Midway Metals Stormwater Sampling and Analyses

Final Report

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Abstract

Midway Metals, located at 258010 Hwy 101 in Sequim, WA, has been used as a scrap metal recycling facility since 1991. In 2008, the site was listed on the Confirmed and Suspected Contaminated Sites list by the Washington State Department of Ecology. A Site Hazard Assessment was completed using the Washington Ranking Method which resulted in a rank of 1, representing the highest level of potential risk.

Stormwater testing was prompted due to concerns over the level of contamination on the property. Clallam County and Washington State Department of Ecology partnered to collect and analyze samples in an attempt to determine if contaminants of concern were leaving the site. Three sampling sites were selected at various points in stormwater conveyances. All samples were collected using the Washington State Department of Ecology's Standard Operating Procedure titled "Collecting Grab Samples from Stormwater Discharges" (Publication 18-10-023).

Results were compared against benchmarks allowed for each parameter permitted in the Midway Metals Industrial Stormwater General Permit (ISGP). The parameters not permitted in the ISGP were compared to the MTCA Surface Water Cleanup Levels. All parameters included in the stormwater permit were below reporting limits except lead; however, lead was below benchmark values allowed by the permit. Chromium and cadmium are not included in the ISGP and had values above reporting limits. A technical memo summarizes the results.

Introduction

Study site and background

Midway Metals, Washington State Department of Ecology (Ecology) Facility Site ID#1671323, is located in Clallam County (parcel # 04-30-18-43-1000) on the south side of Hwy 101 in Sequim, WA. The property has been in operation as a scrap metal recycling facility since the early 1990's and was ranked a "1" under the Models Toxics Control Act (MTCA) site in 2008 (Cleanup Site ID# 958). The rankings represent an estimation of the potential threat posed by a site compared to all other ranked sites in the state.

The property is located on Hwy 101 and is zoned Rural Low (R5), which is described as having a low-density rural setting free from commercial, industrial, and moderate density residential developments. The business operates as a non-conforming dump site and is undergoing enforcement by Clallam County. The site is largely unattended, and as a result, many uncharacterized substances have been dumped at the site. The site also contains a variety of home appliances that have not been properly decommissioned, lawnmowers, vehicles and car parts, lead-based batteries, and construction and demolition debris, amongst other solid waste.

The terrain of the property slopes up immediately upon entering south onto the easement with a slope of 9.4% (CCEH, 2006). The east side of the property is heavily worked and has a slight slope to the east. Stormwater flows downhill to the north and east from the property and into two drainage ditches located along the road at the northern end of the property. The property owners recently acquired an Industrial Stormwater General Permit (ISGP)/ National Pollutant Discharge Elimination System (NPDES) permit which became effective February 5, 2020 (# WAR308805). Prior to that, the business had not been in compliance with a required ISGP since 2010.

The primary stormwater conveyance is parallel to the road and drains east directly into McDonald Creek (WRIA #18.0160). McDonald Creek is a Class AA waterbody that supplies water to the Agnew Irrigation District and is a significant, independent tributary that drains into the Strait of Juan de Fuca. McDonald Creek has historically supported several salmon species, including coho and chum salmon, steelhead, cutthroat and rainbow trout, and Dolly Varden trout, all whose smolt are monitored by the Jamestown S'Klallam Tribe (Elwha-Dungeness Planning Unit, 2005).

There is a second conveyance draining directly from the property's easement that flows east until it drains into the Agnew Irrigation District intake. It mixes with irrigation water, which then gets diverted under the road and emptied into a wetland (ID# MS0604). The current drainage was constructed as part of the highway construction project. The Agnew Irrigation District supplies water to area farms and residents downstream (Yuam, 2020).

Figure 1 is an aerial photograph delineating parcels in the study area. Midway Metals is in the center of the image (#43-0105). McDonald Creek, not in the image, is downstream (east) of the property.

Figure 1: Study Area

Clallam County Department of Community Development, 2017

Previous Studies and Regulatory Issues

Summary of previous studies and existing data

Clallam County Environmental Health (CCEH) conducted a site assessment in October 2006 via soil sampling. The sample results are described in Table 1 below with the exceedances of the MTCA Method A cleanup levels noted in bold text. Sampling results at Midway Metals indicate that discharges from materials and substances caused contamination levels in soil that exceeded the MTCA Method A cleanup levels for cadmium (Cd), lead (Pb), and total petroleum hydrocarbons (TPH)-heavy oil. One sampling location also had high levels of TPH-Diesel (TPHD) (CCEH, 2006).

Table 1: 2006 Soil Sample Results

Sample	Analyte Found	Sample Result (ppm)	Applicable Standard	(ppm)
Lawn Mower	Cadmium	**4.1**	MTCA A ULU*	2.0
	Lead	172	"	250
	TPH-Diesel	120	"	2,000
	TPH-Heavy Oil	530	"	2,000
Tier 2 West	Cadmium	**3.5**	"	2.0
	Lead	136	"	250
	TPH-Diesel	280	"	2,000
	TPH-Heavy Oil	1,300	"	2,000
Batteries	Cadmium	**7.1**	"	2.0
	Lead	**3,000**	"	250
	TPH-Diesel	1,800	"	2,000
	TPH-Heavy Oil	**10,000**	"	2,000

***MTCA A ULU refers to the Model Toxics Control Act Table 740-1 Method A Soil Cleanup Levels for Unrestricted Land Use**

The site was scored and ranked using the Washington Ranking Method (WARM) as described in Ecology's Publication 90-14 based on the analytical results outlined above in Table 1. Cd, Pb, TPH-diesel and TPH-heavy oil were considered for scoring. Migration potential was valued at the maximum score of 10 due to no run-on/run-off control. Two targets were identified: a wetland, located 750 feet away from the site, and McDonald Creek, located 1000 feet downstream (CCEH, 2006; Clallam County, 2020).

In 2012, the Washington State Department of Transportation (WSDOT) conducted remedial activities through Ecology's Voluntary Cleanup Program (VCP) under VCP#SW1202 after acquiring a section of the right-of-way on the northernmost portion of the property. Analyses of soil samples collected from 2 feet below ground surface or less detected concentrations exceeding MTCA Method A soil cleanup levels of these contaminants: heavy metals, TPHs, and total carcinogenic polycyclic aromatic hydrocarbons (cPAHs). Sources identified in the report include surface releases from junked vehicles, lead/acid batteries, and heavy machinery. The report also stated that contaminants of concern (COCs) have been released and mixed with shallow soils due to site activities, and that one of the potential transport mechanisms include soil erosion caused by rainwater runoff and wind, with subsequent downgradient deposition (GeoEngineers, 2013).

Regulatory criteria or standards

In 2018, the property owners were granted legal, non-conforming use of the property as a wrecking/junk yard by the Clallam County Superior Court (Haymaker, 2018). However, the property owner was required to comply with all requirements necessary to operate as a legal wrecking yard or junk yard. This would include state licensing requirements, compliance with Clallam County Code, and acquiring and maintaining compliance with a NPDES permit/ISGP. This permit "limits the discharge of pollutants to surface waters under the authority of the Federal Water Pollution Control Act (U.S.C.S. 1251) and limits the discharge of pollutants to surface and groundwater under the authority of Chapter 90.48 RCW" (Ecology, 2019).

Washington State Administrative Code (WAC) 173-201A-240(1) states that "toxic substances shall not be introduced above natural background levels in waters of the state which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the department [Ecology]" (WAC, 2020)

PCBs are monitored under the federal Toxic Substances Control Act of 1976 (EPA 2019c).

Purpose of Study

At the start of this project, Midway Metals had not had a valid ISGP since 2010 and did not have a state license to operate as a metal scrapping facility. Clallam County sought to learn the extent of contamination leaving the Midway Metals site via stormwater runoff to determine the potential threat this non-conforming facility may have on environmental and public health.

Method

Field data collection

Sampling locations and frequency

Field staff followed the field protocol described in the Ecology approved Quality Assurance Project Plan (QAPP) developed for this project (Watts, 2020).

Figure 2 presents sampling locations in the stormwater conveyances located on each side of the property (1 and 2), located at the center of the image, and at the outflow point at the northeastern corner of the property (3). The main stormwater conveyance is parallel to the road and flows directly into McDonald Creek, which is located 1000 feet downstream (Elwha-Dungeness Planning Unit, 2005). The conveyance at the outflow runs parallel and 15-20 feet south of the main conveyance until it flows into the Agnew Irrigation District's intake about 250 feet downstream (Yuam, 2020). Table 2 lists each sample location's geographical coordinate.

Figure 2: Sample Collection Sites

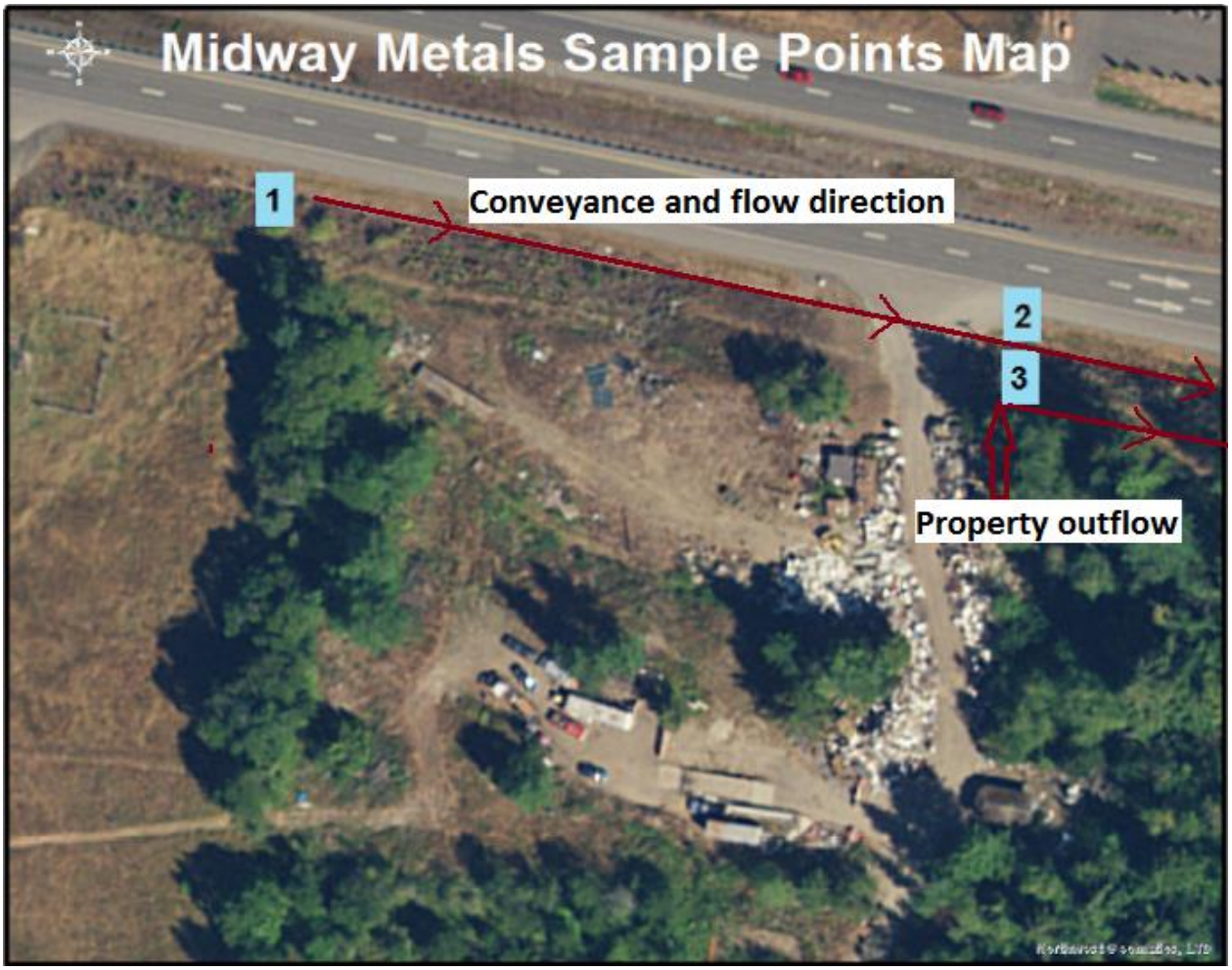

Table 2: Sample locations Geographical Coordinates

Sample Site Name	Sample ID	Latitude	Longitude
Site #1	1	48.091093	-123.253339
Site #2	2	48.089270	-123.240351
Site #3	3	48.089263	-123.240727
Site #3	3FR	48.089263	-123.240727

Sampling locations were selected for representativeness based on this reasoning:

- Sample site #1: stormwater conveyance located parallel to the highway and upstream from the active portion of the site at the property line to serve as baseline measurement
- Sample site #2: Stormwater conveyance downstream from sample site #1
- Sample site #3: Stormwater conveyance running directly off the property and into Agnew irrigation intake and occasionally overflowing into sample site #2 conveyance

Field parameters and laboratory analytes to be measured

The COCs, their potential sources, and concerns related to the environment and/or public health are summarized in Table 3. Polychlorinated biphenyls (PCBs) were added to the list of COCs, although not previously tested for in the assessments described above, due to the type of solid waste at the site.

Table 3: Contaminants of Concern (COCs)

Contaminant	Potential Source	Cause for concern
Cadmium[1]	Batteries, metal plating, pigments, burning oil	Pulmonary irritation; kidney disease; carcinogen; potential developmental toxicant
Chromium[2]	Steel/alloy materials, chrome plating, dyes/pigments, textiles	Effects on respiratory tract; carcinogen; leachability potential
Lead[3]	Lead gasoline, lead/acid batteries, C&D waste, lead-based paints	Highly toxic, especially to children under 6 and pregnant women; affects most organs and systems in body; bioaccumulation
Mercury[4]	Electronic devices, batteries, light bulbs and thermometers	Neurotoxin; developmental toxicant; heart, kidney and lung impairments; bioaccumulation
PAHs[5]	Released in fumes from burning gasoline, oil, trash, creosote, and wood	Irritant, carcinogen, liver and blood abnormalities
PCBs[6]	Transformers, fluorescent lighting lubricants, hydraulic fluids, heat transfer fluids, plasticizers, flame retardant	Cancer; effects on the immune, reproductive, nervous, and endocrine systems; bioaccumulation
TPHG[7]	Gasoline, motor and lubricating oils, heating oils, unknown substances	Affects central nervous system, blood, immune system, lungs, skin, and eyes
TPHD[6]	Gasoline, motor and lubricating oils, diesel fuel, heating oils, unknown substances	Affects central nervous system, blood, immune system, lungs, skin, and eyes

1. EPA, 2016a
2. EPA, 2016b
3. EPA, 2019a
4. EPA, 2019b
5. CDC, 2009
6. EPA, 2019c
7. EPA, 2010

Assumptions underlying design

There was an expectation most of the COCs would be present in Sample 1. This sample therefore would serve as the baseline reading due to proximity to the highway, although the highway runoff is addressed in the Department of Transportation's (WSDOT) Municipal Stormwater Permit. Midway Metals ISGP only covers stormwater leaving the site and does not consider background.

The study design assumed the sampling locations adequately captured the contaminants flowing off the property. This snapshot will provide a representative picture that will help determine the need for future monitoring/enforcement.

Challenges and contingencies

Precipitation was not significant enough at the time of sampling to create enough flow in the channels. Field staff had to dig holes at each sampling site to create a pool of water to collect the sample from.

Results

Field Data

The pre-sampling site visit was conducted on February 6, 2020. The flow in the stormwater conveyances was adequate to collect samples.

Field samples were collected March 10, 2020. The flow was lower than the pre-sampling site visit. Field staff had to dig a hole to create a pool to collect water from to collect the samples. No out-of-the ordinary observations were made.

Figures 3, 4, and 5 are copies of the field data sheets.

Figure 3: Site #1 Field Data

Site # 1

Clallam County Environmental Health:
Field Log

Project name: Midway Metals Stormwater Sampling & Analyses Project location: 258010 Hwy 101, Port Angeles, WA

Project EIM ID MM-Clallam-2020

Presampling site visit:

Date 2/6/2020 Field personnel E. Owens, H. Watts

Sequence of events

Time:	Observation/event
9AM	water flowing enough for representative sample.

Environmental conditions:

Sample site locations

Site Name	Latitude	Longitude
Sample site #1		
Sample site #2		
Sample site #3		

Field Sampling:

Site 1 Date 3/10/2020 Field personnel J. Garcelon, A. Gosnell, J. Hart, + H. Watts

Sequence of events

Time:	Observation/event
0940	Grassy, broad bottomed ditch appox 10' South of Hwy 101. Water Channel ~ 2' across. Water is ~ 1-2" deep, silty with more abundant algae. Low flow

Environmental conditions: 37°F, Overcast, slight breeze

Deviations from QAPP: (include explanation) Had to dig a trench to create deeper enough water to fill larger bottles.

Unusual circumstances:

Figure 4: Site #2 Field Data

Site #2

Clallam County Environmental Health:
Field Log

Project name: Midway Metals Stormwater Sampling & Analyses Project location: 258010 Hwy 101, Port Angeles, WA

Project EIM ID MM-Clallam-2020

Presampling site visit:

Date 2/6/2020 Field personnel E.Owens, H.Watts

Sequence of events

Time:	Observation/event
9:00 Am	Water flowing enough in ditch for representative sample.

Environmental conditions: Roadside ditch vegetated with rushes, grasses and small saplings.

Sample site locations

Site Name	Latitude	Longitude
Sample site #1		
Sample site #2		
Sample site #3		

Site 2 **Field Sampling:**

Date 3/10/2020 Field personnel Heather Watts, Andy Gosnell, Jen Carelton, Jason Hart

Sequence of events

Time:	Observation/event
0900	Approx 2" of water flowing from aluminum culvert into grassy ditch paralleling Hwy 101. Roughly 10' south of roadway

Environmental conditions: 37° F @ 8:53Am, overcast

Deviations from QAPP: (include explanation)

Unusual circumstances:

Figure 5: Site #3 Field Data

Site #3

Clallam County Environmental Health:
Field Log

Project name: Midway Metals Stormwater Sampling & Analyses Project location: 258010 Hwy 101, Port Angeles, WA

Project EIM ID MM-Clallam-2020

Presampling site visit:

Date 2/2020 (2/6/2020) Field personnel E. Owens, H. Watts

Sequence of events

Time:	Observation/event
9AM	water flowing enough for representative sample.

Environmental conditions:

Sample site locations

Site Name	Latitude	Longitude
Sample site #1		
Sample site #2		
Sample site #3		

Site 3 **Field Sampling:**

Date 3/10/2020 Field personnel Jen Garcelon, Heather Watts, Jason Hart, Andy Gosnell

Sequence of events

Time:	Observation/event
0921	Grassy ditch paralleling sample site 2, roughly 20ft south. Approx. 2" of water, no flow. Water channel is ~10" wide

Environmental conditions: 37°F. Overcast

Deviations from QAPP: (include explanation) Had to dig a trench to create deep enough water to fill larger bottles.

Unusual circumstances:

Lab Data

The results from each sample are detailed in Table 4.

Table 4: Laboratory Results

Analyte (unit)	Sample Site Name				RL/LLOQ	Qualifiers
	1	*2*	*3*	*3FR*		
Cd (µg/L)	0.10	0.10	0.10	0.16	0.10	U/U/U
Cr (µg/L)	2.74	1.47	1.64	1.91	0.20	
Hg (µg/L)	0.50	0.50	0.50	0.50	0.50	U/U/U/U
Pb (µg/L)	0.51	0.37	0.68	1.23	0.10	
PCB-1016 (µg/L)	0.0294	0.0294	0.0294	0.0294	0.0294	U/U/U/U
PCB-1221 (µg/L)	0.0294	0.0294	0.0294	0.0294	0.0294	U/U/U/U
PCB-1232 (µg/L)	0.0294	0.0294	0.0294	0.0294	0.0294	U/U/U/U
PCB-1242 (µg/L)	0.0294	0.0294	0.0294	0.0294	0.0294	U/U/U/U
PCB-1248 (µg/L)	0.0294	0.0294	0.0294	0.0294	0.0294	U/U/U/U
PCB-1254 (µg/L)	0.0294	0.0294	0.0294	0.0294	0.0294	U/U/U/U
PCB-1260 (µg/L)	0.0294	0.0294	0.0294	0.0294	0.0294	U/U/U/U
PCB-1262 (µg/L)	0.0294	0.0294	0.0294	0.0294	0.0294	U/U/U/U
PCB-1268 (µg/L)	0.0294	0.0294	0.0294	0.0294	0.0294	U/U/U/U
1-methlnapthalene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
2-chloronapthalene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
2-methylnapthalene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
acenaphthalene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
acenaphthylene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
anthracene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
benz[a]anthracene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
benzo(a)pyrene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	UJ/U/U/U
benzo(b)fluoranthene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	UJ/U/U/U
benzo(ghi)perylene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	UJ/U/U/U
benzo(k)fluoranthene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
carbazole	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
chrysene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U

Analyte (unit)	Sample Site Name				RL/LLOQ	Qualifiers
	1	*2*	*3*	*3FR*		
dibenzo(a,h)anthracene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
dibenzofuran	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
fluoranthene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
fluorene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
indeno(1,2,3-cd)pyrene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	UJ/U/U/U
napthalene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
phenanthrene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
pyrene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
retene	0.0568	0.0559	0.0595	0.0610	0.0568(1)/0.0559(2)/0.0595(3)/0.0610(3FR)	U/U/U/U
#2 Diesel	0.19	0.17	0.18	0.18	0.19(1)/0.17(2)/0.18(3)/0.45(3FR)	U/U/U/U
Lube Oil	0.47	0.42	0.45	0.45	0.47(1)/0.42(2)/0.45(3)/0.45(3FR)	U/U/U/U
Gasoline	0.070	0.070	0.070	0.070	0.070 (1-3dup)	U/U/U/U

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Colors desginate analyte class.

Discussion

The ISGP helps industrial facilities comply with federal regulations that reduce pollution. Ecology requires most industrial sites in Washington to monitor, measure, and reduce stormwater pollution leaving their site. Oil sheen, total lead, and petroleum hydrocarbons (diesel fraction) were analyzed in this study and are parameters included in Midway Metal's ISGP. The results for these parameters were compared against the benchmarks allowed for each parameter in the permit. Lead values were below benchmarks in all samples. There was no visible oil sheen present on the surface of the water. The benchmarks for each of the parameters permitted for the site can be found in Tables 5 and in section 2 of Table 6 (Ecology, 2020b).

Table 5: Benchmarks and Sampling Requirements Applicable to All Facilities (Table 2 in ISGP)

Parameter	Units	Benchmark Value	Analytical Method	Laboratory Quantitation Level [a]	Minimum Sampling Frequency [b]
Turbidity	NTU	25	EPA 180.1 Meter	0.5	1/quarter
pH	Standard Units	Between 5.0 and 9.0	Meter/Paper [c]	±0.5	1/quarter
Oil Sheen	Yes/No	No Visible Oil Sheen	N/A	N/A	1/quarter
Copper, Total	µg/L	Western WA: 14 Eastern WA: 32	EPA 200.8	2.0	1/quarter
Zinc, Total	µg/L	117	EPA 200.8	2.5	1/quarter

Table 6: Additional Benchmarks and Sampling Requirements Applicable to Specific Industries (Table 3 in ISGP)

Parameter	Units	Benchmark Value	Analytical Method	Laboratory Quantitation Level [a]	Minimum Sampling Frequency [b]
1. Chemical and Allied Products (325xxx), Food and Kindred Products (311xxx-312xxx)					
BOD_5	mg/L	30	SM 5210B	2	1/quarter
Nitrate + Nitrite Nitrogen, as N	mg/L	0.68	SM4500 NO3-E/F/H	0.10	1/quarter
Phosphorus, Total	mg/L	2.0	EPA 365.1	0.01	1/quarter
2. Primary Metals(331xxx), Metals Mining (2122xx), Automobile Salvage and Scrap Recycling (42314x and 42393x), Metals Fabricating (332xxx), Machinery Manufacturing (333xxx)					
Lead, Total	µg/L	64.6	EPA 200.8	0.5	1/quarter
Petroleum Hydrocarbons (Diesel Fraction)	mg/L	10	NWTPH-Dx	0.25	1/quarter

Laboratory criteria requires that duplicate results that are greater than 5 times the reporting limit (RL) should be within 20% of each other. This criteria is met for Cr and Cd, but it is not met for Pb. Data for

lead from site #3 (samples #3 and #3F) differed by almost double. Sample #3 was collected before sample #3FR. The RL for Pb is 0.10 µg/L. The results reported were 0.68 µg/L and 1.23 µg/L. This can be explained as inherent variability. Two samples taken in two different bottles at slightly different times could result in different compositions. The difference observed here potentially supports the transport mechanism proposed by GeoEngineers. They stated "contaminants of concern have been released and mixed with shallow soils due to site activities, and that one of the potential transport mechanisms include soil erosion caused by rainwater runoff and wind, with subsequent downgradient deposition (GeoEngineers, 2013)."

MTCA cleanup levels are concentrations of hazardous substances in the environment that are considered sufficiently "protective of human health and the environment under specified exposure conditions" (WAC 173-340-200). Determining cleanup levels for hazardous substances is a crucial part of the MTCA cleanup process, since "cleanup levels must be established for every [contaminated] site" (WAC 173-340-355(2)) (Ecology 2020a). Data for the remaining parameters (Cr, Cr, Hg, PAH, PCB, TPHD and TPHG) with results over RLs were analyzed using MTCA standard Method B Surface Water Cleanup Levels (Ecology, 2020a).

Ecology's Technical Memo

Metals

As shown in CLARC, for the following metals, fresh surface water criteria for the protection of aquatic life are not a single number, but change based on hardness of the water at the Site:

- Cadmium
- Chromium III
- Copper
- Lead
- Nickel
- Silver
- Zinc

Therefore, since hardness was not measured in the surface water samples, the results cannot be directly compared to a surface water criteria. However, there are some observations that can be made by comparing the results from the sample location upstream of the Site (#1) to the sample locations downstream of the Site (#2 and #3) to see if there appears to be a significant increase in concentrations from Site runoff:

1. Cadmium: No noticeable increase in concentration was observed in the primary samples since all three results were below the laboratory reporting limit (0.10 µg/L). However, the duplicate sample for #3 (sample #3FR) showed a result (0.16 µg/L) that was above the laboratory reporting limit. The Quality Assurance Project Plan (QAPP) for the project did not specify the acceptance criteria for field duplicates (field replicates) (Watts, 2020). Therefore, for review purposes, a criteria was obtained from EPA (EPA, 2018):

a. For all analytes detected at concentrations greater than or equal to five times the sample quantitation limit (SQL) in both field duplicate samples of aqueous matrices, the absolute relative percent difference (RPD) should be less than or equal to 30 percent (RPD < 30%).
b. For all analytes detected at concentrations less than five times the sample quantitation limit (SQL), including non-detects, in either field duplicate sample of aqueous matrices, the absolute difference between the sample concentrations should be less than or equal to twice the SQL.

Based on the above criteria, the replicate values for cadmium are acceptable.

2. Chromium: No increase downstream relative to upstream.
3. Mercury: All results for mercury were below laboratory reporting limits. However, the reporting limits for mercury were above applicable surface water criteria.
4. Lead: One downstream sample was lower than the upstream location and both the result from #3 and the duplicate were higher than the upstream sample. Also, there was considerable variability in the replicate results (RPD = 58%). Since both replicate results were greater than five times the 0.10 micrograms per liter (µg/L) reporting limit, the RPD should have been <30%. Therefore, the replicate results exceed the recommended acceptable criteria. It is unknown what the cause of this variability is. However, sample heterogeneity one likely reason. Therefore, additional data collection would be needed in order to determine how the Site affects lead concentrations in surface water.
5. Copper, nickel, silver, and zinc were not analyzed. However, it is recommended that analyses for copper, nickel, silver, zinc, and hardness be included if additional surface water samples are collected.

Polychlorinated Biphenyls (PCBs)

Nine PCB aroclors were analyzed (1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268). All results were below the laboratory reporting limit (0.0294 µg/L for each aroclor). However, it should be noted that this reporting limit exceeds the total PCBs surface water criteria of 0.014 µg/L.

Semi-Volatile Organics

All results for semi-volatile organics were below laboratory reporting limits. However, the reporting limits for carcinogenic polycyclic aromatic hydrocarbons (cPAHs) were above applicable surface water criteria.

Total Petroleum Hydrocarbons (TPH)

Results for TPH – gasoline range, TPH – diesel range, and TPH – heavy oil range were all below the laboratory reporting limit.

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