder met regularly to participate in the projects. He appreciated the stakeholder involvement. The contractors did good work and communicated well with the community.

- What effects have site operations had on the surrounding community? The impacts were none or very minimal.
- 3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details?

During cleanup, the area was monitored for odors/impacts. Community meetings were held during the cleanup. The RP, the contractors and the MPCA did a good job of communicating what was going on with the project and impacts.

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

He is not aware of any vandalism or incidents.

- Do you feel well informed about the site's activities and progress? Yes
- Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
 No. He felt involved and had opportunity to comment and have his concerns herd.
- Do you have any other concerns or comments about the site?
 He has not followed the monitoring the last five years, but does not have any concerns.

INTERVIEW RECORD		
Site Name: SLRIDT	Site ID Number:	
Subject: 4th Five-Year Review	Date: 6/21/2018	
Type: Telephone	Incoming Outgoing	
Contact Made By:		
Name: Kathryn Larson	Organization: Bay West, Inc.	
Title: Project Manager		
Individual Contacted:		
Name: Terry Anderson	Organization: EBI	
Title: Land/business owner		
Telephone Number: (218) 348-4571	Street Address:	
E-Mail Address:	City, State, Zip:	
Summary of Conversation		

- What is your overall impression of the project? (general sentiment)
 Project was well run. But he was uncomfortable with how long it took, especially for his site.
- What effects have site operations had on the surrounding community?
 Effects were drastic when the project started. But have not been noticeable since.
- 3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details?

No

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

No

- Do you feel well informed about the site's activities and progress? Yes
- 6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? No
- 7. Do you have any other concerns or comments about the site?

No

Appendix E – Site Chronology and Background

E.1 Site Chronology

Event	Date
Site Discovery when polycyclic aromatic hydrocarbons (PAH) contamination was detected in Stryker Bay sediments and later surface water by Minnesota Pollution Control Agency (MPCA).	
Local resident reported oil rising to the surface of Stryker Bay.	1981
Preliminary Assessment by United States Environmental Protection Agency (USEPA).	1983
Site Inspection by USEPA.	1983
Listing on USEPA National Priorities List (NPL) in combination with US Steel Site.	1983
Listing on the MPCA Permanent List of Priorities (PLP).	1984
Remedial Investigation Completed.	1990
ROD selecting TSOU remedy and deferring remediation of all other contamination to the SOU is signed on October 19.	1990
Request for Response Action (RFRA) issued to three Potential Responsible Parties (PRPs) for implementation of the TSOU remedy and investigation and remediation of the SOU.	1991
MPCA approves RD/RAP with modifications.	1992
TSOU Explanation of Significant Difference (ESD) to address changes in Resource Conservation and Recovery Act (RCRA) regulations was signed.	1993
TSOU remedial action completed.	1994
On March 22, an RFRA issued to Interlake for the RI/FS and RD/RA of the SedOU.	1994
On June 20 USEPA and MPCA enter into MPCA Enforcement Deferral Pilot Project.	1995
ROD selecting the remedy for soil and deferring the sediment and groundwater remedy is signed.	1995
RFRA issued to Allied, Beazer, and Domtar for the RI/FS and RD/RA of the SedOU on March 26.	1996
Air Sparge Pilot Test for Area C naphthalene deposit of SOU determined air sparging was not a viable option.	1996
RA for the SOU began.	1996
SOU ESD is signed that modifies the area C naphthalene deposit remedy from air sparging to leaving the contamination in place.	1997
SOU excavation portion of RA is completed.	1997
Sediment RI/FS and Remedy Selection Agreement Between the Companies and the MPCA, February 22	2000
SOU bioventing RA at Maurice's parking lot is completed.	2001
First Five-Year Review.	2003
ROD selecting the RA for SedOU is signed, August 24.	2004
Erie Pier capping material and maintenance dredging sand used as capping material in Slip 7	2004
RD/RAP was prepared for SedOU and approved by the MPCA	2005
Temporary sheet pile containment wall was installed; cap/surcharge sand was placed in Stryker Bay. End dike for CAD was constructed at the southern boundary of Slip 6.	2006
Borings near Radio Tower on Western shore of Stryker Bay to delineate tar layer.	2007

On-site water filtration plant (WFP) was constructed and operated to filter excess water in the CAD. Contaminated sediments mechanically dredged from portions of Stryker Bay, transported, and placed in CAD. Impacted sediments excavated from two wetland work areas along 54th Ave peninsula.	2007
Second Five-Year Review	2008
Tar layer and associated sediments on the west side of Stryker Bay, near the residences, were dredged and disposed in the CAD.	2008
Additional aggregate material delivered, blended, placed in multiple areas within Stryker Bay. A cap was also placed in a portion of the 54th Ave peninsula. Dredging and/or capping occurred on portions of Slip 6 and in Minnesota Channel. CAD end dike was inspected and repaired.	2008
South wetland dredging, Minnesota Channel dredging, Slip 7/Minnesota Channel aggregate material placement, CAD leveling, Stryker Bay aggregate material placement, Stryker Bay sheet pile wall removal, Stryker Bay cap/surcharge excavation, Stryker Bay (SB-7) armor sand placement, and CAD isolation zone sand placement.	2009
Tallas Island Winter Work, CAD capping using an activated carbon (ACM) mat and a minimum thickness of 4.5 feet of aggregate material, environmental media (EM) placement in upland work areas, Tallas Island EM dredging and placement, CAD end dike modification, Riparian Buffer Zone earthwork designated into four areas with a width of approximately 200 feet from the shoreline, and SLRIDT site restoration	2010
Land work in Wisconsin portion of the Site completed	2011
MPCA approves the Long Term Monitoring and Maintenance (LTM&M) Plan that identifies monitoring and maintenance requirements, and presented within the ROD, RD/RAP and the MDNR Permit	2013
Phase II Investigation indicates that vapor intrusion pathway does not represent significant risk at Former Maurice's Building, where vapor extraction previously occurred.	2013
Area E soil and tar contamination addressed	2018
Area B tar seeps addressed	2018

E.2 Background

General

The St. Louis River/ Interlake/ Duluth Tar Site (Site) is within the West Duluth neighborhood of the city of Duluth, on the north bank of the St. Louis River, approximately four river miles upstream of Lake Superior. The Site includes approximately 255 acres of land and river embayments, wetlands, and boat slips.

The land includes the 59th Avenue Peninsula (Hallett Peninsula), the 54th Avenue Peninsula, and is bounded on the north by the Burlington Northern right-of-way. The two peninsulas consist largely of fill material. The topography of the Site is uneven, and slopes slightly toward the St. Louis River. Portions of the Site are located within the 100-year floodplain. The Site is zoned for industrial land use.

There are three geographically separated areas of concern in the river within the Site. Stryker Embayment (approximately 35 acres and defines the western boundary) is a shallow water embayment with emergent wetlands at the north end. Boat Slip 6 (about 23 acres located in the middle of the Site) is a shallow water and deep water environment. The 48 Inch Outfall Area and Keene Creek Bay/Boat Slip 7 (about 27 acres and defines the eastern boundary) are emergent wetlands and shallow water environments grading into deepwater environment.

The St. Louis River and estuary is the largest tributary on the U.S. side of Lake Superior, the largest freshwater lake by area in the world, providing a wealth of natural resources. Resource management goals for the estuary are to protect, preserve, restore, and enhance natural resources, and to provide opportunities for public use for this and future generations. More specifically, natural resource managers have identified priority needs of

conserving and enhancing near shore shallow water fishery habitat, nesting and rearing habitat for shorebirds, and wetlands.

Site Geology

In general, the Site consists of two types of geologic areas. A portion of the Site consists of native (natural) materials which includes interbedded clay, silty clay, silty sand and sand. The area of native materials is located on the northern approximately one third of the Site north of the original St. Louis River shoreline. Areas A, B, E, and Maurice's parking lot are, for the most part, composed of native material. In general, the stratigraphy in these areas consists of an upper clay layer of varying thickness (average ten feet) that overlies a silty sand layer (approximately 15 feet thick) and a lower red clay layer that is over 150 feet thick. Both the upper and lower clay layers have a relatively low permeability, which tends to inhibit the migration of water and chemical compounds. The upper clay layer has been penetrated by building foundations and other structures, and contains fractures and silt stringers which can increase the permeability. The lower clay is a confining layer. Varying thicknesses of fill material have also been deposited upon areas of native materials north of the original shoreline. The other areas of the Site, including most of the 54th and 59th Avenue Peninsulas south of the original shoreline, consist primarily of industrial and other fill material. Slag from pig iron operations, dredge spoils, solid by-products, and wastes were used as fill.

The most permeable materials present at the Site consist of the silty sand and sand layers found in the native materials. Some of the granular fill materials are also permeable. Groundwater flows, under water table conditions, from the upland portions of the Site towards the embayments and the St. Louis River. Flow is generally to the south from the natural upland areas and from the center of the peninsulas radially outward where the groundwater discharges to surface water of the St. Louis River. The depth to groundwater varies at the Site as does the surface topography. In general, the depth to groundwater is greater in the northern portion of the Site (approximately 15 feet) and is closer to the surface in the lower areas which are near the St Louis River.

Groundwater occurs within the gabbroic bedrock at depths greater than 200 feet. The potentiometric surface of the bedrock groundwater is estimated to be higher than the ground surface at the Site. The bedrock aquifer is isolated from the shallow unconfined groundwater by the thick regional red clay present. In addition, an upward potentiometric gradient exists from the bedrock into the red clay interval.

Land and Resource Use

The Site has been used for industrial purposes since the late 1800s. From the 1880s to the early 1960s the operations included coal tar refining, tar product manufacturing, coking and by-product recovery, iron making, and gas making.

Iron manufacturing operations were conducted from the 1880s to the early 1960s. The Zenith Furnace Company built the first coke plant and a water gas manufacturing plant in approximately 1905. This coke plant operated until approximately 1929 when the Zenith facilities were dismantled and partially removed. The Interlake Iron Company was built about this time, including a second coke plant. The Interlake Iron Co. continued to operate the coke plant and the water gas manufacturing plant until 1961. During the years of operation, filling of the river was conducted to create the land on the 59th Avenue Peninsula. Fill was also used to form the 54th Avenue Peninsula. Discharges from the coking and pig iron operations flow from the outfall pond/ditch of the Keene Creek Bay to a southerly ditch and finally to a 48-inch pipe at the southern end of the 54th Avenue Peninsula. The filling activities that have since been conducted on the 54th Avenue Peninsula have covered the former pond/ditch.

Between 1961 and 1966, the Site was not in use. In 1966, Hallett Dock Company (Hallett) purchased the former Interlake portion of the Site. Since that time, the Hallett property has been used primarily for bulk storage and handling of bentonite, coal, coke and other industrial materials. Hallett currently owns most of the Site and

leases certain buildings and property on the Site to others. In the late 1970s Hallett sold a portion of the northern most part of the Site to Maurices', Inc. and in 1999 sold a portion of the Site south of Fremont St. and west of 59th Avenue to Cedar Bay Partners, LLC. Hallett later sold 54th Avenue Peninsula and 59th Avenue Peninsula shoreline to GKN for the establishment of a Shoreline Buffer Zone as part of the SedOU RA.

The Duluth Tar and Chemical Company, who used the by-products of the iron companies coking operations to manufacture products such as shingles and tarpaper, operated from approximately 1920 to 1927. The company was located on the eastern portion of the Site along what was the 1905 shoreline. During the 1930s another company, American Tar and Chemical Company, began operating a plant immediately north of the Duluth Tar and Chemical Plant. An underground pipeline directly supplied the tar plant with dehydrated coal tar from the neighboring coke plant. This area later became an automobile salvage yard that operated from 1963 until approximately 1998, when Earth Burner Inc. (EBI) purchased it. EBI operated a contaminated soil thermal treatment facility until approximately 2001, when it discontinued the soil treatment operations and is now called EBI, Drilling Inc. EBI home office is located on-site and they lease or use the site land and structures for storage of materials.

A horsemeat packing plant operated from 1929 through 1975 on the western edge of the Site, south of the tar company operations. The buildings on the property were destroyed by fire on February 20, 1975 and the area remains vacant.

History of Contamination

The coking and pig iron industrial operations produced waste products. These products include coke, pig iron, coal tar, slag, sodium nitrate, and coal gas. The tar waste products included coal tar, pitch, and oils. In 1979 the MPCA staff detected the PAHs in samples collected from Stryker Embayment sediments. Subsequent analysis of embayment surface water samples, by MPCA staff in 1980, showed the presence of PAH compounds. In 1981, a local resident reported oil rising to the surface of Stryker Embayment, apparently from the slow release of oil from the sediments.

Based on the industrial operations and waste products, distinct areas of contamination were identified. These area designations, used throughout the Site documentation, are shown in Attachment 1, Figure 2.

- Areas A and E were the locations of former tar distillation operations.
- Area B included the waste liquor settling basin, naphthalene sump, discharge sewer line structures, and surrounding soil that were associated with the iron manufacturing and waste handling.
- Area C included the ditches, pipes, lift station, and settling pond contaminated from Interlake's waste handling. These areas contained tarry wastes and naphthalene deposits.
- Area D included soil impacted by tarry wastes from the water gas plant and coking ovens.
- Area F contained several areas of soil contamination as a result of discharges to a crescent shaped pond and disposal of contaminated dredge spoils located near the western edge of the 59th Avenue peninsula.
- Maurice's' Parking Lot was an area of visually stained soil observed during the original re-medial investigation. The source of the volatile organic compounds (VOCs and naphthalene contamination were unknown.

Initial Response Pre-Record of Decision

No clean-up activities were performed prior to issuing the first ROD (for the Tar Seep OU). As part of the initial investigations, the MPCA staff identified four Responsible Parties (RPs), three of which agreed to undertake remedial actions for various portions of the Site. These include the Interlake Corporation (Interlake), Allied Signal Inc. (Allied) and Domtar Inc. (Domtar). The fourth, Beazer East Inc. (Beazer), had not participated.

The MPCA requested the RPs to conduct remedial actions in accordance with the following RFRAs for the TSOU and SOU:

- The March 26, 1991, RFRA was issued to Interlake, Domtar and Allied for RD/RA of the TSOU and the RI/FS and RD/RA of the SOU.
- The May 25, 1993, RFRA was issued to Interlake for the RI/FS and RD/RA of additional areas of the SOU and to Beazer for the RI/FS and RD/RA of the TSOU and SOU.

The 1991 and 1993 RFRAs allocate responsibility to TSOU and SOU by area. Domtar and Beazer are responsible for Area E and tar seeps on the border of Areas A and E. Allied is responsible for Area A and tar seeps on the border of Areas A and E. Interlake is responsible for Areas and sub-Areas of B, C, D, F, and Maurice's' Parking Lot and the 48-Inch Outfall.

Basis for Taking Action

The contaminated environmental media at the Site includes soil, groundwater, sediment and surface water. PAHs were detected in surface and subsurface soils during investigation of the peninsulas and in sediments from the embayment, boat slip, and outfall areas.

- Waste discharged from the outfall spread and hardened resulting in a tar blanket extending across a considerable area into the open waters of the St. Louis River.
- Large tar seeps were present on the 59th Avenue Peninsula in Area A, Area B near the north end of the Hallett Boat Slip, and Northern Area D.
- Black contaminated native sand and clay were present north of the peninsulas (Maurice's' parking lot).
- Elevated concentrations of inorganics were identified in groundwater, sediment and soil samples collected at the Site.
- Groundwater contamination appeared to be localized and correlated to the contamination seen in soils in the vicinity of the monitoring wells.
- VOCs were detected in groundwater, in outfall sediments and in the boat slip sediments.
- Floating wastes were periodically present in the open waters as a hydrocarbon sheen or solid material composed of compounds associated with coal tar wastes.

The Human Health Risk Assessment, developed in 1993 by the MPCA, identified the following Contaminants of Concern (COCs): the carcinogenic PAHs: benz[a]anthracene, ben-zo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, and indeno[1,2,3]pyrene; the noncarcinogenic PAHs: acenaphthene, anthracene, fluoranthene, fluorine, napththalene, pryrene, 2,4dimethylphenol, 2-methylphenol, 4-methylphenol, phenol; the VOCs: acetone, benzene, ethylbenzene, styrene, toluene, and xylenes; and the inorganics: cy-anide and lead. Potential pathways for human exposure to Site contaminants include inhalation, ingestion, and skin contact.

The RIs indicated that PAHs were found in every sample taken at the Site (Retec 1993). Of the 278 samples collected and analyzed for Total cPAHs and EnSys field screening, 237 (85 percent) were higher that the MPCA preliminary cleanup goal of 0.8 parts per million (ppm) Total cPAHs. Non-cPAH compounds were always detected in association with cPAHs. In all areas, if the preliminary clean-up goal was exceeded for any compound, it was also exceeded for Total cPAHs. VOCs were found only in association with high concentrations of PAHs.

Samples have been collected from areas of the Site that have fill but no specific history of tar disposal or process operations. The fill consists of slag, silt with debris, general fill material, and maintenance debris from the current owner's operations. The cPAH concentrations of these samples ranging from detection levels to 86 ppm

are lower than areas impacted by tarry material. These concentrations may be representative of levels found throughout the industrial fill not directly associated with tar contamination.

Previous investigations indicated that groundwater contamination does not represent a risk pathway at this site.

Remedial Actions

TSOU:

The tar seeps can be defined as amorphous, black residues from the coking process and other industrial activities characterized by high concentrations of PAHs. The selected remedy for the TSOU targeted four large tar seeps and was completed in March 1994. The remedy included excavation of approximately 192 tons of fuel-grade tar waste and transportation of the wastes to be burned off-site for energy recovery at the Missouri Fuel Recycler/Continental Cement Company of Hannibal, Missouri. However, 14 rolloff boxes of nonfuel-grade material were stored at the SLRIDT site and subsequently addressed along with the remediation of the SOU. In addition, the tar associated with the TSOU in Areas A and E was not of a quality to allow its use as a recyclable/burnable fuel. Therefore, remediation of tar in Areas A and E was deferred for treatment in the SOU.

The First Five-Year Review provided a detailed summary of the ROAs, Selected Remedy, Remedy Implementation, and System Operations/O&M.

SOU:

The RAOs, as summarized in the September 27, 1995, ROD for the SOU, are to prevent current or future exposure to the contaminated soils and reduce the contaminant migration to groundwater. To achieve this objective, the ROD established soil clean-up levels based on contaminant leachability to groundwater and direct exposure to contaminant residue in the soil. These clean-up levels were included in the First Five-Year Review Report.

The SOU ROD specified the following RAs:

- 1. Excavation of tarry soils and tar impacted soils to a maximum depth of 12 feet below the ground surface or to the water table to satisfy the soil clean-up levels established in the ROD. The excavated material will be treated by on-site thermal treatment of the tarry soils in combination with off-site landfill disposal that includes the tar-impacted soils excavated during the TSOU remediation. As an added precaution, any area where contamination is left in place below groundwater and the water table is less than 8 feet below ground surface; clean fill will be added to a depth of 8 feet above the water table.
- 2. Structure decontamination. Structures above the water table that will be decontaminated by scraping contaminated material from the surface include but are not limited to: piping, sumps, tanks, footings, building foundations, settling basins, and lift stations.
- 3. Air Sparging for Area C naphthalene to remediate the entire thickness to the soil clean-up levels presented in Table 1 of the ROD.
- 4. Bioventing for Maurice's Parking Lot to achieve the soil clean-up levels in the ROD.
- 5. Groundwater monitoring. Two rounds of monitoring will be performed prior to implementation of the soil remedy to establish a baseline to evaluate the remedy performance. The monitoring network existing at the time of the ROD and the ten new wells proposed as part of the SedOU work will be monitored in accordance with a MPCA staff approved plan on a quarterly basis.
- 6. Institutional Controls, as follows:
- Zoning designation. This Site will be used for industrial development only.

- Excavation will not occur below twelve feet or groundwater, whichever is most shallow. In addition, any soil removed below a depth of 3.5 feet must be placed back below 3.5 feet or disposed of in accordance with a MPCA staff approved plan.
- Wells will not be constructed within the uppermost aquifer at the Site.

In 1996, the Area C pilot study demonstrated that air sparging would not effectively remediate the Area C naphthalene deposit that is present below the water table. Based on this information, the MPCA staff recommended that the contamination be left in place. This recommendation is consistent with the SOU ROD that allows contamination to remain in place below the water table. An ESD, dated February 10, 1997, documents this significant change from the September 1995 ROD. The ESD specified:

- 1. Additional groundwater monitoring wells will be installed and groundwater monitoring will be conducted to determine groundwater and surface water impacts.
- 2. The contaminated area will be covered with a minimum of eight feet of clean soil above the water table to allow for future industrial development.
- 3. Institutional controls will be used to minimize risk to human health and the environment.

Interlake, Domtar, and Allied excavated soil from their respective areas to meet the soil clean-up levels presented in the SOU ROD. Verification of soil excavation completeness was determined using an iterative sampling procedure from a Michigan Department of Natural Resources guidance document modified to reflect the two-layered Clean-up Levels and heterogeneous nature of the deposits. Samples were collected and analyzed from the bottom and sidewalls of the excavation. The data set for each excavation was compared to the ROD clean-up levels with final approval by the on-site MPCA inspector prior to backfilling. In Areas A and E it was also noted that the native red clay soil underlying the contaminated soil provided a visual reference to contrast the contaminated soil.

Excavation of contaminated material could not be completed under existing operational structures without damaging the structures. Therefore, soil contamination above the subsurface clean-up levels remains under these structures. Contaminated material that exceeded the clean-up levels specified in the ROD, but which is either beneath the water table or deeper than 12 feet, also remains in place at the Site. This information is provided in a Technical Memorandum on Residuum in Appendix A to the "Documentation of Operable Unit Completion, Soil Operable Unit, St. Louis River/Interlake/Duluth Tar Site, Duluth, MN, October 1997."

The MPCA concurred with the remedy completions in the document, "Documentation of Operable Unit Completion, Soil Operable Unit, St. Louis River/Interlake/Duluth Tar Site, Duluth, MN, October, 1997" and the addendum "Addendum to the Documentation of OU Completion Report, Soil Operable Unit, St. Louis River/Interlake/Duluth Tar Site, Duluth, MN, December 2002."

The RA also included the decontamination of structures that were uncovered during excavation. All structures encountered were scraped clean and, when possible, removed. The specific RAs for each area are presented below:

Areas A and E

Domtar and Allied implemented the soil excavation for Areas A and E in August 1996 and completed it in January 1997. Approximately 14,711 cubic yards (cy) of contaminated soil were excavated from a series of sixteen areas. The excavated soil was transported to the Minnesota Industrial Containment Facility in Rosemount, Minnesota for disposal.

The steel tank base from the former 860,000-gallon tank in the southeast corner of Area E and the steel inground vessel from the central portion of Area E were removed, scraped clean and transported to a scrap yard. The foundations and footings left in place were scraped clean. In general, piping was excavated for off-site disposal. The MPCA inspected the Site on August 7, 1997 and noted three areas requiring additional work. A small gully that had formed near the toe of the re-vegetated bank of excavation area 16 was filled and stabilized. A sump in the northwest corner of the concrete pad in Area A was determined to be a safety hazard and was filled to grade with sand and gravel. A small amount, approximately one quart, of black tarry material was observed near this sump and was removed.

Areas, B, C, D, F and Maurice's Parking Lot

The Interlake Corporation implemented the selected remedies, summarized below, for Areas B, C, D, and F in May 1996 and for Maurice's Parking lot in September 1996. The soil excavation portion of the remedy was completed in August 1997 and the bioventing system remediation at Maurice's Parking Lot was completed in December 2001.

Approximately 30,441 cy of soil and debris were excavated and remediated from Areas B, C, D, and F.

Simultaneous to the soil remediation, an Interim Response Action was implemented to remove and treat approximately 4,400 cy of contaminated sediments dredged from the north end of Slip 6.

Buried drums discovered in Area C2, determined to be nonhazardous, were disposed of off-site at Lake Area Landfill.

The one-half acre area of VOC soil contamination in Maurice's Parking Lot including benzene, toluene, ethylbenzene, xylene, and styrene was treated with a six-vent bioventing system. The system operated during the non-winter months until the blower failed in September 1997. The soil was sampled at this time to determine if clean-up levels had been met. The sampling demonstrated that the soil still exceeded the clean-up levels, so a new blower was installed and the system was restarted in October 1997. The system continued to operate until December 2001. Soil samples collected in 2000 detected only one VOC, ethyl benzene at 1.6 mg/kg, at concentrations exceeding clean-up levels (0.06 mg/kg for ethyl benzene). Groundwater was sampled several times between August 2000 and June 2001 at two water table wells located down gradient from Maurice's' Parking Lot to monitor water quality between the Site and the river. None of the Site contaminants have been detected in the groundwater samples. The MPCA concurred that the RA was complete based on the decrease of all contaminants except ethyl benzene to below clean-up levels, that the low levels of contamination remaining are at depth, and contamination was not detected in the groundwater.

SedOU:

Remedial actions for the SedOU were part of the current FYR and are discussed in the document; additional discussion was not included for this appendix.

Appendix F – Duluth SLRIDT IC Study

Duluth SLRIDT IC Study

The contents include the following:

- Letter Report
- Figures
 - Figure 1 Former VIC Sites
 - Figure 2 Site Areas
 - Figure 3 Capped Containment
 - Figure 4 Residual Contaminant
 - o Figure 5 Railroad Easement
 - Figure 6 Street Easement
 - Figure 7 Utility Easement
 - Figure 8 Riparian Buffer Zone
 - Figure 9 Land Use
 - Figure 10 Parcels
 - Figure 11 Environmental Covenants
 - Figure 12 Zoning
- Complete IC Documents Master Table
- Appendix A Supporting Documents
- Appendix B Capped Containment Figures
- Appendix C Residual Contaminant Figures



AECOM 11 East Superior Street, Suite 260 Duluth, MN 55802 218.625.8766 tel 218.625.2201 fax

January 28, 2013

Ms. Susan Johnson Project Leader Minnesota Pollution Control Agency 525 Lake Ave. South, Suite 400 Duluth, MN 55802

Subject: Institutional Control Study for St. Louis River/Interlake/Duluth Tar Superfund Site in Duluth, Minnesota; AECOM Project # 60279079

Dear Ms. Johnson:

AECOM is pleased to present our Institutional Control (IC) Study geodatabase for the St. Louis River/Interlake/Duluth Tar (SLRIDT) site located in Duluth, Minnesota. The proposed study area for the SLRIDT IC Study was defined by 63rd Avenue West, railroad property to the north, Slip #7 to the east and Wisconsin to the south. The general purpose of the IC Study was to develop a Geographic Information System (GIS) data base with property information and to identify areas where ICs exist and where ICs do not exist or may not be adequate.

The GIS structure which is attached to this letter identifies the information to be included and the individual layers.

SCOPE

AECOM used a City of Duluth GIS air photograph as the base map for this database. The study area boundaries are defined by a yellow border in the attached database. AECOM first developed the GIS database outline and then submitted this outline to the MPCA for approval in May 2011. After the GIS outline was approved, the information contained within the database was obtained through city, county and government sources.

The database identifies the current parcel and property ownership boundaries within the study area. Zoning, current land use and City ordinances that apply to the study were obtained from the City of Duluth.

Locations of known existing soil and sediment contamination were documented in the GIS system along with areas of contained (capped) contamination. Contaminants of concern were also included for these areas. Properties that are currently or formerly enrolled in the MPCA Volunteer Investigation and Cleanup (VIC) program were identified. The MPCA provided this information through existing files, documents and the MPCA VIC online database. Existing Assurance Letters and Environmental Covenants recorded on the property deeds are included for the identified VIC properties. Individual site areas (Area A through Area F) recorded on the site's Record of Decision (ROD) are also identified in the database. A files and records search was performed at the St. Louis County Recorder's Office to identify current ICs known to exist in the study area. Utility easements, railroad, street and riparian easements recorded on the deeds are also contained within the database.

RESULTS

The study area for this database consists of 153 separate parcels (Figure 10) with each titleholder (at the time data were collected) identified in the database. There are four zoning designations (Figure 12) within the database boundaries consisting of residential, industrial, mixed use and open space/undeveloped designations. Land use varies within the study boundaries and consists of nine land use designations (Figure 9):

- Harbor
- High Density Residential
- Light Industrial
- Manufacturing Industrial
- Miscellaneous
- Medium Density Residential
- Open Space Undeveloped
- Park
- Railroad Yard

Known areas of contamination (Figure 11) were identified in the database including containment areas (Figure 3) and impacted soil and sediment areas. Soil contamination areas are located on upland areas of:

- 54th Avenue West peninsula (naphthalene, PAHs),
- Hallett Dock 6 peninsula (PAHs and black tar layers) and
- Communication tower peninsula west of Stryker Bay (black tar layer).

54th Avenue West peninsula is currently owned by XIK Corporation which is a responsible party for the site. The area is zoned industrial and designated as open space undeveloped land use. A riparian buffer zone is identified on Figure 2 of the site's Response Action Plan; however a recorded easement was not identified during the records search. The site has restricted access from land (fence) and current ICs exist in the form of Environmental Covenants restricting soil disturbance and utilizing the property for industrial purposes.

Hallett Dock 6 peninsula is owned by the Hallett Dock Company and is used for bulk storage of materials. The area is zoned industrial and is designated as harbor land use except for a small western portion of the site that is designated as open space undeveloped. A riparian buffer zone is also identified on Figure 2 of the site's Response Action Plan along the western and southern shorelines; however a recorded easement was not identified during the records search. It is no longer used for shipping and receiving from vessels as the incorporation of Slip 6 as a Contained Aquatic Disposal (CAD) effectively ended the use for vessel traffic. Current ICs exist in the form of Environmental Covenants restricting soil disturbance and utilizing the property for industrial purposes.

Communication Tower peninsula west of Stryker Bay is zoned industrial and designated land use is open space undeveloped. It is currently owned by Midwest Communications and no known environmental covenants are recorded on the property deed.

Areas of contained (capped) contamination were identified in the database and shown as Figure 3. These areas include both upland and aquatic areas. Upland areas are located on the 54th Avenue West peninsula and have recorded Environmental Covenants. Aquatic areas include Stryker Bay, Slip 7 and adjacent areas, and Slip 6. Slip 6 was utilized as the CAD facility receiving contaminated dredging materials that were deposited within and capped with aggregate materials. The parcels surrounding aquatic capped areas all contain recorded Environmental Covenants restricting land use.

Former VIC Properties - Five former VIC properties are identified on the database (Figure 1), four of which currently contain Environmental Covenants recorded on the property deeds. These properties include:

- Former Maurices site (Inactive),
- Moline Machinery (Inactive), and
- Western National Bank (former Kemp's Fisheries Inactive) property.
- Hallett Dock Scalehouse

The Hallett Dock 7 parcel is the only inactive VIC property with no current Environmental Covenant as the covenant was terminated in late 2010. All of these properties are zoned industrial and land use designation varies. The inactive former Maurices site has the land use designation light industrial, Moline Machinery is designated as manufacturing industrial and the Western National Bank land use is open space undeveloped. Both Hallett Dock properties land designations are harbor use. The Environmental Covenants restrict soil disturbance and uses for industrial purposes.

CONCLUSIONS

Institutional controls exist within certain parcels of the site as Environmental Covenants recorded on the property deeds. The majority of property areas within the study boundary contain Environmental Covenants recorded on the property deeds. Remaining soil contamination on the former 54th Avenue West peninsula and the Hallett Dock peninsula have Environmental Covenants recorded on the deeds restricting soil disturbance and restricting land use to industrial. These ICs appear to be adequate for these areas and property uses. Hallett Dock does utilize its property for industrial purposes and they do not ship or receive materials via vessels.

The "DRAFT Project Completion Report" shows, on Figure 1-2, a conservation /buffer zone owned by XIK Corporation on the western and southern shoreline of the Hallett Dock 6 peninsula; however, it is not recorded on the property deed. The 54th Avenue West peninsula is open space and access is restricted from land. "The Draft Project Completion Report" Figure 1-2 also shows a conservation /buffer zone that exists on this property. This conservation/buffer zone is also not recorded on the property deed. There are no restrictions recorded on the deed for the remaining contamination (tar layer) on the communication tower peninsula owned by Midwest Communications. It appears from "The DRAFT Project Completion Report" that this area was investigated but not remediated.

Institutional controls are not present in parceled land areas of capped contamination in aquatic areas of Stryker Bay. Environmental Covenants are recorded on the property deeds adjacent to these areas and on capped aquatic area of Slips 6 and 7 that restrict soil disturbance but there are no apparent anchoring, dredging or docking restrictions that exist.

RECOMMENDATIONS

Institutional Controls seem warranted for the communication tower peninsula property (black tar layer) along the western shoreline of Stryker Bay. The existing tar layer identified in the database should be addressed through additional actions. Institutional controls should then be applied to this location if deemed appropriate.

Capped aquatic areas of remaining contamination on parceled lands identified in the "DRAFT Project Completion Report" should have ICs applied that restrict sediment disturbance that could pose a health risk. This could include anchoring, dredging restrictions or docking limitations.

This database is based upon information referenced within. Changes can be expected to occur to the information base with time. The database must be updated to stay current.

If you have questions concerning the project, please contact Klete Fallowfield of AECOM by calling 218-625-8766 to discuss.

Sincerely,

Alit Jullion

Klete Fallowfield Project Manager

att. Det

Robert L. DeGroot, PG PE Principal Engineer

Figures
























Complete IC Documents Master Table

AECOM ID	PARCEL No.	EXISTING ICs?	TYPE of IC	DOCUMENT ID	COMMENTS
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
1	010-2320-02970*	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	See Document# 429714 for property
2	010-2320-03030*	Y	Convenants	and 675203	description for Lots 7-14
				See Documents #	·
			Environmental Restrictive	<mark>674811, 674812,</mark>	
3	010-2320-03130*	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
4	010-2320-03210*	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
5	010-2320-03220*	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
6	010-2320-03240*	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
7	010-2320-03230*	Y	Convenants	and 675203	
				See Documents #	
				<mark>674811, 67812,</mark>	Document 88835 refers to the
			Environmental Restrictive	and 675203,	Termination of this Parcel ID from the
8	010-2320-03020	Y	Convenants	888385	restrictive covenant
				See Documents #	
				<mark>674811, 674812</mark>	Document 88835 refers to the
			Environmental Restrictive	and 675203,	Termination of this Parcel ID from the
9	010-2320-03010	Y	Convenants	888385	restrictive covenant
10	010-2320-03000	N			
11	010-2390-00130	N			
12	010-2390-00170	Ν			
13	010-2390-00200	Ν			
14	010-2390-00240	N			
15	010-2390-00260	Ν			
				See Document#	
16	010-2390-00270	Y	Street easements	0460808	
17	010-2390-00280	Ν			
18	010-2390-00290	Ν			
19	010-2390-00300	Ν			
20	010-2390-00310	Ν			
21	010-2390-00350	Ν			
22	010-2390-00340	N			
23	010-2390-00330	Ν			
24	010-2380-00340	N		1	
25	010-2350-00010	N			
26	010-2350-00045	Ν			
27	010-2350-00040	Ν			
				See Documents#	
				1134733 and	
28	010-2350-00070	Y	Street easements	1138039	
				See Documents#	
				1134733 and	
29	010-2350-00080	Y	Street easements	1138039	
				See Documents#	
				1134733 and	
30	010-2350-00090	Y	Street easements	1138039	
				See Documents#	
				1134733 and	
31	010-2350-00100	Y	Street easements	1138039	

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				See Documents#	
				1134733 and	
32	010-2350-00110	Y	Street easements	1138039	
				See Documents#	
				1134733 and	
33	010-2350-00120	Y	Street easements	1138039	
34	010-2360-00010	N			
35	010-2360-00170	Ν			
36	010-2360-00190	N			
37	010-2360-00200	N			
38	010-2360-00210	N			
30	010-2360-00210	N			
39	010-2300-00220	N N		-	
40	010-2360-00240	IN N			
41	010-2360-00260	N			
42	010-2360-00280	N			
				See Document#	
43	010-2360-00290	Y	Ordinance	560800	
44	010-2390-00010	N			
45	010-2390-00020	N			
				See Document#	
			Ordinance and Railroad	560800 and	
46	010-2390-00030	Y	easement	198273	
47	010-2390-00070	N			
	010 2000 00070			See Document#	
10	010 2200 00100	v	Street escoments	0460808	
40	010-2390-00100	I	Street easements	0400808	
10	010 0000 00110		<u>.</u>	See Document#	
49	010-2390-00110	Ŷ	Street easements	0460808	
				See Document#	
50	010-2390-00160	Y	Street easements	0460808	
				See Document#	
51	010-2390-00150	Y	Street easements	0460808	
				See Document#	
52	010-2390-00140	Y	Street easements	0460808	
				See Documents #	
			Environmental Restrictive	674811, 674812,	
53	010-2340-00050	Y	Convenants	and 675203	
	010 10 10 00000			See Documents #	
			Environmental Restrictive	674811 674812	
Г 4	010 2240 00040	V	Convenants	or4011, 074012,	
54	010-2340-00040	ř	Convenants		
				See Documents #	
			Environmental Restrictive	6/4811, 6/4812,	
55	010-2340-00030	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
56	010-2340-00020	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	674811, 674812,	
57	010-2320-02780	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	674811 674812	
58	010-2320-02750	v	Convenants	and 675203	
	010 2320-02730	1		See Documents #	
			Environmental Destriction	674914 C74942	
50	010 2220 02720	.,		0/4811, 0/4812,	
59	010-2320-02730	Y	convenants	and 675203	
			1	See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
60	010-2320-02940	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
61	010-2330-00190	Y	Convenants	and 675203	

r				See Documents #	
			Environmental Bestrictive	674811 674812	
62	010-2340-00010	Y	Convenants	and 675203	
02	010 20 10 00010			See Documents #	
			Environmental Restrictive	674811 and	
63	010-2330-00010	Y	Convenants	675203	
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			Environmental Bestrictive	674811, 674812,	
64	010-2330-00020	v	Convenants	and 675203	
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			Environmental Bestrictive	674811 674812	
65	010-2330-00030	v	Convenants	and 675203	
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			Environmental Restrictive	674811 674812	
66	010 2220 00200	v	Convonants	and 675202	
00	010-2330-00200	I	Convenants	Soo Documents #	
			Environmental Pectrictive	522 DOCUMENTS #	
67	010 2220 00210	V	Convenents	074011, 074012,	
67	010-2330-00210	Ŷ	Convenants	and 675203	
				See Documents #	
60	040 0000 00000	N.	Environmental Restrictive	674811, 674812,	
68	010-2330-00220	Ŷ	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	674811, 674812,	
69	010-2330-00230	Ŷ	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
70	010-2330-00240	Y	Convenants	and 675203	
			Restrictions, covenants,	See Documents #	
			easement, and Affidavit	768014, 768015,	
			concerning property	408018, 674811,	
			contaminated with hazardous	674812, and	
71	010-4500-04710	Y	substances	675203	
			Restrictions, covenants,	See Documents #	
			easement, and Affidavit	768014, 768015,	
			concerning property	408018, 674811,	
			contaminated with hazardous	674812, and	
72	010-4500-04770	Y	substances	675203	
			Restrictions, covenants,	See Documents #	
			easement, and Affidavit	768014, 768015,	
			concerning property	408018, 674811,	
			contaminated with hazardous	674812, and	
73	010-4500-04775	Y	substances	675203	
		-		See Documents #	
			Restrictions, covenants,	768014, 768015	
			easement, and Affidavit	408018, 571146	
			concerning property	785035 674811	
			contaminated with bazardous	674812 and	
74	010 4500 04780	v	substances	675202	
74	010-4300-04780	I	Postrictions, covenants	673203	
			escement and Affidavit	768014 769015	
			concorning property	100014, 100015,	
			concerning property	408018, 674811,	
75	010 4500 04705		contaminated with hazardous	674812, and	
75	010-4500-04785	Ŷ	substances	675203	
			Restrictions, covenants,	See Documents #	
			easement, and Affidavit	768014, 768015,	
			concerning property	408018, 674811,	
			contaminated with hazardous	674812, and	
76	010-4500-04870	Y	substances	675203	

				See Documents #	
			Restrictions, covenants,	768014, 768015,	
			easement, and Affidavit	408018, 571146,	
			concerning property	785035, 674811,	
			contaminated with hazardous	674812 and	
77	010-4500-04940	Y	substances	675203	
			Restrictions and covenants,	See Document#	
			Affidavit concerning property	768014, 768015,	
			contaminated with hazardous	675203, and	
78	010-4500-04970	Y	substances	<mark>674811, 674812</mark>	
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812</mark>	
79	010-4500-05030	Y	Convenants	and 675203	
				See Document#	
				904091, 571146,	
			Agreement for Covenants,	<mark>785035, 674811,</mark>	
			Restrictions, Easements and	674812, and	
80	010-4500-05100	Y	Licenses	<mark>675203</mark>	Active VIC Hallett Dock Scalehouse
				See Documents #	
			Environmental Restrictive	<mark>674811, 674812,</mark>	
81	010-4500-05190	Y	Convenants	and 675203	
				See Document#	
			Agreement for Covenants,	<mark>785035, 674811,</mark>	
			Restrictions, Easements and	674812, and	
82	010-4500-05250	Y	Licenses	<mark>675203</mark>	
				See Document#	
				<mark>904091, 571146,</mark>	
			Agreement for Covenants,	<mark>785035, 674811,</mark>	
			Restrictions, Easements and	674812, and	
83	010-4500-05260	Y	Licenses	<mark>675203</mark>	Active VIC Hallett Dock Scalehouse
84	010-4500-05350				
				See Document#	
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85	010-4500-05410	Y	Licenses	<mark>675203</mark>	
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				<mark>904091, 571146,</mark>	
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86	010-4500-05420	Y	Licenses	675203	Active VIC Hallett Dock Scalehouse
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			Restrictions, Easements and	674812, and	
87	010-4500-05570	Y	Licenses	675203	
				See Documents #	
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88	010-4500-05510	Y	Convenants	and 675203	
				See Document#	
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			Restrictions, Easements and	674812, and	
89	010-4500-05580	Y	Licenses	675203	Active VIC Hallett Dock Scalehouse
				See Documents #	
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90	010-4500-05670	Ŷ	Convenants	and 675203	
			_ ,	See Documents #	
			Environmental Restrictive	674811 674812,	
91	010-4500-05700	Ŷ	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	674811 674812,	
92	010-4500-05990	Y	Convenants	and 675203	

				See Documents #	
			Environmental Restrictive	<mark>674811 674812,</mark>	
93	010-4500-06035	Y	Convenants	and 675203	
				See Documents #	
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94	010-4500-06075	Ŷ	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	6/4811, 6/4812	
95	010-4500-06085	Ŷ	Convenants	and 675203	
			Environmental Destrictive	See Documents #	
06	010 4500 00000	N/	Conversion Restrictive	0/4811, 0/4812	
96	010-4500-06090	Ŷ	Convenants	and 675203	
			Environmental Destrictive	See Documents #	
07	010 4500 00125	N/	Conversion Restrictive	674811, 674812,	
97	010-4500-06125	Ŷ	Convenants	and 675203	
			Environmental Destrictive	See Documents #	
00	010 4500 00125	N/	Conversion Restrictive	0/4811 0/4812,	
98	010-4500-06135	Ŷ	Convenants	and 675203	
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00	010 4500 00145	N/	Environmental Restrictive	6/48116/4812,	
99	010-4500-06145	Ŷ	Convenants	and 675203	
				See Documents #	
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100	010-4500-06170	Ŷ	Convenants	and 675203	
				See Documents #	
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101	010-4500-06150	Y	Convenants	and 675203	
				See Documents #	
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102	010-4500-06160	Y	Convenants	and 675203	
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			contaminated with hazardous	<mark>674812, 675203,</mark>	
103	010-4500-06310	Y	substances	<mark>571146</mark>	
				See Documents#	
			Restrictions and covenants,	<mark>768014, 768015,</mark>	
			Affidavit concerning property	<mark>674811, 674812,</mark>	
			contaminated with hazardous	571146, and	
104	010-4500-06312	Y	substances	<mark>675203</mark>	
				See Document#	
			Restrictions and covenants,	<mark>768014, 768015,</mark>	
			Affidavit concerning property	<mark>785035, 674811,</mark>	
			contaminated with hazardous	674812, 675203,	
105	010-4500-06470	Y	substances	571146	
				See Document#	
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			Affidavit concerning property	785035, 674811,	Restrictions and Convenants under
			contaminated with hazardous	674812, 675203,	the Voluntary Investigation and
106	010-4500-06630	Y	substances	571146	Cleanup (VIC) program
			Restrictions and covenants	See Documents#	See "Moline Property" Document, for
			Affidavit concerning property	571146, 768014	Restrictions and Convenants under
			contaminated with bazardous	768015 674811	the Voluntary Investigation and
107	010-4500-06632	v	substances	and 675203	Cleanup (VIC) program
			Restrictions covenants	See Document#	
			easement and Affidavit	768014 768015	
			concerning property	785035 67/811	
			contaminated with bazardous	674812 675203	
109	010 4500 06050	v	substances	571146	
100	010-4000-00900	I '	JUDJUILES	5/1140	1

				See Document#	
			Postrictions and sovepants	768014 76801E	See "Meline Property" Decument for
			Restrictions and covenants,	706014, 706015,	See Moline Property Document for
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				See Document#	
				785032, 571146,	
			Agreement for Covenants	785035 674811	
			Disperior buffer Destrictions	(74912 and	
	010 2700 00550	N.	Riparian burler, Restrictions,	674812, and	
111	010-2700-00550	Y	Easements and Licenses	675203	
				See Document#	
				785032, 785035,	
			Dredging, Anchoring, Riparian	<mark>674811, 674812,</mark>	
			buffer, Structure, Restrictions	<mark>675203, 888385</mark>	
112	010-0130-00256	Y	and covenants	and Figure 4-6	Inactive VIC Hallett Dock 7
				See Document#	
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			Restrictions Essements and	675203 674811	
112	010 0120 00255	v	Liconcoc	674812 and	
115	010-0150-00255	T	Licenses	674612, allu	
				See Documents #	
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114	010-0130-00257	Y	Convenants	and 675203	
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			Restrictions, Easements and	785035, 675203,	
115	010-0130-00280	Y	Licenses	<mark>674811, 674812</mark>	
				See Document#	
				785032, 785035,	
			Dredging, Anchoring, Riparian	674811.	
			huffer Structure Restrictions	674812 675203	
116	010 0120 00201	v	and covenants	and Figure 4.6	
110	010-0130-00291	1		See Decuments #	
				366 DOCUMENTS #	
				785032, 571146,	
			Agreement for Covenants,	785035, 675203,	
			Riparian buffer, Restrictions,	<mark>674811, 674812,</mark>	
117	010-0130-00290	Y	Easements and Licenses	and 675204	
				See Documents #	
			Environmental Restrictive	674811, 674812	See Document# 1101836 for the
118	010-0130-00292	Y	Convenants	and 675203	Release of Lien
				See Documents #	
			Environmental Restrictive	674811 674812	
110	010-0130-00203	v	Convenants	and 675203	
119	010-0130-00293	1	convenants	See Desuments #	
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120	010-0130-00294	Y	Convenants	and 675203	
				See Document#	
			Environmental Convenants	<mark>571146, 00748110,</mark>	
			and Swampland Patent	675203, and	
121	010-2700-00551	Y	(MDNR)	674811, 674812	
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			1	See Document#	
			Environmental Convonants	5711/6 007/9110	
			and Swampland Datast	675202 and	
			and Swampland Patent	675203, and	
122	010-2700-00560	Y	(MDNR)	674811, 674812	

123	010-2700-00570	Y	Environmental Convenants and Swampland Patent (MDNR)	See Document# 571146, 00748110, 675203, 70023, 674811, and 674812	
				See Document#	
			Environmental Convenants	571146, 00748110,	
			and Swampland Patent	675203, and	
124	010-2700-00580	Y	(MDNR)	<mark>674811, 674812</mark>	
				See Document#	
			Environmental Convenants	5471146,	
			Swampland Patent, Dredging,	00748110, 785035,	
			Anchoring, Structure,	Figure 4-6, 674811,	
125	010-2700-00591	Y	Restrictions	<mark>674812, 675203</mark>	
	Т			See Document#	
				<mark>785032, 571146,</mark>	
			Environmental Convenants,	00748110, 675203,	
			Riparian buffer, and	and 674811,	
126	010-2700-00590	Y	Swampland Patent (MDNR)	674812	Tar seeps
			Dtrictions, covenants	See Documents #	
			Restrictions, covenants,	785032, 708014,	
			Affidavit concerning	705025 67/811	
			and Annuavic concerning	67/812 and	
127	010-0130-00300	Y	hazardous substances	675203	
12,	010 0100 00000	· · ·		See Documents #	
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128	010-0130-00410	Y	Convenants	and 675203	
				See Documents #	
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131	010-4500-05850	Y	Convenants	and 675203	
			En ironmental Bostrictivo	See Documents #	
100	010 4500 05860	v		6/4811, 0/4812	
152	010-4300-03800		Convenants	See Documents #	
			Environmental Restrictive	674811 674812	
133	010-4500-05870	Y	Convenants	and 675203	
100	010 1000 00070		conventints	See Documents #	
			Environmental Restrictive	674811, 674812	
134	010-4500-05880	Y	Convenants	and 675203	

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135	010-4500-05980	Y	Convenants	and 675203	
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136	010-4500-05970	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	6/4811, 6/4812	
137	010-4500-05960	Y	Convenants	and 675203	
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138	010-4500-05950	Y	Convenants	and 675203	
				See Documents #	
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139	010-4500-05940	Y	Convenants	and 675203	
				See Documents #	
			Environmental Restrictive	674811, 674812	
140	010-4500-05930	Y	Convenants	and 675203	
				See Documents #	
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141	010-4500-05920	Y	Convenants	and 675203	
				See Documents #	
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142	010-4500-05910	Y	Convenants	and 675203	
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				See Document#	
				101372, 674811,	
			Environmental Covenants and	674812 and	
145	010-4500-07270	Y	Easement	675203	
				See Documents#	
				1134733 and	
146	010-2350-00060	Y	Street easements	1138039	
				See Documents#	
				1134733 and	
147	010-2350-00065	Y	Street easements	1138039	
				See Documents#	
				1134733 and	
148	010-2350-00115	Y	Street easements	1138039	
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				1134733 and	
149	010-2350-00125	Y	Street easements	1138039	
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				1134733 and	
150	010-2350-00130	Y	Street easements	1138039	
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151	010-2350-00140	Y	Street easements	1138039	
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				1134733 and	
152	010-2350-00150	Y	Street easements	1138039	
				See Documents#	
				1134733 and	
153	010-2350-00160	Y	Street easements	1138039	

Notes: *=Register of Deeds Office has Parcel No. as 010-2370