Spirit Lake – Former U. S. Steel Duluth Works Site Great Lakes Legacy Act Project - Duluth, Minnesota

Proposed Remedy

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U.S. Environmental Protection Agency Great Lakes National Program Office



Overview

- Welcome and Introductions
- Great Lakes Legacy Act
- Roles and Responsibilities
- Site History
- Extent of Impacts
- Proposed Cleanup Approach
- Benefits of the Project
- Potential Impacts
- Schedule
- Opportunities for Input

Implementation Approach

Great Lakes Legacy Act (Cooperative)

instead of

MERLA (Enforcement)



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Great Lakes Legacy Act

Goal:

- Faster: Accelerate the pace of sediment remediation at Areas of Concern (AOCs)
- *Better: Go above and beyond* the minimum requirements
- Restore: Incorporate habitat restoration into remediation projects

Mechanism:

 Uses public-private partnerships to remove roadblocks to sediment remediation







2,370,500 cubic yards remediated



Who are the GLLA Non-Federal Sponsors?

- States
- Industries
- Municipalities
- Combinations of the above



Industries (37) Involved in GLLA Projects

- DuPont Co.
- GenCorp Inc.
- Honeywell International Inc.
- Illinois Tool Works, Inc.
- United Technologies
- Allied Waste Industries, Inc.
- Phelps Dodge (Now Freeport-McMoRan)
- Cabot Corp
- Detrex Corp
- XIK Corp
- Consumers Energy
- Varta Microbattery, Inc.
- The Mosaic Co.
- BP-Husky Refining
- BASF Corp.
- Arkema Corp
- Wisconsin Public Service
- Pollution Risk Services

- Cleveland Illuminating Co.
- Mallinckrodt Inc
- Millennium Inorganic Chemicals
- Ohio Power
- Olin Corp
- Occidental Chemical
- RMI Titanium Co
- Sherwin Williams
- Union Carbide
- CBS Operations (Viacom Intl)
- Elkem Metals
- Perstorp Polyols, Inc.
- Chevron USA
- Sunoco, Inc
- Pilkington North America
- U.S. Steel
- + Ford
- Tyco Fire Products
 - Fraser Shipyard



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Benefits of GLLA

- Cooperative, Collaborative Approach
- Faster Implementation
- Shared Goals
- Shared Costs
- More Comprehensive Approach



Roles and Responsibilities

- U.S. EPA
 - Project Management
 - Project Implementation
 - Funding
- U. S. Steel
 - Project Management
 - Project Implementation
 - Funding
- MPCA
 - Project Oversight/Permitting
 - Technical Coordination/Technical Expertise



Project Location



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Project Location





Former Duluth Works





History of Duluth Works

- Development of steel making facility beginning in 1907
- Operations commence in 1915
- Integrated steel manufacturing plant (Coke, Iron, Steel and Finishing facilities)
- Production peaks in World War I, II and 1950s
- Shutting down by 1979
- Most structures demolished by 1988



History of Duluth Works

- Environmental site listing 1983 (Federal and State SuperFund programs)
- Record of Decision 1989 Prescribed upland remedies & "no action with periodic inspections/monitoring" for sediments units
- Upland remediation work completed in phases additional work based on Agency 5 year reviews
- On-going monitoring activities
- Duluth Seaway Port Authority partnership
- U. S. Steel and EPA partners on Spirit Lake sediment site planning since 2011



Project Area





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Spirit Lake Sediment Studies





Area of Sediment Impacts





Milestones

- Remedial Investigations (RI) 2011-2013
 - Multiple sampling events winter and summer
- Feasibility Study (FS) 2013-2015
 - Twelve Alternatives developed and evaluated
- Seven Resource Managers meetings held along the way to obtain feedback
- Final FS Addendum December 2015
 - Incorporated additional hybrid Alternative



Potential Remedial Alternatives

- No Action
- Monitored Natural Recovery
- Capping
- Dredging
- Enhanced Natural Recovery
- Combination Remedies



Remedy Evaluation Factors

- Protection of Human Health and the Environment
- Compliance with State and Federal Laws
- Long Term Effectiveness
- Short Term Effectiveness
- Reduction in Toxicity, Mobility, and/or Volume
- Implementability
- Cost
- State and Community Acceptance



Screening Level Evaluation of Alternatives

Table 2-2

(FS Addendum - Revision of Table 5-2 to include Alternative 8B) SCREENING LEVEL EVALUATION OF ALTERNATIVES

Former U. S. Steel Duluth Works - Spirit Lake Sediment Site

Saint Louis River

Duluth, Minnesota

		Effectiveness of Achieving RAOs and Considerations Upland RAOs and Considerations Estuary RAOs and Considerations			Relative Cost	Screening Level Score		
Alternative	Description	Protect numer health and the environment Provide a stable water course for stormwater conveyance and discharge Preserve areas for economic development	Protect numan health and the environment Reduce beneficial use impairments for St. Louis River Area Concern Improve habitat (betterment)	Implementability	Relative Rankings: #1 = lowest cost; #12 = highest cost	(sum of Effectiveness, Implementability, and Cost scores)	Additional Factors for Consideration	Retained for Detailed Evaluation?
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Screening Alternatives - continued

Table 2-2 (FS Addendum - Revision of Table 5-2 to include Alternative 88) SCREENING LEVEL EVALUATION OF ALTERNATIVES Former U. S. Steel Duluki Works - Spirit Lake Sediment Site

Saint Louis River

Duluth Minnecota

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Screening Key:	Effectiveness	Implementability	Cost	Overall Score
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	Medum Effectiveness - 3 points	Median Implementati IV - 3 conta	Metit in Cost is to vite	E.10 points
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Lowest score is the most desirable

Detailed Alternatives Comparison

Table 2-11 (FS Addendum - Revision of Table 5-10 to include Alternative 8B) ALTERNATIVES COMPARISON Former U. S. Steel Duluth Works - Spirit Lake Sediment Site Saint Louis River Duluth, Minnesota

	<u>Alternative 4</u> CDF on OU-M Delta (within shoreline)	<u>Alternative 6</u> Shallow Sheltered Bay with CDF	<u>Alternative 7</u> Shallow Sheltored Bay and Delta Cap Area with Upland CDFs	<u>Alternative 8</u> Shallow Shalterad Bay with Delta Sediment CDF and Upland CDFs	<u>Alternative 8B</u> Shallow Sheltered Bay with Delta Sediment CDF above OHWL and Upland CDFs	<u>Alternative 12</u> Open Water Bay with Upland CDFs
Overall protection of human health and the environment	Score: 1 Protective	Score: 1 Protective	Score: 1 Protective	Score: 1 Protective	Score: 1 Protective	Score: 1 Protective
Compliance with regulatory requirements (ARARs)	<u>Score: 1</u> Compliant	Score: 2 Compliant. Requires additional permit considerations as part of CDF is located within assumed OHWL.	<u>Score: 1</u> Compliant	Score: 2 Compliant. Requires additional permit considerations as part of CDF is located within assumed OHWL.	Score: 1 Compliant. CDF footprint entirely west of the OHWL results in less permitting requirements.	<u>Score: 1</u> Compliant
Long-term effectiveness and permanence	Score: 2 More stormwater structures to maintain.	<u>Score: 1</u> Effective	Score: 3 Stormwater management and three CDFs would require more O&M than other alternatives and would be more likely to result in greater potential risk of short and long-term failure than the other alternatives.	Score: 2 Effective. Three CDFs would require more O&M than other alternatives.	Score: 2 Effective. Three CDFs would require more O&M than other alternatives.	Score: 2 Effective. Three CDFs would require more O&M than other alternatives.
Reduction of toxicity, mobility (overall risk)	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk
Short-term effectiveness	Score: 2 Effective. Stormwater diversion south of spit.	<u>Score: 1</u> Effective.	Score: 3 Stormwater management presents risks during construction. Less effective than other alternatives because of longer construction duration.	Score: 1 Effective	Score: 1 Effective	Score: 2 Less effective than other alternatives because of longer construction duration.
İmplementability	Score: 3 Implementable; however, Upland material must be moved longer distance to CDF.	Score: 5 Implementable; however, height of delta CDF creates potential sight-line impairments and geotechnical loading concerns. In addition, elimination of the LS&M Railroad is required.	Score: 5 Implementable; however, has the most uncertainty because of the complications of stormwater management in a confined channel, and CDF construction, which includes steeper berms and requires soil stabilization, is more complicated than other alternatives. Height of OU-M Delta CDF has potential to create view-shed impacts. Longer construction schedule than other alternatives.	Score: 2 Implementable. Consolidation areas are proximal to source removal areas.	Score: 4 Implementable. Consolidation areas are proximal to source removal areas. Height of OU-M Upland CDF and its berms requires soil stabilization and has the potential to create view-shed impacts.	Score: 5 Implementable; however, removed material must be moved greater distance than other alternatives retained for detailed analysis. Height of OU-M Upland CDF berms requires soil stabilization and has the potential to create view-shed impacts. Longer construction schedule than other alternatives.
Cost	<u>Score: 2</u> Lowest cost of the alternatives retained for detailed analysis	Score: 3 Moderate cost, more than Alternatives 4 and 8, but less than Alternatives 7 and 12	<u>Score: 5</u> Most expensive of the alternatives retained for detailed analysis	Score: 3 Moderate cost	<u>Score: 3</u> Moderate cost	Score: 4 Second highest among the alternatives retained for detailed analysis
Compliance with 11 Sediment Principles/Sediment Guidance	Score: 1 Compliant	Score: 1 Compliant	<u>Score: 1</u> Compliant	Score: 1 Compliant	<u>Score: 1</u> Compliant	Score: 1 Compliant
Total Score	13	15	20	13	14	17

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Scoring Key: 1 through 5, lowest score is the most desirable

Alternative 8B Recommended



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Components of the Proposed Remedy

- Dredging (697,000 cubic yards)
- Underwater Capping (109 acres in the estuary)
- Enhanced Monitored Natural Recover (30 acres)
- Monitored Natural Recovery (59 acres)
- On Site Confined Disposal Facilities (CDFs)
- Long-Term Monitoring
- Habitat Restoration
- Estimated Cost is ~\$70M



Proposed Remedy





Dredging



Dredging







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Dredging

- Dredging is the mechanical or hydraulic removal of sediments from the waterbody.
- Targeted for areas of higher contamination and where additional water depth is desired for ecological and human use.
- Most complicated remedial approach requiring multiple components
 - Dredging
 - Transport
 - Processing/Dewatering
 - Water Trea<mark>tmen</mark>t
 - Disposal
 - Control of Residual Contamination



















- Disposal cells specifically designed to manage and contain contaminated sediments.
- Targeted for impacted areas adjacent to Unnamed Creek and the Unnamed Creek Delta (total of 40 acres).
- Used successfully throughout the Great Lakes
- Require long-term maintenance and monitoring (U. S. Steel responsibility)
 – Overseen by EPA and MPCA
- Could include habitat/access enhancements









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- Placement of clean material (cap) over contaminated sediments that will remain in place.
- Creates a physical and chemical barrier to prevent exposure to contaminants.
- Highly effective at immediately reducing exposures.
- Can be utilized to efficiently create targeted water depth for aquatic habitat restoration.
- Requires long-term monitoring and maintenance.

Monitored Natural Recovery

- Utilizes, on-going, naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants.
- Targeted for areas where natural sedimentation has buried historical contamination.
- Primary MNR Mechanism: Sedimentation
- Secondary MNR Mechanism: Contaminant Breakdown (for PAHs)

Monitored Natural Recovery

Natural Cover Areas

Enhanced Monitored Natural Recovery

- Provides an additional thin layer cap to speed up the naturally occurring sedimentation processes taking place at the site.
- Targeted for areas where:
 - Surface contamination is low
 - Natural sedimentation has partially buried contamination
 - Models predict on-going sedimentation to occur
 - Areas of low energy
 - Areas of higher habitat quality

Enhanced Monitored Natural Recovery

Enhanced Monitored Natural Recovery

U.S. Environmental Protection Agency Great Lakes National Program Office

Potential Restoration Opportunities

- Submerged Aquatic Plants
- Emergent Aquatic Plants
 - Wild Rice
- Fish Habitat
 - Shallow, Sheltered Bay
 - Structure
 - Spawning Habitat
- Public Access
 - Canoe/Kayak Launch
 - Hiking Tra<mark>ils</mark>

Summary of Project Benefits

- Protection of Human Health and the Environment
- Creation of Open Water (30 acres)
- Creation of Shallow, Sheltered Bay Habitat
- Shallow Water Vegetation
- Potential to Enhance Public Access to the River

Potential Short-term Impacts

- Noise During Construction
- Increased Truck Traffic
- Interruption of Railroad Operations
- Construction Lighting

Project Schedule

- Public Input/Finalize FS (November 2016)
- Design and Permitting (December 2017)
- Construction (January 2018 to December 2019)
- Long-Term Monitoring (Forever)

Opportunities for Input

- Q&A Session
- Poster Session
- Comment Forms
- Email
- Written Comments
- Additional Meetings During Design Phase
- EPA and U. S. Steel to Prepare a Response to Comments Document

