Water Quality Special Study Report

U.S. Army Corps of Engineers
Omaha District

Existing Physicochemical Condition and Elutriate Testing of Missouri River Alluvial Sediments from Fort Randall Dam to Ponca State Park, Nebraska as an Indicator of the Potential Water Quality Impacts Posed by Dredging these Sediments to Construct Emergent Sandbar Habitat

Constructed Emergent Sandbar Habitat in the Missouri River Headwaters of Lewis and Clark Lake

Report Number: CENWO-ED-HA/WQSS/Missouri River/2010

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Prepared by:

Water Control and Water Quality Section
Hydrologic Engineering Branch
Engineering Division
Omaha District
U.S. Army Corps of Engineers

September 2010

For Information Regarding This Document Please Contact:

Dave Jensen
Water Control and Water Quality Section
Hydrologic Engineering Branch
Engineering Division
Department of the Army
Corps of Engineers Omaha District
1616 Capitol Avenue
Omaha, NE 68102-4901
(402)-995-2314
DLL-CENWO-WATER-QUALITY@nwo02.usace.army.mil

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1 BACKGROUND INFORMATION

1.1 CREATION AND MAINTENANCE OF EMERGENT SANDBAR HABITAT (ESH) PURSUANT TO THE MISSOURI RIVER BIOLOGICAL OPINION

In 2000, the U.S. Fish and Wildlife Service (USFWS) issued a Biological Opinion with recommendations for the U.S. Army Corps of Engineers' (Corps) operations of the Missouri River Mainstem System for protection and enhancement of threatened and endangered species (USFWS, 2000). In 2003, the USFWS issued an amendment that supplemented the recommendations of the 2000 Biological Opinion (USFWS, 2003). The amended Biological Opinion (BiOp) was the result of continuing consultation between the Corps and USFWS under the Endangered Species Act (ESA). The BiOp found that the Corps' operations on the Missouri River were not likely to jeopardize the endangered interior least tern *(Sterna antillarum)* and threatened piping plover *(Charadrius melodus)* populations if the Reasonable and Prudent Alternative (RPA) set forth in the BiOp was implemented. Element IVB of the RPA includes recommendations for the mechanical creation and maintenance of Emergent Sandbar Habitat (ESH) as nesting habitat for these two species in terms of habitat acres per river mile.

The BiOp separates the Missouri River from Fort Randall Dam downstream to Ponca, Nebraska into three separate segments: 1) Segment 8 – Fort Randall Dam to Niobrara River; 2) Segment 9 – Niobrara River to Gavins Point Dam; and 3) Segment 10 – Gavins Point Dam to Ponca, NE (Figure 1). All three segments are identified as "High Priority" reaches for the interior least tern and piping plover. ESH goals of 10 acres per river mile by the year 2005 and 20 acres per river mile by the year 2015 have been established for Segment 8. ESH goals of 40 acres per river mile by the year 2005 and 80 acres per river mile by the year 2015 have been established for Segments 9 and 10. Existing ESH acreages within these segments are currently below these goals.

1.2 CREATION OF EMERGENT SANDBAR HABITAT ON THE MISSOURI RIVER

In accordance with the BiOp, the Corps is conducting ongoing efforts to create and/or reclaim a sufficient amount of ESH to stabilize, and eventually recover, interior least tern and piping plover populations along the Missouri River. The creation of ESH was necessitated by the unforeseen loss of the habitat due to channelization and flood control efforts along the Missouri River, and the resulting decline of tern and plover numbers. The specific purpose for the Corps' actions is to implement the portion of RPA Element IVB of the BiOp that relates to artificially or mechanically created ESH.

The importance of constructed ESH in the lower Missouri River to the least tern and piping plover populations was witnessed with the recent return of normal navigation flows to the Missouri River downstream of Gavins Point Dam. ESH projects constructed downstream of Gavins Point Dam produced 80 percent of the interior least terns and piping plovers that fledged on the lower Missouri River with over 100 successful nests documented. In 1997, the last time high water and flows occurred prior to recent drought conditions, only one successful nest was documented in the reach.

1.3 EMERGENT SANDBAR HABITAT CONSTRUCTION METHODS

Past construction of ESH on the Missouri River by the Corps has utilized hydraulic dredges, sand scrapers, bulldozers and other construction equipment to build up sandbars. Hydraulic dredges are used to pump and place material to build up existing shallowly submerged sandbars. The hydraulic dredges typically use a cutter-head to break up sediment and a pump and pipeline to transport the dredged material to the deposition site. The dredged material is usually mined from "sediments" within the "high-water elevation" of the Missouri River. It is believed that using deposited material from the "river channel" emulates a natural process of redistribution of sediments within the river, and results in no net addition or

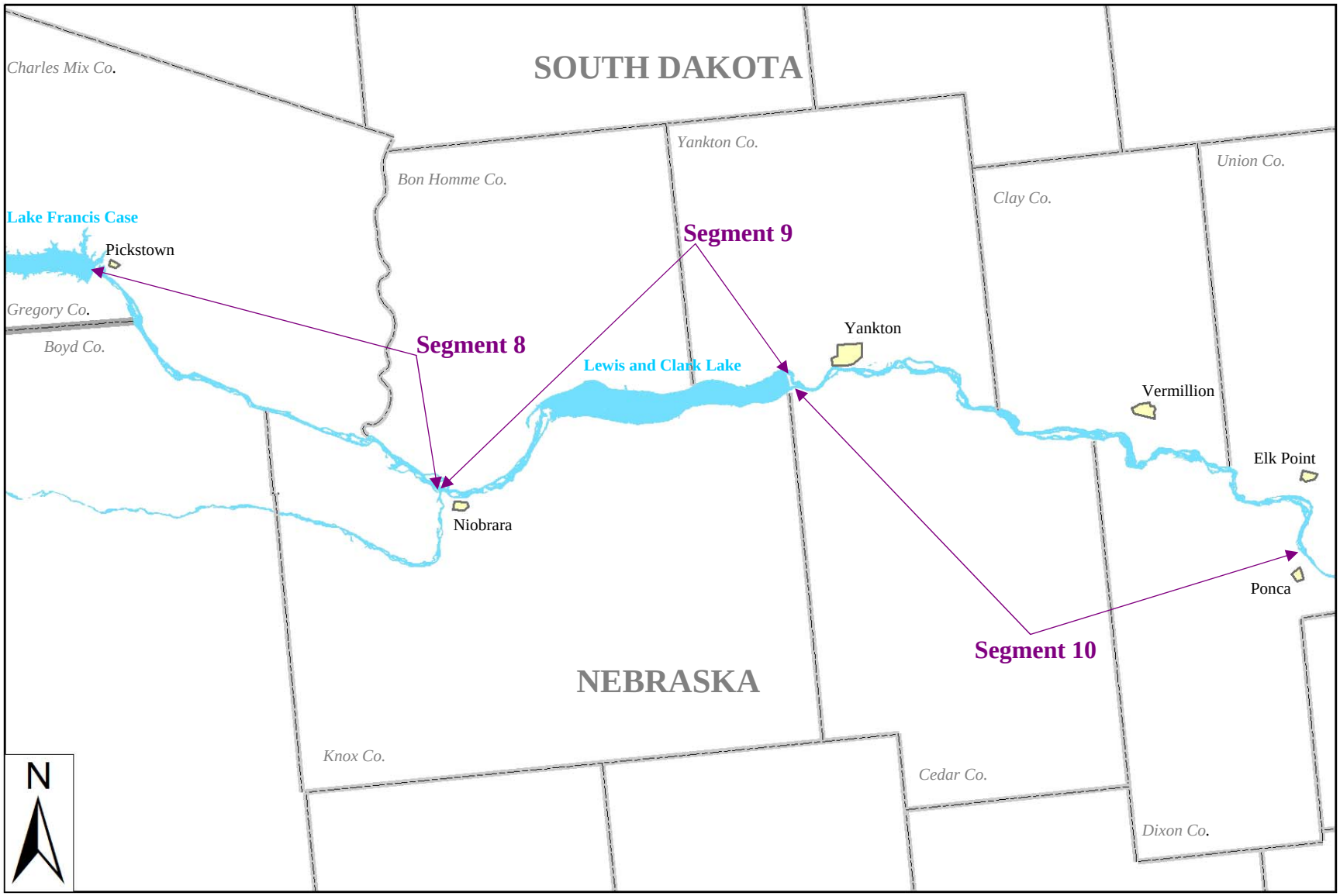

Figure 1. BiOp identified segment 8, 9, and 10 along the Missouri River from Fort Randall Dam, South Dakota to Ponca, Nebraska.

removal of sediment from the system. Sand Scrapers, bulldozers and other construction equipment are used to form the dredged sand to the specified elevations in order to create sandbars that closely resemble naturally formed ESH.

Avoiding bottom sediments high in organic matter and utilizing coarser, "sandy" material for fill material improves the habitat quality of the ESH created. Coarser fill material is easier to "work" and contour and is better suited for the construction of ESH. Typically, coarser material also contains significantly less nutrients and seed stocks which should slow down the encroachment of vegetation on the created sandbars. This maximizes the time period the created sandbars provide quality habitat for the terns and plovers, and extends the time before control measures are needed to manage encroaching vegetation.

1.4 SECTION 404 PERMITTING REQUIREMENTS

The requirements for a Individual Section 404 permit must be met for most dredging activities conducted on the Missouri River. To meet the Section 404 Individual Permit requirements, a Section 401 Certification must be obtained from the appropriate States that "certifies" that the proposed actions will not "violate" State water quality standards. To facilitate review of past "Shallow Water Habitat" (SWH) projects for Section 401 Certification, "elutriate testing" of material from the proposed dredging sites has been conducted. It has been recently requested by the State of Nebraska that elutriate testing also be conducted on ESH projects. It has also been suggested by Nebraska that representative sediment samples for elutriate testing could be collected from the three priority segments to ascertain that sediment contamination was not a concern within the segments. This information could then be utilized to facilitate Section 401 Certification of future ESH projects on Segment 8, 9, and 10. In this regard, a monitoring project was implemented to collect representative sediment samples from Segments 8, 9, and 10 as identified in the BiOp. Elutriate testing of the collected sediment samples was conducted pursuant to the Inland Testing Manual, "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual (USEPA and USACE, 1998).

1.5 SPECIFIC WATER QUALITY CONCERNS

The States of Nebraska and South Dakota have not identified any portions of Segments 8, 9, or 10 as an impaired waterbody pursuant to Section 303(d) of the Federal Clean Water Act. Neither State has issued fish consumption advisories applicable to the three segments.

In a 401 Certification letter for a proposed Corps ESH project on the Missouri River at RM842, the State of Nebraska stated the following:

"In order to establish certainty of compliance, an elutriate test must be conducted first on appropriate samples of the sediment which will be discharged to the waterway. The test should cover the following contaminants:

Heavy metals: lead, arsenic, mercury, chromium, zinc, copper

Ammonia

Persistent pesticides such as:

Chlordane, Dieldrin, Aldrin, DDT and its metabolites

PCB's

If the concentration of any of these pollutants is sufficient to cause violation of Title 117 – Nebraska Surface Water Quality Standards when the sediments are discharged to the river, the applicant must make arrangements for disposal elsewhere or revise the discharge schedule and/or volume to bring it into compliance."

Some public drinking water facilities that use the Missouri River and Lewis and Clark Lake for source water have expressed concerns that creation of ESH increases the loading of organic matter in their raw water supply. They believe this may cause them to exceed drinking water standards for trihalomethanes (THMs) in their treated water. Increasing the amount of organic matter in water can increase the levels of THM precursors. This may pose a problem for facilities with inadequate treatment processes as THMs can form when the "raw" water is chlorinated.

2 METHODS

2.1 REPRESENTATIVE SITES SAMPLED TO CHARACTERIZE MISSOURI RIVER BIOP SEGMENTS

Seven sites were selected to represent alluvial sediment conditions along the three Missouri River BiOp segments from Fort Randall Dam to Ponca, Nebraska (Figure 2). Sediment samples for elutriate testing were collected at these sites. Two sites were sampled to characterize Segment 8: RM867 and RM853 (Plate 1and Plate 2). The site at RM 867 is believed to represent conditions in the upper half of Segment 8. The site at RM853 is believed to represent conditions in the lower half of Segment 8. Two sites were sampled to characterize Segment 9: RM 842 and RM827 (Plate 3 and Plate 4). The site at RM 842 is believed to represent conditions downstream from the confluence of the Niobrara River to the "delta area" of Lewis and Clark Lake. The site at RM827 is believed to represent conditions in the "delta area" of Lewis and Clark Lake. Three sites were sampled to characterize Segment 10: RM800, RM779, and RM756 (Plate 5, Plate 6, and Plate 7). The site at RM800 is believed to represent conditions from just downstream of Gavins Point Dam to the James River. The site at RM 779 is believed to represent conditions downstream of the James River and upstream of the Vermillion River. The site at RM756 is believed to represent conditions downstream of the Vermillion River.

2.2 SAMPLE COLLECTION

2.2.1 Sampling Design

Sediment samples were collected at seven sites (RM867, RM853, RM842, RM827, RM800, RM779, and RM756) on the Missouri River. At each site three locations were sampled: 1) shallow submerged sandbar in main river channel (SSM), 2) shallow "side-channel" area (SSC), and 3) depositional backwater area with vegetative growth and accumulated detritus (BWD). It is believed these three location types characterize the sediment conditions that could be dredged for ESH creation. At each of the seven sites sediment core samples were collected to represent the three locations (i.e., SSM, SSC, and BWD). Plate 1, Plate 2, Plate 3, Plate 4, Plate 5, Plate 6, and Plate 7 show the three locations sampled at the seven sites.

2.2.2 Water Measurements and Sample Collection

Water from the Missouri River was collected at each of the seven sites to prepare elutriate samples (see Section 1.41.4). The laboratory required 2 to 3 gallons of receiving water for each 1 gallon of sediment to be analyzed. In addition to the 2 to 3 gallons of water for each 1gallon of sediment, an additional 1 gallon of receiving water was collected for "background" analysis. The receiving water was collected from the main river channel at each site.

At the time the receiving water was collected, the following field measurements were taken: water temperature, dissolved oxygen, pH, conductivity, oxidation-reduction potential, and turbidity. The measurements were obtained with a "HydroLab" equipped with a MS5 DataSonde and Surveyor data logger in accordance with the Water Quality Unit's SOP Number WQ-21201, "Using a Hydrolab DS4a and DS5 to Directly Measure Water Quality (USACE, 2008). Measurements were taken by immersing the DataSonde directly into the river where the receiving water was collected.

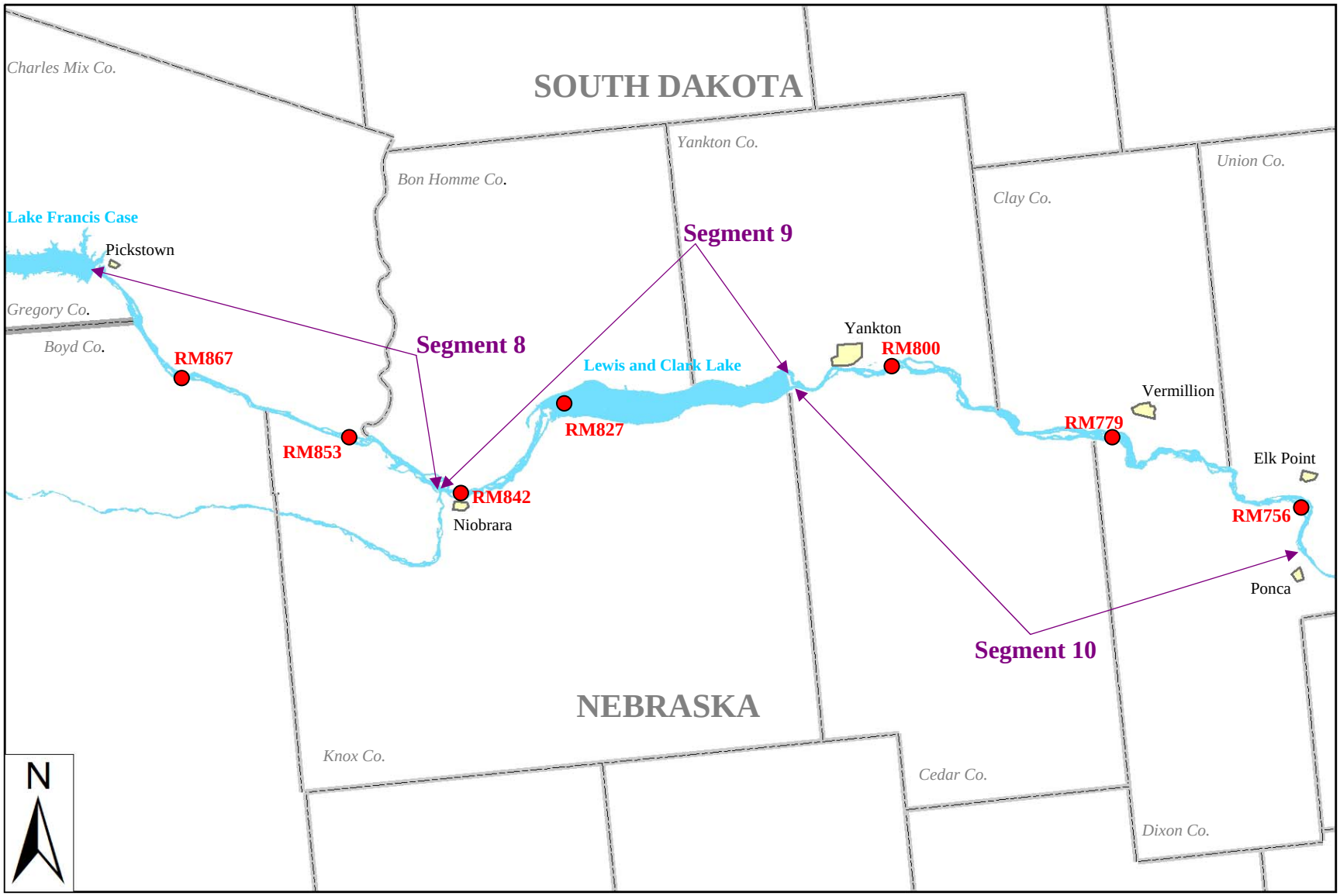

Figure 2. Locations of the seven sites selected for sampling to characterize alluvial sediment conditions along the three Missouri River BiOp segments.

2.2.3 Sediment Sample Collection

Locations representative of SSM, SSC, and BWD conditions were identified for sediment sampling in the field. Once a location was identified, a hand-held GPS unit (Garmin GPS Map765) was used to obtain the latitude and longitude of the location. Sediment samples were then collected with a Wildco® 2-inch (5.13 cm) stainless steel hand-corer sampler. The sampler was used to collect a sediment core sample to a depth of 2 to 3 feet (61.5 to 92.3 cm). The collected sediment core sample was deposited into a field-rinsed plastic bucket for compositing. Repeated sediment core samples were collected and deposited in the plastic bucket until 1 to 2 gallons (4.4 to 8.8 liters) of sediment were accumulated. The composited sediment was hand-mixed in the plastic bucket until it was deemed homogenous. A 1-gallon glass jar was then filled with the mixed sediment, labeled, and transported to the laboratory for elutriate testing.

2.3 ELUTRIATE TESTING

Preparation of elutriate samples was done by Midwest Laboratories, Inc. in Omaha, Nebraska. Midwest Laboratories is a NELAC (National Environmental Laboratory Accreditation Committee) certified laboratory, and under contract to the Omaha District to provide water quality analyses.

2.3.1 Standard Elutriate Samples

Standard elutriate samples were prepared in accordance with the "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual: Inland Testing Manual" (USEPA and USACE, 1998). The elutriate samples were prepared by using receiving water collected from the appropriate seven sites that were sampled along the Missouri River (i.e., RM756, RM779, RM800, RM827, RM842, RM853, and RM867). A 1-liter aliquot of sediment was taken from the collected sediment sample. The sediment material and unfiltered receiving water were then combined in a sediment-to-water ratio of 1:4 on a volume basis at room temperature (22 ± 2°C). After the correct ratio was achieved, the mixture was stirred vigorously for 30 minutes with a mechanical stirrer/shaker. After the 30 minute mixing period, the mixture was allowed to settle for at least one hour. The supernatant was then siphoned off and filtered through a 0.45 micron filter. The filtered water is the standard elutriate sample that was analyzed. Standard elutriate samples indicate the levels of dissolved constituents that could be liberated from agitated sediment. Many chemical constituents are more harmful to aquatic life in the dissolved phase.

2.3.2 Pre-Elutriate Samples

As an additional indicator of the physicochemical conditions of the collected sediment, "pre-elutriate" samples were prepared and analyzed. Pre-elutriate samples were prepared the same way as standard elutriate samples through the point of vigorous mixing for 30 minutes. At that point, the mixture was allowed to settle for a "few minutes" (allow heavier, coarse material to settle) and an aliquot of water was siphoned off without filtration and identified as the pre-elutriate sample. The pre-elutriate samples were prepared and analyzed to get an indication of the total levels of selected constituents that could be mobilized with the resuspension of the alluvial sediments. Mobilization of alluvial sediment occurs naturally in river systems, and would also occur when sediments are dredged for ESH construction.

2.3.3 Laboratory Analyses

Laboratory analyses were conducted on the following samples: sediment, receiving water, pre-elutriate, and standard elutriate. Table 1, Table 2, Table 3, and Table 4, respectively, list the parameters, analytical methods, method detection limits, and reporting limits for the analyses conducted on the sediment, receiving water, standard elutriate, and pre-elutriate samples. All samples were analyzed by Midwest Laboratories, Inc. located in Omaha, Nebraska.

Table 1. Parameters analyzed in collected sediment samples**.**

Parameter	Method	Detection Limit
PHYSICAL AND AGGREGATE PROPERTIES		
Particle Size	Sieve (Minimum Sieve #200)	0.001 mm
Alkalinity, Total	SM2320B	4 mg/l
Oxidation Reduction Potential	SM2580B	1 mV*
pH	EPA 150.1	0.1 S.U.*
NUTRIENTS		
Ammonia, Total as N	EPA 350.1	0.2 mg/kg
Kjeldahl Nitrogen, Total as N	EPA 351.3	2 mg/kg
Nitrate/Nitrite, Total as N	EPA 353.2	0.2 mg/kg
Phosphorus, Total	SM4500PF	0.2 mg/kg
AGGREGATE ORGANIC CONSTITUENTS		
Total Organic Carbon	EPA 415.1	2 mg/kg
METALS		
Metals Scan (Total)	EPA 6010B	See Table 5
PESTICIDES AND PCBs		
Organochlorine Pesticide and PCB Scan	EPA 8081 and EPA 8082	See Table 6

* Resolution Limit

Table 2. Parameters analyzed in collected receiving water samples.

Parameter	Method	Detection Limit
PHYSICAL AND AGGREGATE PROPERTIES		
Alkalinity, Total	SM2320B	4 mg/l
Total Dissolved Solids	EPA 160.1	5 mg/l
Total Suspended Solids	EPA 160.2	4 mg/l
True Color	ASTM D-1209-05	1 S.U.
NUTRIENTS		
Ammonia, Total as N	EPA 350.1	0.02 mg/l
Kjeldahl Nitrogen, Total as N	EPA 351.3	0.2 mg/l
Nitrate/Nitrite, Total as N	EPA 353.2	0.02 mg/l
Phosphorus, Dissolved	SM4500PF	0.02 mg/l
Phosphorus, Total	SM4500PF	0.02 mg/l
Orthophosphate Phosphorus, Dissolved	EPA 365.1	0.02 mg/l
AGGREGATE ORGANIC CONSTITUENTS		
Chemical Oxygen Demand	ASTM D1252	3 mg/l
Chlorophyll *a* (corrected)	SM10200H2	1 ug/l
Dissolved Organic Carbon	EPA 415.1	0.2 mg/l
Total Organic Carbon	EPA 415.1	0.2 mg/l
Trihalomethane Formation Potential	SM5710	1 ug/l
METALS		
Metals Scan (Total)	EPA 6010B	See Table 5
PESTICIDES AND PCBs		
Organochlorine Pesticide and PCB Scan	EPA 8081 and EPA 8082	See Table 6

Table 3. Parameters analyzed in standard elutriate water samples.

Parameter*	Method	Detection Limit
SAMPLE PREPARATION		
Elutriate Sample Preparation	1:4 Sediment:Receiving Water	-----
PHYSICAL AND AGGREGATE PROPERTIES		
Alkalinity	SM2320B	4 mg/l
Color	ASTM D-1209-05	1 S.U.
pH	EPA 150.1	0.1 S.U.**
Total Dissolved Solids	EPA 160.1	5 mg/l
NUTRIENTS		
Ammonia, Dissolved as N	EPA 350.1	0.02 mg/l
Kjeldahl Nitrogen, Dissolved as N	EPA 351.3	0.2 mg/l
Nitrate/Nitrite, Dissolved as N	EPA 353.2	0.02 mg/l
Phosphorus, Dissolved	SM4500PF	0.02 mg/l
Ortho-Phosphorus, Dissolved	EPA 365.1	0.02 mg/l
AGGREGATE ORGANIC CONSTITUENTS		
Chemical Oxygen Demand, Dissolved	ASTM D1252	3 mg/l
Dissolved Organic Carbon	EPA 415.1	0.2 mg/l
Trihalomethane Formation Potential, Dissolved	SM5710	1 ug/l
METALS		
Metals Scan (Dissolved)	EPA 6010B	See Table 5
PESTICIDES AND PCBs		
Organochlorine Pesticide and PCB Scan (Dissolved)	EPA 8081 and EPA 8082	See Table 6

* Since the final step in preparing elutriate samples is filtration (0.45 micron filter), the results for all parameters are reported as dissolved.

** Resolution limit.

Table 4. Parameters analyzed in Pre-Elutriate Water Samples.

Parameter*	Method	Detection Limit
PHYSICAL AND AGGREGATE PROPERTIES		
Total Suspended Solids	EPA 160.1	4 mg/l
Turbidity	EPA 180.1	1 NTU
NUTRIENTS		
Ammonia, Total as N	EPA 350.1	0.02 mg/l
Kjeldahl Nitrogen, Total as N	EPA 351.3	0.2 mg/l
Nitrate/Nitrite, Total as N	EPA 353.2	0.02 mg/l
Phosphorus, Total	SM4500PF	0.02 mg/l
AGGREGATE ORGANIC CONSTITUENTS		
Total Organic Carbon	EPA 415.1	0.2 mg/l
Trihalomethane Formation Potential, Total	SM5710	1 ug/l

Table 5. Individual metals included in the metals scan of sediment and water samples and the appropriate detection limits.

Metal	Sediment Detection Limit (mg/kg)	Water Detection Limit (ug/l)	Metal	Sediment Detection Limit (mg/kg)	Water Detection Limit (ug/l)
Aluminum	2	25	Lead	1	0.5
Antimony	1	0.5	Magnesium	2	1,000
Arsenic	1	1	Manganese	1	2
Beryllium	0.1	2	Mercury	0.2	0.02
Cadmium	0.5	0.2	Nickel	0.2	10
Calcium	5	1,000	Selenium	1	1
Chromium	0.2	1	Silver	1	1
Copper	0.2	1	Thallium	1	0.5
Cyanide	0.5	8	Zinc	1	10
Iron	4	7			

Table 6. Individual constituents included in the organochlorine pesticide and PCB scan of sediment and water samples and the appropriate detection limits.

Parameter	Sediment Detection Limit (µg/kg)	Water Detection Limit (µg/l)	Parameter	Sediment Detection Limit (µg/kg)	Water Detection Limit (µg/l)
DDE	0.8	0.005	Alpha-BHC (alpha-Lindane)	0.4	0.009
DDD	0.7	0.005	Beta-BHC (beta-Lindane)	0.9	0.009
DDT	1.0	0.004	Delta-BHC (delta-Lindane)	1.8	0.014
Methoxychlor	1.2	0.005	Gamma-BHC (gamma-Lindane)	0.6	0.035
Aldrin	0.7	0.008	Gamma-Chlordane	0.8	0.006
Dieldrin	0.7	0.004	PCB - Aroclor1016	16	0.110
Endosulfan 1	0.7	0.006	PCB - Aroclor1221	14	0.194
Endosulfan 2	0.8	0.003	PCB - Aroclor1232	10	0.171
Endosulfan Sulfate	1.0	0.010	PCB - Aroclor1242	10	0.107
Endrin	1.0	0.003	PCB - Aroclor1248	12	0.218
Endrin Aldehyde	1.0	0.011	PCB - Aroclor1254	16	0.155
Endrin Ketone	0.8	0.006	PCB - Aroclor1260	15	0.129
Heptachlor	0.5	0.009	PCB - Aroclor1262	9	0.157
Heptachlor Epoxide	0.8	0.007	PCB - Aroclor1268	10	0.236
Alpha-Chlordane	0.8	0.011			

3 RESULTS

3.1 MISSOURI RIVER BIOP SEGMENT 8 – FORT RANDALL DAM TO NIOBRARA RIVER

3.1.1 Sediment Sampling Site Locations

Sediment samples were collected on 29-July-2009 at site RM867 and on 27-August-2009 at site RM853. The field determined latitude and longitude of the sediment sampling locations (i.e., SSM, SSC, and BWD) at sites RM867 and RM853 are given in Table 7. Plate 8, Plate 9, and Plate 10, respectively, are photographs taken at site locations RM867SSM, RM867SSC, and RM867BWD at the time sediment samples were collected. Plate 11, Plate 12, and Plate 13, respectively, are photographs taken of site locations RM853SSM, RM853SSC, and RM853BWD at the time of sediment sampling.

Table 7. Field determined latitude and longitude for sediment sampling site locations on segment 8.

Site	Location	Latitude*	Longitude*
RM867	SSM – Main Channel	42° 55’ 40.6” N	98° 25’ 18.4” W
RM867	SSC – Side Channel	42° 55’ 41.0” N	98° 24’ 50.2” W
RM867	BWD – Backwater/Detritus	42° 55’ 43.2” N	98° 25’ 00.5” W
RM853	SSM – Main Channel	42° 50’ 36.8” N	98° 11’ 42.3” W
RM853	SSC – Side Channel	42° 50’ 31.0” N	98° 10’ 53.2” W
RM853	BWD – Backwater/Detritus	42° 50’ 31.8” N	98° 11’ 00.1” W

* NAD27 CONUS

3.1.2 Field Measured Water Quality Conditions

Field measured water quality conditions of the main-channel Missouri River at the time of sediment and receiving water sample collection at sites RM867 and RM853 are given in Table 8.

Table 8. Field measured water quality conditions of the main-channel Missouri River at sites RM867 and RM853.

Parameter	RM867	RM853
Date Sampled	29-Jul-09	27-Aug-09
Water Temperature (°C)	20.3	23.6
Dissolved Oxygen (mg/l)	7.6	8.4
Dissolved Oxygen (% Sat.)	86.0	102.1
pH (S.U.)	7.9	8.4
Specific Conductance (μmhos/cm)	768	772
Oxidation-Reduction Potential (mV)	318	311
Turbidity (NTU)	2	0

3.1.3 Laboratory Results

3.1.3.1 Composition of Collected Sediment Samples

Table 9 summarizes the composition of the collected sediment samples at site locations RM867SSM, RM867SSC, RM867BWD, RM853SSM, RM853SSC, and RM853BWD. Appendix A includes the “Particle Size Distribution Reports” received from Midwest laboratories, Inc. for the collected sediment samples.

Table 9. Composition of sediment samples collected at sites RM867 and RM853.

Site Location	Percent Gravel		Percent Sand			Percent Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
RM867SSM	0.0	0.0	0.0	6.2	91.5	1.1	1.2
RM867SSC	0.0	0.2	1.0	13.1	84.9	0.0	1.2
RM867BWD	0.0	0.0	0.2	15.3	76.7	6.6	1.2
RM853SSM	0.0	0.0	0.0	7.2	91.5	0.5	0.8
RM853SSC	0.0	0.0	0.0	1.3	94.4	3.5	0.8
RM853BWD	0.0	0.0	0.0	3.6	91.8	3.8	0.8

3.1.3.2 Sediment and Elutriate Test Results

Table 10, Table 11, and Table 12, respectively, provide laboratory results of the physicochemical analyses of the collected sediment samples at site locations RM867SSM, RM867SSC, and RM867BWD. Pre-elutriate and standard-elutriate test results of the collected sediment samples at the three locations sampled at site RM867, and the quality of the receiving water used in the elutriate testing, are also provided in the Tables. Table 13, Table 14, and Table 15, respectively, provide laboratory results of the physicochemical analyses of the collected sediment samples at site locations RM853SSM, RM853SSC, and RM853BWD. Pre-elutriate and standard-elutriate test results of the collected sediment samples at the three locations sampled at site RM853, and the quality of the receiving water used in the elutriate testing, are also provided in the Tables. Appendix B includes the "Analytical Reports" received from Midwest laboratories, Inc. that give the analytical results for the collected soil (i.e., sediment) and receiving water samples, and the prepared pre-elutriate and elutriate samples.

Table 10. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM867SSM.

Parameter	Units*	Sediment	Receiving Water (RM867)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	n.d.	152	-----	169
Carbon, Organic (Dissolved)	mg/l	-----	2.6	-----	n.d.
Carbon, Organic (Total)	mg/kg mg/l	300	2.8	4.6	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	9	-----	13
Chlorophyll a	µg/l	-----	1	-----	-----
Color, True	S.U. (APHA)	-----	5	-----	6
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	234	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.03	n.d.	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.5	-----	n.d.
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	74.7	0.5	1.4	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	n.d.	0.05	n.d.	-----
Oxidation-Reduction Potential	mV	-160	-188	-----	-135
pH	S.U.	7.9	8.3	-----	8.1
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	365	0.02	0.18	-----
Solids, Total Dissolved	mg/l	-----	626	-----	673
Solids, Total Suspended	mg/l	-----	13	134	-----
Turbidity	NTU	-----	n.d.	205	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	2,523	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	0.6
Arsenic	mg/kg µg/l	8.49	n.d.	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	0.15	n.d.	-----	n.d.
Calcium	mg/kg mg/l	9,338	60	-----	60
Chromium	mg/kg µg/l	0.15	n.d.	-----	n.d.
Copper	mg/kg µg/l	4.7	n.d.	-----	20
Iron	mg/kg µg/l	11,993	n.d.	-----	130
Lead	mg/kg µg/l	7.97	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	3,021	20.5	-----	20.7
Manganese	mg/kg µg/l	439	n.d.	-----	30
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	15.3	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	4	-----	4
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	29.9	40	-----	110
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	191	170	184
THMFP-Bromodichloromethane	µg/l	-----	28	26	29
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	6	5	6
THMFP-Chloroform	µg/l	-----	157	138	149

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 11. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM867SSC.

Parameter	Units*	Sediment	Receiving Water (RM867)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	n.d.	152	-----	164
Carbon, Organic (Dissolved)	mg/l	-----	2.6	-----	n.d.
Carbon, Organic (Total)	mg/kg mg/l	200	2.8	5.6	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	9	-----	11
Chlorophyll a	µg/l	-----	1	-----	-----
Color, True	S.U. (APHA)	-----	5	-----	6
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	234	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.03	n.d.	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.5	-----	n.d.
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	76.2	0.5	1.0	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	n.d.	0.05	n.d.	-----
Oxidation-Reduction Potential	mV	-179	-188	-----	-141
pH	S.U.	7.5	8.3	-----	8.2
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	322	0.02	0.15	-----
Solids, Total Dissolved	mg/l	-----	626	-----	626
Solids, Total Suspended	mg/l	-----	13	97	-----
Turbidity	NTU	-----	n.d.	130	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	1,990	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Arsenic	mg/kg µg/l	10.4	n.d.	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	0.17	n.d.	-----	n.d.
Calcium	mg/kg mg/l	8,500	60	-----	60
Chromium	mg/kg µg/l	4.3	n.d.	-----	n.d.
Copper	mg/kg µg/l	4.3	n.d.	-----	n.d.
Iron	mg/kg µg/l	13,102	n.d.	-----	50
Lead	mg/kg µg/l	6.73	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	1,902	20.5	-----	20.7
Manganese	mg/kg µg/l	833	n.d.	-----	10
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	16.5	n.d.	-----	n.d.
Selenium	mg/kg µg/l	0.64	4	-----	4
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	31.6	40	-----	100
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	191	166	182
THMFP-Bromodichloromethane	µg/l	-----	28	26	28
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	6	n.d.	6
THMFP-Chloroform	µg/l	-----	157	135	148

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 12. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM867BWD.

Parameter	Units*	Sediment	Receiving Water (RM867)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	1,630	152	-----	178
Carbon, Organic (Dissolved)	mg/l	-----	2.6	-----	1.1
Carbon, Organic (Total)	mg/kg mg/l	290	2.8	2.1	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	9	-----	16
Chlorophyll a	µg/l	-----	1	-----	-----
Color, True	S.U. (APHA)	-----	5	-----	7
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	234	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.03	0.05	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.5	-----	n.d.
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	15.8	0.5	1.2	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	n.d.	0.05	n.d.	-----
Oxidation-Reduction Potential	mV	-140	-188	-----	-135
pH	S.U.	7.7	8.3	-----	8.0
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	406	0.02	0.23	-----
Solids, Total Dissolved	mg/l	-----	626	-----	786
Solids, Total Suspended	mg/l	-----	13	237	-----
Turbidity	NTU	-----	n.d.	298	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	2,250	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	1
Arsenic	mg/kg µg/l	11	n.d.	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	0.22	n.d.	-----	n.d.
Calcium	mg/kg mg/l	9,883	60	-----	60
Chromium	mg/kg µg/l	5	n.d.	-----	n.d.
Copper	mg/kg µg/l	4.7	n.d.	-----	n.d.
Iron	mg/kg µg/l	13,230	n.d.	-----	n.d.
Lead	mg/kg µg/l	6.64	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	2,716	20.5	-----	17.7
Manganese	mg/kg µg/l	511	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	15	n.d.	-----	n.d.
Selenium	mg/kg µg/l	1.23	4	-----	3
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	34.0	40	-----	80
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	191	141	192
THMFP-Bromodichloromethane	µg/l	-----	28	23	29
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	6	n.d.	n.d.
THMFP-Chloroform	µg/l	-----	157	114	159

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 13. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM853SSM.

Parameter	Units*	Sediment	Receiving Water (RM853)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	281	156	-----	169
Carbon, Organic (Dissolved)	mg/l	-----	2.8	-----	2.8
Carbon, Organic (Total)	mg/kg mg/l	110	3.0	3.2	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	9	-----	15
Chlorophyll a	µg/l	-----	n.d.	-----	-----
Color, True	S.U. (APHA)	-----	6	-----	6
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	240	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.08	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.10	n.d.	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	n.d.	-----	0.2
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	129	0.2	0.5	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	n.d.	0.03	n.d.	-----
Oxidation-Reduction Potential	mV	-160	-170	-----	-110
pH	S.U.	8.6	8.1	-----	8.4
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	295	0.02	0.12	-----
Solids, Total Dissolved	mg/l	-----	570	-----	630
Solids, Total Suspended	mg/l	-----	n.d.	33	-----
Turbidity	NTU	-----	n.d.	159	n.d.
Metals – (Water - Dissolved)					
Aluminum	mg/kg µg/l	1,879	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Arsenic	mg/kg µg/l	8.94	2	-----	1
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	0.15	n.d.	-----	n.d.
Calcium	mg/kg mg/l	7,591	61	-----	58
Chromium	mg/kg µg/l	4.3	n.d.	-----	n.d.
Copper	mg/kg µg/l	4.22	n.d.	-----	n.d.
Iron	mg/kg µg/l	12,905	40	-----	20
Lead	mg/kg µg/l	4.57	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	1,756	21.4	-----	20.4
Manganese	mg/kg µg/l	492	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	15	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	2	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	33.3	60	-----	80
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	165	302	182
THMFP-Bromodichloromethane	µg/l	-----	25	34	27
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	6	6	6
THMFP-Chloroform	µg/l	-----	134	262	149

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 14. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM853SSC.

Parameter	Units*	Sediment	Receiving Water (RM853)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	1,131	156	-----	167
Carbon, Organic (Dissolved)	mg/l	-----	2.8	-----	2.5
Carbon, Organic (Total)	mg/kg mg/l	260	3.0	2.3	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	9	-----	12
Chlorophyll a	µg/l	-----	n.d.	-----	-----
Color, True	S.U. (APHA)	-----	6	-----	8
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	240	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.08	-----	0.11
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.10	0.10	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	n.d.	-----	0.6
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	119	0.2	1.1	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	n.d.	0.03	n.d.	-----
Oxidation-Reduction Potential	mV	-180	-170	-----	-117
pH	S.U.	8.2	8.1	-----	8.2
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	355	0.02	0.14	-----
Solids, Total Dissolved	mg/l	-----	570	-----	694
Solids, Total Suspended	mg/l	-----	n.d.	104	-----
Turbidity	NTU	-----	n.d.	232	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	2,881	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Arsenic	mg/kg µg/l	7.18	2	-----	1
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	0.22	n.d.	-----	n.d.
Calcium	mg/kg mg/l	7,944	61	-----	61
Chromium	mg/kg µg/l	6.3	n.d.	-----	n.d.
Copper	mg/kg µg/l	4.08	n.d.	-----	n.d.
Iron	mg/kg µg/l	10,071	40	-----	n.d.
Lead	mg/kg µg/l	5.60	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	3,165	21.4	-----	18
Manganese	mg/kg µg/l	325	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	14	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	2	-----	3
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	29.8	60	-----	190
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	165	262	122
THMFP-Bromodichloromethane	µg/l	-----	25	34	22
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	6	6	5
THMFP-Chloroform	µg/l	-----	134	222	95

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 15. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM853BWD.

Parameter	Units*	Sediment	Receiving Water (RM853)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	795	156	-----	169
Carbon, Organic (Dissolved)	mg/l	-----	2.8	-----	2.0
Carbon, Organic (Total)	mg/kg mg/l	300	3.0	2.1	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	9	-----	13
Chlorophyll a	µg/l	-----	n.d.	-----	-----
Color, True	S.U. (APHA)	-----	6	-----	9
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	240	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.08	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.10	n.d.	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	n.d.	-----	0.6
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	128	0.2	0.9	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	n.d.	0.03	n.d.	-----
Oxidation-Reduction Potential	mV	-160	-----	-----	-----
pH	S.U.	7.9	8.1	-----	8.0
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	365	0.02	0.18	-----
Solids, Total Dissolved	mg/l	-----	570	-----	598
Solids, Total Suspended	mg/l	-----	n.d.	207	-----
Turbidity	NTU	-----	n.d.	248	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	2,848	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Arsenic	mg/kg µg/l	8.06	2	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	0.18	n.d.	-----	n.d.
Calcium	mg/kg mg/l	8,160	61	-----	64
Chromium	mg/kg µg/l	6.3	n.d.	-----	n.d.
Copper	mg/kg µg/l	4.04	n.d.	-----	n.d.
Iron	mg/kg µg/l	10,444	40	-----	n.d.
Lead	mg/kg µg/l	5.27	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	3,166	21.4	-----	19.4
Manganese	mg/kg µg/l	354	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	14	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	2	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	29.9	60	-----	80
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	165	229	113
THMFP-Bromodichloromethane	µg/l	-----	25	32	20
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	6	5	n.d.
THMFP-Chloroform	µg/l	-----	134	192	89

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

3.2 MISSOURI RIVER BIOP SEGMENT 9 – NIOBRARA RIVER TO GAVINS POINT DAM

3.2.1 Sediment Sampling Site Locations

Sediment samples were collected on 16-July-2009 at sites RM842 and RM827. The field determined latitude and longitude of the sediment sampling locations (i.e., SSM, SSC, and BWD) at sites RM842 and RM827 are given in Table 16. Plate 14, Plate 15, and Plate 16, respectively, are photographs taken at site locations RM842SSM, RM842SSC, and RM842BWD at the time sediment samples were collected. Plate 17, Plate 18, and Plate 19, respectively, are photographs taken of site locations RM827SSM, RM827SSC, and RM827BWD at the time of sediment sampling.

Table 16. Field determined latitude and longitude for sediment sampling site locations on segment 9.

Site	Location	Latitude*	Longitude*
RM842	SSM – Main Channel	42° 45’ 58.8” N	98° 00’ 33.1” W
RM842	SSC – Side Channel	42° 46’ 13.1” N	98° 00’ 24.6” W
RM842	BWD – Backwater/Detritus	42° 46’ 10.7” N	98° 00’ 30.7” W
RM827	SSM – Main Channel	42° 51’ 06.4” N	97° 47’ 38.4” W
RM827	SSC – Side Channel	42° 51’ 22.5” N	97° 47’ 57.7” W
RM827	BWD – Backwater/Detritus	42° 51’ 21.0” N	97° 48’ 02.0” W

* NAD27 CONUS

3.2.2 Field Measured Water Quality Conditions

Field measured water quality conditions of the main-channel Missouri River at the time of sediment and receiving water sample collection at sites RM842 and RM827 are given in Table 17.

Table 17. Field measured water quality conditions of the main-channel Missouri River at sites RM842 and RM827.

Parameter	RM842	RM827
Date Sampled	16-Jul-09	16-Jul-09
Water Temperature (°C)	21.5	23.4
Dissolved Oxygen (mg/l)	7.9	7.8
Dissolved Oxygen (% Sat.)	94.1	94.6
pH (S.U.)	8.1	7.8
Specific Conductance (µmhos/cm)	751	688
Oxidation-Reduction Potential (mV)	294	285
Turbidity (NTU)	60	29

3.2.3 Laboratory Results

3.2.3.1 Composition of Collected Sediment Samples

Table 18 summarizes the composition of the collected sediment samples at site locations RM842SSM, RM842SSC, RM842BWD, RM827SSM, RM827SSC, and RM827BWD. Appendix A includes the “Particle Size Distribution Reports” received from Midwest laboratories, Inc. for the collected sediment samples.

Table 18. Composition of sediment samples collected at sites RM842 and RM827.

Site Location	Percent Gravel		Percent Sand			Percent Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
RM842SSM	0.0	0.0	0.0	1.1	96.6	1.0	1.3
RM842SSC	0.0	0.0	0.2	0.9	96.2	1.4	1.3
RM842BWD	0.0	0.0	0.0	1.4	76.5	19.0	3.1
RM827SSM	0.0	0.0	0.0	0.1	55.2	37.4	7.3
RM827SSC	0.0	0.0	0.0	0.5	70.8	24.2	4.5
RM827BWD	0.0	0.0	0.0	0.3	92.9	5.5	1.3

3.2.3.2 Sediment and Elutriate Test Results

Table 19, Table 20, and Table 21, respectively, provide laboratory results of the physicochemical analyses of the collected sediment samples at site locations RM842SM, RM842SSC, and RM842BWD. Pre-elutriate and standard-elutriate test results of the collected sediment samples at the three locations sampled at site RM842, and the quality of the receiving water used in the elutriate testing, are also provided in the Tables. Table 22, Table 23, and Table 24, respectively, provide laboratory results of the physicochemical analyses of the collected sediment samples at site locations RM827SSM, RM827SSC, and RM827BWD. Pre-elutriate and standard-elutriate test results of the collected sediment samples at the three locations sampled at site RM827, and the quality of the receiving water used in the elutriate testing, are also provided in the Tables. Appendix B includes the "Analytical Reports" received from Midwest laboratories, Inc. that give the analytical results for the collected soil (i.e., sediment) and receiving water samples, and the prepared pre-elutriate and elutriate samples.

Table 19. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM842SSM.

Parameter	Units*	Sediment	Receiving Water (RM842)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	362	154	-----	168
Carbon, Organic (Dissolved)	mg/l	-----	2.6	-----	3.0
Carbon, Organic (Total)	mg/kg mg/l	400	2.7	3.0	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	n.d.	-----	18
Chlorophyll a	µg/l	-----	1	-----	-----
Color, True	S.U. (APHA)	-----	5	-----	5
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	223	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	n.d.	-----	0.20
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.03	0.30	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.6	-----	0.9
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	59.3	0.7	1.1	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.1	0.11	n.d.	-----
Oxidation-Reduction Potential	mV	-84	-47	-----	-75
pH	S.U.	8.2	8.3	-----	8.1
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	131	0.04	0.26	-----
Solids, Total Dissolved	mg/l	-----	534	-----	534
Solids, Total Suspended	mg/l	-----	4	275	-----
Turbidity	NTU	-----	3	269	1
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	1,657	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	0.9	-----	0.5
Arsenic	mg/kg µg/l	n.d.	1	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	2,339	57	-----	60
Chromium	mg/kg µg/l	5.1	n.d.	-----	n.d.
Copper	mg/kg µg/l	2.75	n.d.	-----	n.d.
Iron	mg/kg µg/l	3,047	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	1,046	19.5	-----	20.5
Manganese	mg/kg µg/l	106	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	7.7	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	3	-----	3
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	18.4	70	-----	90
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	168	196	261
THMFP-Bromodichloromethane	µg/l	-----	26	29	28
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chloroform	µg/l	-----	137	162	261

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 20. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM842SSC.

Parameter	Units*	Sediment	Receiving Water (RM842)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	2,318	154	-----	157
Carbon, Organic (Dissolved)	mg/l	-----	2.6	-----	3.0
Carbon, Organic (Total)	mg/kg mg/l	5,700	2.7	3.0	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	n.d.	-----	17
Chlorophyll a	µg/l	-----	1	-----	-----
Color, True	S.U. (APHA)	-----	5	-----	8
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	223	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	n.d.	-----	0.57
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.03	0.57	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.6	-----	1.4
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	323	0.7	1.4	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.1	0.11	n.d.	-----
Oxidation-Reduction Potential	mV	-56	-47	-----	-41
pH	S.U.	7.7	8.3	-----	7.8
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	379	0.04	0.23	-----
Solids, Total Dissolved	mg/l	-----	534	-----	808
Solids, Total Suspended	mg/l	-----	4	240	-----
Turbidity	NTU	-----	3	325	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	4,484	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	0.9	-----	n.d.
Arsenic	mg/kg µg/l	n.d.	1	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	14,558	57	-----	61
Chromium	mg/kg µg/l	8.3	n.d.	-----	n.d.
Copper	mg/kg µg/l	6.86	n.d.	-----	n.d.
Iron	mg/kg µg/l	11,405	n.d.	-----	n.d.
Lead	mg/kg µg/l	7.6	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	5,515	19.5	-----	19.5
Manganese	mg/kg µg/l	368	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	15	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	3	-----	3
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	34.3	70	-----	120
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	168	196	215
THMFP-Bromodichloromethane	µg/l	-----	26	29	26
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chloroform	µg/l	-----	137	162	186

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 21. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM842BWD.

Parameter	Units*	Sediment	Receiving Water (RM842)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	3,446	154	-----	157
Carbon, Organic (Dissolved)	mg/l	-----	2.6	-----	n.d.
Carbon, Organic (Total)	mg/kg mg/l	7,000	2.7	2.8	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	n.d.	-----	13
Chlorophyll a	µg/l	-----	1	-----	-----
Color, True	S.U. (APHA)	-----	5	-----	n.d.
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	223	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.03	0.12	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.6	-----	0.9.
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	281	0.7	0.9	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.2	0.11	n.d.	-----
Oxidation-Reduction Potential	mV	-100	-47	-----	-31
pH	S.U.	7.5	8.3	-----	7.3
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	436	0.04	0.13	n.d.
Solids, Total Dissolved	mg/l	-----	534	-----	532
Solids, Total Suspended	mg/l	-----	4	173	-----
Turbidity	NTU	-----	3	167	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	4,697	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	0.9	-----	n.d.
Arsenic	mg/kg µg/l	n.d.	1	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	17,145	57	-----	64
Chromium	mg/kg µg/l	8.6	n.d.	-----	n.d.
Copper	mg/kg µg/l	8.22	n.d.	-----	n.d.
Iron	mg/kg µg/l	12,071	n.d.	-----	n.d.
Lead	mg/kg µg/l	7.0	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	5,453	19.5	-----	16.8
Manganese	mg/kg µg/l	445	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	16	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	3	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	37.7	70	-----	120
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	168	62	234
THMFP-Bromodichloromethane	µg/l	-----	26	13	28
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	2.7	n.d.
THMFP-Chloroform	µg/l	-----	137	46	202

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 22. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM827SSM.

Parameter	Units*	Sediment	Receiving Water (RM827)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	3,522	149	-----	199
Carbon, Organic (Dissolved)	mg/l	-----	3.8	-----	2.2
Carbon, Organic (Total)	mg/kg mg/l	7,200	4.0	3.1	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	14	-----	16
Chlorophyll a	µg/l	-----	6	-----	-----
Color, True	S.U. (APHA)	-----	9	-----	5
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	208	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.03	-----	3.3
Nitrogen, Ammonia (Total)	mg/kg mg/l	34.2	0.03	3.6	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	n.d.	-----	3.6
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	406	0.3	4.2	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.2	0.03	n.d.	-----
Oxidation-Reduction Potential	mV	-----	-43	-----	-82
pH	S.U.	7.5	8.1	-----	7.3
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	360	n.d.	0.25	-----
Solids, Total Dissolved	mg/l	-----	464	-----	462
Solids, Total Suspended	mg/l	-----	21	242	-----
Turbidity	NTU	-----	22	287	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	6,498	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Arsenic	mg/kg µg/l	n.d.	2	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	18,660	54	-----	57
Chromium	mg/kg µg/l	10	n.d.	-----	n.d.
Copper	mg/kg µg/l	10.4	n.d.	-----	n.d.
Iron	mg/kg µg/l	11,914	n.d.	-----	n.d.
Lead	mg/kg µg/l	7.0	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	6,463	17.7	-----	18.7
Manganese	mg/kg µg/l	556	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	14	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	3	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	41.0	100	-----	120
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	155	124	159
THMFP-Bromodichloromethane	µg/l	-----	22	22	22
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	4	n.d.
THMFP-Chloroform	µg/l	-----	133	98	134

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 23. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM827SSC.

Parameter	Units*	Sediment	Receiving Water (RM827)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	3,237	149	-----	184
Carbon, Organic (Dissolved)	mg/l	-----	3.8	-----	4.1
Carbon, Organic (Total)	mg/kg mg/l	5,600	4.0	4.0	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	14	-----	13
Chlorophyll a	µg/l	-----	6	-----	-----
Color, True	S.U. (APHA)	-----	9	-----	5
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	208	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.03	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	18.5	0.03	n.d.	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	n.d.	-----	1.0
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	396	0.3	1.7	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.7	0.03	n.d.	-----
Oxidation-Reduction Potential	mV	-190	-43	-----	-80
pH	S.U.	7.6	8.1	-----	7.5
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	310	n.d.	0.20	-----
Solids, Total Dissolved	mg/l	-----	464	-----	512
Solids, Total Suspended	mg/l	-----	21	247	-----
Turbidity	NTU	-----	22	226	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	4,900	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Arsenic	mg/kg µg/l	n.d.	2	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	11,369	54	-----	61
Chromium	mg/kg µg/l	7	n.d.	-----	n.d.
Copper	mg/kg µg/l	6.12	n.d.	-----	n.d.
Iron	mg/kg µg/l	9,363	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	4,055	17.7	-----	19.7
Manganese	mg/kg µg/l	374	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	11	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	3	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	29.2	100	-----	120
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	155	122	154
THMFP-Bromodichloromethane	µg/l	-----	22	22	20
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chloroform	µg/l	-----	133	96	131

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 24. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM827BWD.

Parameter	Units*	Sediment	Receiving Water (RM827)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	1,044	149	-----	167
Carbon, Organic (Dissolved)	mg/l	-----	3.8	-----	4.9
Carbon, Organic (Total)	mg/kg mg/l	4,400	4.0	4.4	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	14	-----	23
Chlorophyll a	µg/l	-----	6	-----	-----
Color, True	S.U. (APHA)	-----	9	-----	9
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	208	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.03	-----	0.10
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.03	n.d.	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	n.d.	-----	1.0
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	204	0.3	1.0	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	n.d.	-----	n.d.
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.2	0.03	n.d.	-----
Oxidation-Reduction Potential	mV	-51	-43	-----	-78
pH	S.U.	7.7	8.1	-----	7.6
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Total	mg/kg mg/l	238	n.d.	0.28	-----
Solids, Total Dissolved	mg/l	-----	464	-----	460
Solids, Total Suspended	mg/l	-----	21	330	-----
Turbidity	NTU	-----	22	273	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	2,624	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	0.7
Arsenic	mg/kg µg/l	n.d.	2	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	6,654	54	-----	70
Chromium	mg/kg µg/l	5.3	n.d.	-----	n.d.
Copper	mg/kg µg/l	2.79	n.d.	-----	n.d.
Iron	mg/kg µg/l	7,099	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	2,677	17.7	-----	16.8
Manganese	mg/kg µg/l	193	n.d.	-----	340
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	736	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	3	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	18.8	100	-----	110
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	155	209	161
THMFP-Bromodichloromethane	µg/l	-----	22	21	23
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chloroform	µg/l	-----	133	186	135

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

3.3 MISSOURI RIVER BIOP SEGMENT 10 – GAVINS POINT DAM TO PONCA, NEBRASKA

3.3.1 Sediment Sampling Site Locations

Sediment samples were collected on 23-November-2009 at sites RM800, RM779, and RM756. Sampling was delayed at these sites until the end of the navigation season to allow identified sediment locations to be accessible to sampling at lower flows. Field determined latitude and longitude of the sediment sampling locations (i.e., SSM, SSC, and BWD) at sites RM800, RM779, and RM756 are given in Table 25. Plate 20, Plate 21, and Plate 22, respectively, are photographs taken at site locations RM800SSM, RM800SSC, and RM8002BWD at the time sediment samples were collected. Plate 23, Plate 24, and Plate 25, respectively, are photographs taken of site locations RM779SSM, RM779SSC, and RM779BWD at the time of sediment sampling. Plate 26, Plate 27, and Plate 28, respectively, are photographs taken of site locations RM756SSM, RM756SSC, and RM756BWD at the time of sediment sampling.

Table 25. Field determined latitude and longitude for sediment sampling site locations on segment 9.

Site	Location	Latitude*	Longitude*
RM800	SSM – Main Channel	42° 51’ 45.3” N	97° 17’ 41.5” W
RM800	SSC – Side Channel	42° 51’ 49.7” N	97° 17’ 49.3” W
RM800	BWD – Backwater/Detritus	42° 51’ 55.1” N	97° 17’ 49.8” W
RM779	SSM – Main Channel	42° 45’ 10.9” N	96° 57’ 36.3” W
RM779	SSC – Side Channel	42° 45’ 25.3” N	96° 57’ 56.9” W
RM779	BWD – Backwater/Detritus	42° 45’ 24.6” N	96° 57’ 56.3” W
RM756	SSM – Main Channel	42° 37’ 56.9” N	96° 41’ 47.7” W
RM756	SSC – Side Channel	42° 37’ 56.0” N	96° 41’ 39.3” W
RM756	BWD – Backwater/Detritus	42° 37’ 59.5” N	96° 41’ 38.6” W

* NAD27 CONUS

3.3.2 Field Measured Water Quality Conditions

Field measured water quality conditions of the main-channel Missouri River at the time of sediment and receiving water sample collection at sites RM800, RM779, and RM756 are given in Table 26.

Table 26. Field measured water quality conditions of the main-channel Missouri River at sites RM800, RM779, and RM756.

Parameter	RM800	RM779	RM756
Date Sampled	23-Nov-09	23-Nov-09	23-Nov-09
Water Temperature (°C)	7.6	8.1	7.5
Dissolved Oxygen (mg/l)	11.9	-----*	9.8
Dissolved Oxygen (% Sat.)	102.2	-----*	84.5
pH (S.U.)	8.0	7.9	7.9
Specific Conductance (µmhos/cm)	672	723	799
Oxidation-Reduction Potential (mV)	318	318	311
Turbidity (NTU)	8	16	20

* Equipment malfunction

3.3.3 Laboratory Results

3.3.3.1 Composition of Collected Sediment Samples

Table 27summarizes the composition of the collected sediment samples at site locations RM800SSM, RM800SSC, RM800BWD, RM779SSM, RM779SSC, RM779BWD, RM756SSM, RM756SSC, RM756BWD. Appendix A includes the "Particle Size Distribution Reports" received from Midwest laboratories, Inc. for the collected sediment samples.

Table 27. Composition of sediment samples collected at sites RM842 and RM827.

Site Location	Percent Gravel		Percent Sand			Percent Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
RM800SSM	0.0	0.0	0.2	4.1	94.1	1.3	0.3
RM800SSC	0.0	0.4	1.0	19.5	77.0	1.8	0.3
RM800BWD	0.0	5.3	1.6	32.9	34.9	13.3	12.0
RM779SSM	0.0	0.0	0.0	6.5	92.6	0.6	0.3
RM779SSC	0.0	0.0	0.0	14.4	84.2	1.1	0.3
RM779BWD	0.0	0.0	0.5	16.8	69.4	11.6	1.7
RM756SSM	0.0	0.0	0.0	5.9	91.8	2.0	0.3
RM756SSC	0.0	0.0	0.2	5.5	89.4	4.6	0.3
RM756BWD	0.0	0.0	0.0	3.7	87.9	7.8	0.6

3.3.3.2 Sediment and Elutriate Test Results

Table 28, Table 29, and Table 30, respectively, provide laboratory results of the physicochemical analyses of the collected sediment samples at site locations RM800SSM, RM800SSC, and RM800BWD. Pre-elutriate and standard-elutriate test results of the collected sediment samples at the three locations sampled at site RM800, and the quality of the receiving water used in the elutriate testing, are also provided in the Tables. Table 31, Table 32, and Table 33, respectively, provide laboratory results of the physicochemical analyses of the collected sediment samples at site locations RM779SSM, RM779SSC, and RM779BWD. Pre-elutriate and standard-elutriate test results of the collected sediment samples at the three locations sampled at site RM779, and the quality of the receiving water used in the elutriate testing, are also provided in the Tables. Table 34, Table 35, and Table 36, respectively, provide laboratory results of the physicochemical analyses of the collected sediment samples at site locations RM756SSM, RM756SSC, and RM756BWD. Pre-elutriate and standard-elutriate test results of the collected sediment samples at the three locations sampled at site RM756, and the quality of the receiving water used in the elutriate testing, are also provided in the Tables. Appendix B includes the "Analytical Reports" received from Midwest laboratories, Inc. that give the analytical results for the collected soil (i.e., sediment) and receiving water samples, and the prepared pre-elutriate and elutriate samples.

Table 28. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM800SSM.

Parameter	Units*	Sediment	Receiving Water (RM800)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	363	152	-----	175
Carbon, Organic (Dissolved)	mg/l	-----	2.9	-----	3.1
Carbon, Organic (Total)	mg/kg mg/l	2,300	3.2	5.0	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	12	----	4
Chlorophyll a	µg/l	-----	5	-----	-----
Color, True	S.U. (APHA)	-----	6	-----	7
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	223	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.07	-----	0.24
Nitrogen, Ammonia (Total)	mg/kg mg/l	2.9	0.07	0.22	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.3	-----	0.5
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	90	0.3	0.8	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	0.15	-----	0.03
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.1	0.15	0.15	-----
Oxidation-Reduction Potential	mV	283	-----	-----	-----
pH	S.U.	8.3	8.3	-----	8.3
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	0.02
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	0.02
Phosphorus, Total	mg/kg mg/l	264	n.d.	0.20	-----
Solids, Total Dissolved	mg/l	-----	480	-----	504
Solids, Total Suspended	mg/l	-----	4	168	-----
Turbidity	NTU	-----	7	192	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	2,015	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	0.5	-----	n.d.
Arsenic	mg/kg µg/l	n.d.	2	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	7,265	57	-----	58
Chromium	mg/kg µg/l	4.7	n.d.	-----	n.d.
Copper	mg/kg µg/l	2.6	n.d.	-----	n.d.
Iron	mg/kg µg/l	8,813	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	2,011	19.6	-----	23.2
Manganese	mg/kg µg/l	287	n.d.	-----	30
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	10.9	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	2	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	23.1	10	-----	n.d.
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	183	279	245
THMFP-Bromodichloromethane	µg/l	-----	27	29	28
THMFP-Bromoform	µg/l	-----	n.d.	3	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	n.d.	4
THMFP-Chloroform	µg/l	-----	152	247	196

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 29. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM800SSC.

Parameter	Units*	Sediment	Receiving Water (RM800)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	307	152	-----	172
Carbon, Organic (Dissolved)	mg/l	-----	2.9	-----	3.4
Carbon, Organic (Total)	mg/kg mg/l	1,500	3.2	7.9	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	12	-----	28
Chlorophyll a	µg/l	-----	5	-----	-----
Color, True	S.U. (APHA)	-----	6	-----	8
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	223	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.07	-----	0.36
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.07	0.41	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	n.d.	-----	0.7
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	92.1	0.3	1.1	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	0.15	-----	0.14
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.2	0.15	0.14	-----
Oxidation-Reduction Potential	mV	194	-----	-----	-----
pH	S.U.	8.3	8.3	-----	8.3
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	0.04
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	0.02
Phosphorus, Total	mg/kg mg/l	243	n.d.	0.32	-----
Solids, Total Dissolved	mg/l	-----	480	-----	512
Solids, Total Suspended	mg/l	-----	4	287	-----
Turbidity	NTU	-----	7	291	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	1,391	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	0.5	-----	0.6
Arsenic	mg/kg µg/l	n.d.	2	-----	2
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	5,816	57	-----	62
Chromium	mg/kg µg/l	3.4	n.d.	-----	n.d.
Copper	mg/kg µg/l	2.2	n.d.	-----	n.d.
Iron	mg/kg µg/l	8,404	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	1,365	19.6	-----	22.1
Manganese	mg/kg µg/l	224	n.d.	-----	40
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	9.4	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	2	-----	1
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	19.4	10	-----	n.d.
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	183	329	222
THMFP-Bromodichloromethane	µg/l	-----	27	26	27
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	2	4
THMFP-Chloroform	µg/l	-----	152	300	191

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 30. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM800BWD.

Parameter	Units*	Sediment	Receiving Water (RM800)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	5,301	152	-----	187
Carbon, Organic (Dissolved)	mg/l	-----	2.9	-----	3.7
Carbon, Organic (Total)	mg/kg mg/l	10,900	3.2	7.1	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	12	-----	10
Chlorophyll a	µg/l	-----	5	-----	-----
Color, True	S.U. (APHA)	-----	6	-----	11
Cyanide	mg/kg µg/l	4.6	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	223	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.07	-----	0.74
Nitrogen, Ammonia (Total)	mg/kg mg/l	20.9	0.07	0.71	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	n.d.	-----	1.0
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	827	0.3	1.2	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	0.15	-----	0.13
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	0.73	0.15	0.13	-----
Oxidation-Reduction Potential	mV	147	-----	-----	-----
pH	S.U.	8.3	8.3	-----	8.2
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	0.04
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	0.03
Phosphorus, Total	mg/kg mg/l	332	n.d.	0.22	-----
Solids, Total Dissolved	mg/l	-----	480	-----	660
Solids, Total Suspended	mg/l	-----	4	198	-----
Turbidity	NTU	-----	7	195	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	3,122	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	0.5	-----	0.8
Arsenic	mg/kg µg/l	n.d.	2	-----	2
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	12,665	57	-----	62
Chromium	mg/kg µg/l	5.4	n.d.	-----	n.d.
Copper	mg/kg µg/l	4.6	n.d.	-----	n.d.
Iron	mg/kg µg/l	9,907	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	3,178	19.6	-----	26.4
Manganese	mg/kg µg/l	557	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	10	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	2	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	26.3	10	-----	n.d.
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	183	343	246
THMFP-Bromodichloromethane	µg/l	-----	27	27	29
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	n.d.	3
THMFP-Chloroform	µg/l	-----	152	314	214

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 31. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM779SSM.

Parameter	Units*	Sediment	Receiving Water (RM779)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	200	160	-----	166
Carbon, Organic (Dissolved)	mg/l	-----	3.3	-----	3.7
Carbon, Organic (Total)	mg/kg mg/l	1,500	4.1	4.8	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	13	-----	16
Chlorophyll a	µg/l	-----	7	-----	-----
Color, True	S.U. (APHA)	-----	6	-----	8
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	241	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.06	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.07	n.d.	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.3	-----	0.3
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	87.9	0.4	0.6	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	0.17	-----	0.19
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	0.74	0.17	0.19	-----
Oxidation-Reduction Potential	mV	275	-----	-----	-----
pH	S.U.	8.3	8.3	-----	8.4
Phosphorus, Dissolved	mg/l	-----	0.06	-----	0.03
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	0.03
Phosphorus, Total	mg/kg mg/l	316	0.06	0.16	-----
Solids, Total Dissolved	mg/l	-----	518	-----	520
Solids, Total Suspended	mg/l	-----	12	103	-----
Turbidity	NTU	-----	21	101	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	1,923	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	0.5	-----	0.6
Arsenic	mg/kg µg/l	n.d.	2	-----	2
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	5,709	60	-----	69
Chromium	mg/kg µg/l	4.4	n.d.	-----	n.d.
Copper	mg/kg µg/l	2.1	n.d.	-----	n.d.
Iron	mg/kg µg/l	8,560	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	1,913	22.2	-----	26.3
Manganese	mg/kg µg/l	222	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	10.3	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	1	-----	1
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	23.9	n.d.	-----	n.d.
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	200	254	210
THMFP-Bromodichloromethane	µg/l	-----	29	31	31
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chloroform	µg/l	-----	166	219	174

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 32. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM779SSC.

Parameter	Units*	Sediment	Receiving Water (RM779)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	244	160	-----	168
Carbon, Organic (Dissolved)	mg/l	-----	3.3	-----	2.9
Carbon, Organic (Total)	mg/kg mg/l	1,900	4.1	4.8	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	13	-----	18
Chlorophyll a	µg/l	-----	7	-----	-----
Color, True	S.U. (APHA)	-----	6	-----	7
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	241	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.06	-----	0.08
Nitrogen, Ammonia (Total)	mg/kg mg/l	n.d.	0.07	n.d.	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.3	-----	0.2
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	72.9	0.4	0.9	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	0.17	-----	0.19
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.2	0.17	0.19	-----
Oxidation-Reduction Potential	mV	258	-----	-----	-----
pH	S.U.	8.4	8.3	-----	8.4
Phosphorus, Dissolved	mg/l	-----	0.06	-----	0.02
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	0.03
Phosphorus, Total	mg/kg mg/l	248	0.06	0.16	-----
Solids, Total Dissolved	mg/l	-----	518	-----	520
Solids, Total Suspended	mg/l	-----	12	103	-----
Turbidity	NTU	-----	21	195	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	1,621	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	0.58	-----	0.7
Arsenic	mg/kg µg/l	n.d.	2	-----	2
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	5,879	60	-----	64
Chromium	mg/kg µg/l	3.6	n.d.	-----	n.d.
Copper	mg/kg µg/l	1.9	n.d.	-----	n.d.
Iron	mg/kg µg/l	7,498	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	1,687	22.2	-----	24.1
Manganese	mg/kg µg/l	217	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	9.5	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	1	-----	3
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	20.0	n.d.	-----	n.d.
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	200	230	197
THMFP-Bromodichloromethane	µg/l	-----	29	28	29
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chloroform	µg/l	-----	166	198	164

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 33. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM779BWD.

Parameter	Units*	Sediment	Receiving Water (RM779)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	3,245	160	-----	175
Carbon, Organic (Dissolved)	mg/l	-----	3.3	-----	3.4
Carbon, Organic (Total)	mg/kg mg/l	3,900	4.1	6.8	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	13	-----	18
Chlorophyll a	µg/l	-----	7	-----	-----
Color, True	S.U. (APHA)	-----	6	-----	8
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	241	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.06	-----	0.79
Nitrogen, Ammonia (Total)	mg/kg mg/l	5.9	0.07	0.76	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.3	-----	0.2
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	194	0.4	1.5	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	0.17	-----	0.14
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	0.79	0.17	0.14	-----
Oxidation-Reduction Potential	mV	162	-----	-----	-----
pH	S.U.	8.1	8.3	-----	8.2
Phosphorus, Dissolved	mg/l	-----	0.06	-----	0.02
Phosphorus, Orthophosphate	mg/l	-----	n.d.	-----	0.03
Phosphorus, Total	mg/kg mg/l	303	0.06	0.21	-----
Solids, Total Dissolved	mg/l	-----	518	-----	534
Solids, Total Suspended	mg/l	-----	12	205	-----
Turbidity	NTU	-----	21	232	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	2,876	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	0.5	-----	0.2
Arsenic	mg/kg µg/l	n.d.	2	-----	1
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	10,655	60	-----	58
Chromium	mg/kg µg/l	5.6	n.d.	-----	n.d.
Copper	mg/kg µg/l	3.9	n.d.	-----	n.d.
Iron	mg/kg µg/l	9,635	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	3,031	22.2	-----	24.5
Manganese	mg/kg µg/l	324	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	12	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	1	-----	1
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	28.3	n.d.	-----	n.d.
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	200	268	211
THMFP-Bromodichloromethane	µg/l	-----	29	28	29
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	n.d.	3	4
THMFP-Chloroform	µg/l	-----	166	237	177

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 34. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM756SSM.

Parameter	Units*	Sediment	Receiving Water (RM756)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	291	174	-----	189
Carbon, Organic (Dissolved)	mg/l	-----	4.6	-----	3.9
Carbon, Organic (Total)	mg/kg mg/l	2,000	4.9	6.4	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	14	-----	23
Chlorophyll a	µg/l	-----	9	-----	-----
Color, True	S.U. (APHA)	-----	8	-----	8
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	274	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.07	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	2.9	0.10	n.d.	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.4	-----	0.3
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	119	0.4	0.8	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	0.12	-----	0.18
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	2.9	0.12	0.17	-----
Oxidation-Reduction Potential	mV	277	-----	-----	-----
pH	S.U.	8.3	8.2	-----	8.3
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	0.05
Phosphorus, Orthophosphate	mg/l	-----	0.03	-----	0.03
Phosphorus, Total	mg/kg mg/l	244	n.d.	0.30	-----
Solids, Total Dissolved	mg/l	-----	586	-----	556
Solids, Total Suspended	mg/l	-----	17	261	-----
Turbidity	NTU	-----	17	286	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	1,992	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Arsenic	mg/kg µg/l	n.d.	2	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	6,643	65	-----	71
Chromium	mg/kg µg/l	4.7	n.d.	-----	n.d.
Copper	mg/kg µg/l	2.1	n.d.	-----	n.d.
Iron	mg/kg µg/l	8,329	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	2,251	26.2	-----	27.2
Manganese	mg/kg µg/l	202	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	10.3	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	2	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	18.3	10	-----	n.d.
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	231	231	257
THMFP-Bromodichloromethane	µg/l	-----	36	32	40
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	6	n.d.	7
THMFP-Chloroform	µg/l	-----	189	196	211

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 35. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM756SSC.

Parameter	Units*	Sediment	Receiving Water (RM756)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	691	174	-----	182
Carbon, Organic (Dissolved)	mg/l	-----	4.6	-----	4.0
Carbon, Organic (Total)	mg/kg mg/l	2,400	4.9	5.6	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	14	-----	10
Chlorophyll a	µg/l	-----	9	-----	-----
Color, True	S.U. (APHA)	-----	8	-----	8
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	274	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.07	-----	0.27
Nitrogen, Ammonia (Total)	mg/kg mg/l	0.88	0.10	0.25	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.4	-----	0.6
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	89	0.4	0.9	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	0.12	-----	0.15
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	1.2	0.12	0.16	-----
Oxidation-Reduction Potential	mV	279	-----	-----	-----
pH	S.U.	8.2	8.2	-----	8.2
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	0.03
Phosphorus, Orthophosphate	mg/l	-----	0.03	-----	0.03
Phosphorus, Total	mg/kg mg/l	310	n.d.	0.20	-----
Solids, Total Dissolved	mg/l	-----	586	-----	602
Solids, Total Suspended	mg/l	-----	17	161	-----
Turbidity	NTU	-----	17	204	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	2,400	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Arsenic	mg/kg µg/l	n.d.	2	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	7,910	65	-----	70
Chromium	mg/kg µg/l	5.8	n.d.	-----	n.d.
Copper	mg/kg µg/l	2.5	n.d.	-----	n.d.
Iron	mg/kg µg/l	7,275	n.d.	-----	n.d.
Lead	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	2,717	26.2	-----	27.2
Manganese	mg/kg µg/l	236	n.d.	-----	n.d.
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	10.8	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	2	-----	1
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	24.0	10	-----	n.d.
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	231	175	200
THMFP-Bromodichloromethane	µg/l	-----	36	29	34
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	6	n.d.	6
THMFP-Chloroform	µg/l	-----	189	142	161

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

Table 36. Laboratory results for sediment, receiving water, pre-elutriate water, and standard elutriate water analyses for site location RM756BWD.

Parameter	Units*	Sediment	Receiving Water (RM756)	Pre-Elutriate Water**	Standard Elutriate Water***
Alkalinity	mg/kg mg/l	2,516	174	-----	183
Carbon, Organic (Dissolved)	mg/l	-----	4.6	-----	3.9
Carbon, Organic (Total)	mg/kg mg/l	3,600	4.9	5.7	-----
Chemical Oxygen Demand	mg/kg mg/l	-----	14	-----	4
Chlorophyll a	µg/l	-----	9	-----	-----
Color, True	S.U. (APHA)	-----	8	-----	8
Cyanide	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Hardness, Dissolved	mg/l	-----	274	-----	-----
Nitrogen, Ammonia (Dissolved)	mg/l	-----	0.07	-----	n.d.
Nitrogen, Ammonia (Total)	mg/kg mg/l	2.6	0.10	0.25	-----
Nitrogen, Kjeldahl (Dissolved)	mg/l	-----	0.4	-----	0.2
Nitrogen, Kjeldahl (Total)	mg/kg mg/l	183	0.4	0.8	-----
Nitrogen, Nitrate/Nitrite (Dissolved)	mg/l	-----	0.12	-----	0.13
Nitrogen, Nitrate/Nitrite (Total)	mg/kg mg/l	2.8	0.12	0.12	-----
Oxidation-Reduction Potential	mV	280	-----	-----	-----
pH	S.U.	8.0	8.2	-----	8.1
Phosphorus, Dissolved	mg/l	-----	n.d.	-----	n.d.
Phosphorus, Orthophosphate	mg/l	-----	0.03	-----	n.d.
Phosphorus, Total	mg/kg mg/l	306	n.d.	0.16	-----
Solids, Total Dissolved	mg/l	-----	586	-----	594
Solids, Total Suspended	mg/l	-----	17	136	-----
Turbidity	NTU	-----	17	204	n.d.
Metals (Water - Dissolved)					
Aluminum	mg/kg µg/l	3,003	n.d.	-----	n.d.
Antimony	mg/kg µg/l	n.d.	n.d.	-----	0.7
Arsenic	mg/kg µg/l	n.d.	2	-----	n.d.
Beryllium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Cadmium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Calcium	mg/kg mg/l	9,942	65	-----	70
Chromium	mg/kg µg/l	6.5	n.d.	-----	n.d.
Copper	mg/kg µg/l	3.2	n.d.	-----	n.d.
Iron	mg/kg µg/l	9,557	n.d.	-----	n.d.
Lead	mg/kg µg/l	6.4	n.d.	-----	n.d.
Magnesium	mg/kg mg/l	3,217	26.2	-----	28.7
Manganese	mg/kg µg/l	265	n.d.	-----	20
Mercury	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Nickel	mg/kg µg/l	11.6	n.d.	-----	n.d.
Selenium	mg/kg µg/l	n.d.	2	-----	2
Silver	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Thallium	mg/kg µg/l	n.d.	n.d.	-----	n.d.
Zinc	mg/kg µg/l	26.9	10	-----	n.d.
Pesticides, Organochlorine****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
Polychlorinated Biphenyls (PCBs)****	µg/kg µg/l	n.d.	n.d.	-----	n.d.
THM Formation Potential	µg/l	-----	231	185	192
THMFP-Bromodichloromethane	µg/l	-----	36	29	32
THMFP-Bromoform	µg/l	-----	n.d.	n.d.	n.d.
THMFP-Chlorodibromomethane	µg/l	-----	6	n.d.	5
THMFP-Chloroform	µg/l	-----	189	151	155

* Where two numbers present, first is the units for sediment and the second is the units for water.
** All reported values for parameters are total.
*** All reported values for parameters are dissolved.
**** See Table 6.

4 DISCUSSION AND CONCLUSIONS

4.1 GENERAL SEDIMENT CHEMICAL CONDITIONS

Table 37 compares the general chemical conditions of the alluvial sediments collected at the different site locations. Measured alkalinity, total organic carbon, total Kjeldahl nitrogen, and total ammonia nitrogen in the collected alluvial sediment samples exhibited significant variation, while measured nitrate-nitrite nitrogen and total phosphorus levels were less variable (Table 37).

Table 37. General conditions of the collected alluvial sediment samples**.**

Site Location	Alkalinity (mg/kg)	Total Organic Carbon (mg/kg)	Total Kjeldahl Nitrogen (mg/kg)	Total Ammonia Nitrogen (mg/kg)	Nitrate-Nitrite Nitrogen (mg/kg)	Total Phosphorus (mg/kg)
RM867SSM	n.d.	300	74	n.d.	n.d.	365
RM867SSC	n.d.	200	76	n.d.	n.d.	322
RM867BWD	1,630	290	16	n.d.	n.d.	406
RM853SSM	281	110	129	n.d.	n.d.	295
RM853SSC	1,131	260	119	n.d.	n.d.	355
RM853BWD	795	300	128	n.d.	n.d.	365
RM842SSM	362	400	59	n.d.	1.1	131
RM842SSC	2,318	5,700	323	n.d.	1.1	379
RM842BWD	3,446	7,000	281	n.d.	1.2	436
RM827SSM	3,522	7,200	406	34.2	1.2	360
RM827SSC	3,237	5,600	396	18.5	1.7	310
RM827BWD	1,044	4,400	204	n.d.	1.2	238
RM800SSM	363	2,300	90	2.9	1.1	264
RM800SSC	307	1,500	92	n.d.	1.2	243
RM800BWD	5,301	10,900	827	20.9	0.7	332
RM779SSM	200	1,500	88	n.d.	0.7	316
RM779SSC	244	1,900	73	n.d.	1.2	248
RM779BWD	3,245	3,900	194	5.9	0.8	303
RM756SSM	291	2,000	119	2.9	2.9	244
RM756SSC	691	2,400	89	0.9	1.2	310
RM756BWD	2,516	3,600	183	2.6	2.8	306

4.2 COMPARISON OF ELUTRIATE SAMPLES TO NEBRASKA'S SURFACE WATER QUALITY STANDARDS CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

4.2.1 General Criteria for Aquatic Life

4.2.1.1 pH

Nebraska water quality standards state that pH levels are to be greater than or equal to 6.5 S.U. and less than or equal to 9.0 S.U. for the protection of aquatic life. Measured pH levels in all the collected receiving water samples and the prepared pre-elutriate and elutriate samples met these criteria (see Tables 10 - 15, 19 - 24, and 28 - 36).

4.2.1.2 Toxic Substances

4.2.1.2.1 Pesticides, PCBs, and Related Compounds

Table 38 lists the numeric acute and chronic criteria defined by Nebraska's water quality standards for the organochlorine pesticides and PCBs that were analyzed in the collected samples. The

defined numerical criteria are for the protection of aquatic life and their uses (e.g., fish consumption). Table 38 also lists the detection limits for the ogranochlorine pesticide and PCB scans that were used to analyze the elutriate samples. No organochlorine pesticide or PCB congener were detected in any of the collected sediment and receiving water samples or prepared pre-elutriate and elutriate samples (Tables 10 - 15, 19 - 24, and 28 - 36). The detection limits of the applied organochlorine pesticide and PCBs scan are well below the acute criteria defined by Nebraska, but slightly above the chronic criteria for some parameters (Table 38). It is noted that most of the chronic criteria below the scan detection limits are for the protection of human health based on the consumption of fish and other aquatic organisms. Nebraska has not issued a fish consumption advisory for any of the analyzed organochlorine pesticides or PCBs along the Missouri River from Fort Randall Dam to Ponca State Park (i.e., BiOp segments 8, 9, and 10) nor listed this reach of the Missouri River as impaired due to these parameters. The non-detection of all the organochlorine pesticide and PCB parameters at the detection limits of the applied scans are believed to indicate the sampled sediments are "clean" for these parameters. Thus, mobilization of these sediments by dredging should not result in concentrations of organochlorine pesticides or PCBs that would result in the water quality of the Missouri River to: 1) exceed water quality standards criteria, 2) degrade existing uses, or 3) result in any "long-term" degradation of the existing high water quality.

Table 38. Numeric criteria defined by Nebraska water quality standards for analyzed pesticides and PCBs and the detection limits of the organochlorine pesticide and PCB scan applicable to the elutriate samples.

Parameter	Nebraska WQS Criteria (µg/l)		Water Detection Limit (µg/l)	Parameter	Nebraska WQS Criteria (µg/l)		Water Detection Limit (µg/l)
	Acute	Chronic			Acute	Chronic	
DDE	1050	0.0059[f]	0.005	Gamma-Chlordane	2.4	0.0043	0.006
DDD	0.6	0.0084[f]	0.005	Alpha-BHC (alpha-Lindane)	-----	-----	0.009
DDT	1.1	0.001	0.004	Beta-BHC (beta-Lindane)	-----	-----	0.009
Methoxychlor	-----	0.03	0.005	Delta-BHC (delta-Lindane)	-----	-----	0.014
Aldrin	3.0	0.00136[f]	0.008	Gamma-BHC (gamma-Lindane)	0.95	0.16	0.035
Dieldrin	0.24	0.00144[f]	0.004	PCB - Aroclor1016			
Endosulfan 1	0.22	0.056	0.006	PCB - Aroclor1221	2.0	0.0017[f]	0.110
Endosulfan 2	0.22	0.056	0.003	PCB - Aroclor1232	2.0	0.0017[f]	0.194
Endosulfan Sulfate	-----	240[f]	0.010	PCB - Aroclor1242	2.0	0.0017[f]	0.171
Endrin	0.086	0.036	0.003	PCB - Aroclor1248	2.0	0.0017[f]	0.107
Endrin Aldehyde	-----	0.81[f]	0.011	PCB - Aroclor1254	2.0	0.0017[f]	0.218
Endrin Ketone	-----	-----	0.006	PCB - Aroclor1260	2.0	0.0017[f]	0.155
Heptachlor	0.52	0.00214[f]	0.009	PCB - Aroclor1262	2.0	0.0017[f]	0.129
Heptachlor Epoxide	0.52	0.0011[f]	0.007	PCB - Aroclor1268	2.0	0.0017[f]	0.157
Alpha-Chlordane	2.4	0.0043	0.011		2.0	0.0017[f]	0.236

[f] Criteria for the chronic protection of aquatic life and human health criteria at the 10^{-5} risk for carcinogens based on the consumption of fish and other aquatic organisms.

4.2.1.2.2 Metals and Inorganics

Table 39 lists the numeric acute and chronic criteria defined by Nebraska water quality standards for the metals and inorganics that were analyzed. The defined numerical criteria are for the protection of aquatic life and their uses (e.g., fish consumption). Nebraska's water quality criteria for several metals (i.e., Cadmium, Chromium, Copper, Lead, Nickel, Silver, and Zinc) are hardness based. To calculate these criteria, a median hardness value of 234 mg/l, calculated from the hardness values determined for the seven receiving water samples, was used. Table 39 also lists the detection limits that were applicable to the metal and inorganic analyses of the water samples.

Table 39. Numeric criteria defined by Nebraska water quality standards for analyzed metals and inorganics and the laboratory detection limits applicable to the elutriate samples. (Criteria apply to dissolved concentrations unless otherwise noted.)

Metal	Nebraska WQS Criteria (µg/l)		Water Detection Limit (µg/l)	Metal	Nebraska WQS Criteria (µg/l)		Water Detection Limit (µg/l)
	Acute	Chronic			Acute	Chronic	
Aluminum	750	87	25	Lead	161	6.3	0.5
Antimony	88	30	0.5	Manganese	-----	1,000	2
Arsenic	340	16.7	1	Mercury	1.4	0.77[T]	0.02
Beryllium	130	5.3	2	Nickel	961	107	10
Cadmium	13	0.4	0.2	Selenium	20[T]	5.0[T]	1
Chromium	1,188	154	1	Silver	15	-----	1
Copper	30	19	1	Thallium	1,400	6.3	0.5
Cyanide	22	5.2	8	Zinc	241	241	10
Iron	-----	1,000	7				

[T] Criteria apply to total recoverable concentrations.

The concentrations of the dissolved metals and inorganics measured in the prepared elutriate samples are compiled in Table 40. No measured values of metals or inorganics exceeded Nebraska acute or chronic water quality standards criteria. Concentrations of dissolved zinc measured in the prepared elutriate and collected receiving water samples indicated an observable difference in zinc levels above and below Lewis and Clark Lake (Table 40).

Table 40. Concentrations (µg/l) of dissolved metals and inorganics measured in the prepared elutriate samples.

Site Location	Aluminum	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Cyanide	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
RM867SSM	n.d.	0.6	n.d.	n.d.	n.d.	n.d.	20	n.d.	130	n.d.	30	n.d.	n.d.	4	n.d.	n.d.	110
RM867SSC	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	50	n.d.	10	n.d.	n.d.	4	n.d.	n.d.	100
RM867BWD	n.d.	1	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	3	n.d.	n.d.	80
RM853SSM	n.d.	n.d.	1	n.d.	n.d.	n.d.	n.d.	n.d.	20	n.d.	n.d.	n.d.	n.d.	2	n.d.	n.d.	80
RM853SSC	n.d.	n.d.	1	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	3	n.d.	n.d.	190
RM853BWD	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	2	n.d.	n.d.	80
RM842SSM	n.d.	0.5	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	3	n.d.	n.d.	90
RM842SSC	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	3	n.d.	n.d.	120
RM842BWD	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	2	n.d.	n.d.	120
RM827SSM	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	2	n.d.	n.d.	120
RM827SSC	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	2	n.d.	n.d.	120
RM827BWD	n.d.	0.7	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	340	n.d.	n.d.	2	n.d.	n.d.	110
RM800SSM	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	30	n.d.	n.d.	2	n.d.	n.d.	n.d.
RM800SSC	n.d.	0.6	2	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	40	n.d.	n.d.	1	n.d.	n.d.	n.d.
RM800BWD	n.d.	0.8	2	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	2	n.d.	n.d.	n.d.
RM779SSM	n.d.	0.6	2	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	1	n.d.	n.d.	n.d.
RM779SSC	n.d.	0.7	2	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	3	n.d.	n.d.	n.d.
RM779BWD	n.d.	0.2	1	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	1	n.d.	n.d.	n.d.
RM756SSM	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	2	n.d.	n.d.	n.d.
RM756SSC	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	1	n.d.	n.d.	n.d.
RM756BWD	n.d.	0.7	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	20	n.d.	n.d.	2	n.d.	n.d.	n.d.

Table 41 compiles the zinc concentrations measured in the sampled media (i.e., sediment, receiving water, and elutriate water) at the various sampled locations. Dissolved zinc concentrations in elutriate samples prepared from alluvial sediment samples collected along the Missouri River upstream of Lewis and Clark Lake (i.e., RM867, RM853, RM842, and RM827) ranged from 80 to190 µg/l, and were generally above 100 µg/l. Dissolved zinc concentrations measured in elutriate samples prepared from sediment samples collected downstream of Lewis and Clark Lake (i.e., RM800, RM779, and RM756) were all below the 10 µg/l detection limit for zinc (Table 41). Collected sediment and receiving water samples showed a similar, but less pronounced, trend for measured zinc levels. Total zinc concentrations in sediment samples collected upstream of Lewis and Clark Lake ranged from 18.4 to 41.0 mg/kg, and ranged from 18.3 to 26.9 mg/kg downstream of Lewis and Clark Lake (Table 41). Dissolved zinc concentrations measured in the Missouri River (i.e., receiving water) ranged from 40 to 100 µg/l upstream of Lewis and Clark Lake, and were at or below the 10 µg/l detection limit for zinc downstream of Lewis and Clark Lake (Table 41).

Table 41. Zinc concentrations measured in sampled media along the Missouri River from Fort Randall Dam, SD to Ponca State Park, NE**.**

Sampled Medium	RM867SSM	RM867SSC	RM867BWD	RM853SSM	RM853SSC	RM853BWD	RM842SSM	RM842SSC	RM842BWD	RM827SSM	RM827SSC	RM827BWD	RM800SSM	RM800SSC	RM800BWD	RM779SSM	RM779SSC	RM779BWD	RM756SSM	RM756SSC	RM756BWD
Sediment Zinc, Total (mg/kg)	29.9	31.6	34.0	33.3	29.8	29.9	18.4	34.3	37.7	41.0	29.2	18.8	23.1	19.4	26.3	23.9	20.0	28.3	18.3	24.0	26.9
Receiving Water Zinc, Dissolved (µg/l)	40	40	40	60	60	60	70	70	70	100	100	100	10	10	10	n.d.	n.d.	n.d.	10	10	10
Elutriate Water Zinc, Dissolved (µg/l)	110	100	80	80	190	80	90	120	120	120	120	110	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

4.2.2 Total Ammonia Criteria for the Protection of Class A – Warmwater

Table 42 shows the levels of ammonia measured in the various media analyzed, including sediment, receiving water, pre-elutriate samples, and elutriate samples. Total ammonia measured in alluvial sediments ranged from non-detectable to 34.2 mg/kg. Total ammonia measured in the Missouri River (i.e., receiving water) ranged from 0.03 to 0.10 mg/l. Dissolved ammonia measured in the prepared elutriate samples ranged from non-detectable to 3.3 mg/l. Measured ammonia levels seemingly were lower at the three upstream sites (RM867, RM853, and RM842) compared to the four downstream sites (RM827, RM800, RM779, and RM756) (Table 42).

Table 42 also gives the acute and chronic ammonia criteria applicable to the Missouri River when the sediment samples were collected. Nebraska's ammonia criteria are dependent upon pH and water temperature. The criteria given in Table 42 are based on the pH and water temperature of the Missouri River (i.e., receiving water) at the time the sediment samples were collected. No elutriate samples exceeded the calculated acute ammonia criteria, and only one elutriate sample exceeded the calculated chronic ammonia criteria. The elutriate sample prepared from the sediment sample collected at site location RM827SSM had a dissolved ammonia concentration of 3.3 mg/l. The acute and chronic ammonia criteria calculated for site RM827 were, respectively, 12.1 and 1.8 mg/l. Site RM827 was in the depositional headwaters of Lewis and Clark Lake (see Plates 4, 17, 18, and 19). This area is densely vegetated and decaying vegetation is abundant. The elutriate tests of the collected sediments do not indicate a widespread ammonia water quality concern if the alluvial sediments were mobilized by dredging. Alluvial sediment with higher organic matter and ammonia levels seemingly exist in localized areas.

Table 42. Ammonia concentrations measured in sampled media. Water temperature and pH levels for receiving water are measured field conditions and were used to calculate the listed Nebraska water quality standards criteria for ammonia.

Site Location	Sediment Total Ammonia (mg/kg)	Receiving Water				Pre-Elutriate Total Ammonia (mg/l)	Elutriate Dissolved Ammonia (mg/l)	Nebraska WQ Standards Ammonia Criteria	
		Water Temperature (°C)	pH (S.U.)	Total Ammonia (mg/l)	Dissolved Ammonia (mg/)			Acute (mg/l)	Chronic (mg/l)
RM867SSM	n.d.	20.3	7.9	0.03	n.d.	n.d.	n.d.	10.13	1.93
RM867SSC	n.d.	20.3	7.9	0.03	n.d.	n.d.	n.d.	10.13	1.93
RM867BWD	n.d.	20.3	7.9	0.03	n.d.	0.05	n.d.	10.13	1.93
RM853SSM	n.d.	23.6	8.4	0.10	0.08	n.d.	n.d.	3.88	0.72
RM853SSC	n.d.	23.6	8.4	0.10	0.08	0.10	0.11	3.88	0.72
RM853BWD	n.d.	23.6	8.4	0.10	0.08	n.d.	n.d.	3.88	0.72
RM842SSM	n.d.	21.5	8.1	0.03	n.d.	0.30	0.20	6.94	1.34
RM842SSC	n.d.	21.5	8.1	0.03	n.d.	0.57	0.57	6.94	1.34
RM842BWD	n.d.	21.5	8.1	0.03	n.d.	0.12	n.d.	6.94	1.34
RM827SSM	34.2	23.4	7.8	0.03	0.03	3.6	3.3	12.13	1.79
RM827SSC	18.5	23.4	7.8	0.03	0.03	1.7	1.0	12.13	1.79
RM827BWD	n.d.	23.4	7.8	0.03	0.03	n.d.	0.10	12.13	1.79
RM800SSM	2.9	7.6	8.0	0.07	0.07	0.22	0.24	8.40	2.43
RM800SSC	n.d.	7.6	8.0	0.07	0.07	0.41	0.36	8.40	2.43
RM800BWD	20.9	7.6	8.0	0.07	0.07	0.71	0.74	8.40	2.43
RM779SSM	n.d.	8.1	7.9	0.07	0.06	n.d.	n.d.	10.13	2.80
RM779SSC	n.d.	8.1	7.9	0.07	0.06	n.d.	0.08	10.13	2.80
RM779BWD	5.9	8.1	7.9	0.07	0.06	0.76	0.79	10.13	2.80
RM756SSM	2.9	7.5	7.9	0.10	0.07	n.d.	n.d.	10.13	2.80
RM756SSC	0.9	7.5	7.9	0.10	0.07	0.25	0.27	10.13	2.80
RM756BWD	2.6	7.5	7.9	0.10	0.07	0.25	n.d.	10.13	2.80

4.3 THM FORMATION POTENTIAL

Concerns have been expressed that dredging sediments for the construction of emergent sandbar habitat mobilizes organic matter that could serve as THM precursors. When subject to chlorination during water treatment, THM precursors form trihalomethanes which are known carcinogens. Major precursors affecting THM formation in chlorinated drinking water are believed to be humic and fulvic substances and simple low-molecular-weight organic compounds. To evaluate this concern, THM Formation Potential (THM-FP) and true color were measured in appropriate samples. THM-FP measures the amount of THMs that are formed in a sample that is chlorinated for an extended period. Color in water may result from the presence of natural metallic ions (iron and manganese), humus and peat materials, plankton, weeds, and industrial wastes. "True color" is the color of water from which turbidity has been removed. True color can be indicative of the amount of dissolved humic substances present in water, and dissolved humic substances can be THM precursors. Dissolved low-molecular weight organic matter is believed to form THMs more readily than "residual" organic matter. Table 43 compiles the THM-FP, organic carbon, and true color levels measured in the collected receiving water and prepared pre-elutriate and elutriate samples. Measured THM-FP levels in the prepared pre-elutriate and elutriate samples were both higher and lower than the Missouri River receiving water. In a few cases, THM-FP levels in the prepared elutriate samples were appreciably higher than the receiving water (i.e., sites RM800 and RM779). The elutriate samples at sites RM800 and RM779 had high organic carbon levels. Overall, the prepared elutriate samples did not seem to have significantly elevated THM-FP levels when compared to the applicable Missouri River receiving water.

Table 43. THM formation potential, organic carbon, and true color levels measured in Missouri River receiving water and prepared elutriate samples**.**

	THM Formation Potential (mg/l)			TOC (mg/l)		DOC (mg/l)	True Color (S.U. APHA)	
Site Location	Receiving Water	Pre-Elutriate Water	Elutriate Water	Receiving Water	Pre-Elutriate Water	Elutriate Water	Receiving Water	Elutriate Water
RM867SSM	191	170	184	2.8	4.6	n.d.	5	6
RM867SSC	191	166	182	2.8	5.6	n.d.	5	6
RM867BWD	191	141	192	2.8	2.1	1.1	5	7
RM853SSM	165	302	182	3.0	3.2	2.8	6	6
RM853SSC	165	262	122	3.0	2.3	2.5	6	8
RM853BWD	165	229	113	3.0	2.1	2.0	6	9
RM842SSM	168	196	261	2.7	3.0	3.0	5	5
RM842SSC	168	196	215	2.7	3.0	3.0	5	8
RM842BWD	168	62	234	2.7	2.8	n.d.	5	n.d.
RM827SSM	155	124	159	4.0	3.1	2.2	9	5
RM827SSC	155	122	154	4.0	4.0	4.1	9	5
RM827BWD	155	209	161	4.0	4.4	4.9	9	9
RM800SSM	183	279	245	3.2	5.0	3.1	6	7
RM800SSC	183	329	222	3.2	7.9	3.4	6	8
RM800BWD	183	343	246	3.2	7.1	3.7	6	11
RM779SSM	200	254	210	4.1	4.8	3.7	6	8
RM779SSC	200	230	197	4.1	4.8	2.9	6	7
RM779BWD	200	268	211	4.1	6.8	3.4	6	8
RM756SSM	231	231	257	4.9	6.4	3.9	8	8
RM756SSC	231	175	200	4.9	5.6	4.0	8	8
RM756BWD	231	185	192	4.9	5.7	3.9	8	8

4.4 NUTRIENTS

Nutrient levels measured in the collected alluvial sediments were previously shown in Table 37. The potential for dredging of alluvial sediments for construction of ESH to increase nutrient levels in the Missouri River is indicated by the nutrient levels measured in the prepared elutriate samples. Table 44 gives the total Kjeldahl nitrogen (TKN), nitrate-nitrite nitrogen, and total phosphorus levels measured in the prepared pre-elutriate and elutriate samples and collected Missouri River receiving water. In general, TKN levels in the pre-elutriate water were about double the levels in the Missouri River receiving water (Table 44). Dissolved TKN levels in the elutriate samples were less than the total TKN levels in the pre-elutriate water, and generally a little higher than the dissolved TKN levels in the Missouri River receiving water (Table 44). One sediment sample (i.e., RM827SSM) resulted in significantly higher TKN levels in the pre-elutriate and elutriate samples than in the Missouri River receiving water. The levels of nitrate-nitrite nitrogen in both pre-elutriate and elutriate samples exhibited no increase over Missouri River Receiving water conditions (Table 44). Total phosphorus levels were significantly higher in the pre-elutriate samples compare to the total phosphorus levels measured in the Missouri River receiving water (Table 44). This is expected given the adsorption of phosphorus to suspended sediment and the increased suspended solids levels in the pre-elutriate samples. Dissolved phosphorus levels in the elutriate samples were comparable to dissolved phosphorus levels in the Missouri River receiving water (Table 44).

Table 44. Total Kjeldahl nitrogen, nitrate-nitrite nitrogen, and total phosphorus levels measured in Missouri River receiving water and prepared elutriate samples.

Site Location	Total Kjeldahl Nitrogen (mg/l)				Nitrate-Nitrite Nitrogen (mg/l)				Total Phosphorus (mg/l)			
	Receiving Water		Pre-Elutriate Water (Total)	Elutriate Water (Dissolved)	Receiving Water		Pre-Elutriate Water (Total)	Elutriate Water (Dissolved)	Receiving Water		Pre-Elutriate Water (Total)	Elutriate Water (Dissolved)
	Tot.	Dis.			Tot.	Dis.			Tot.	Dis.		
RM867SSM	0.5	0.5	1.4	n.d.	0.05	n.d.	n.d.	n.d.	0.02	n.d.	0.18	n.d.
RM867SSC	0.5	0.5	1.0	n.d.	0.05	n.d.	n.d.	n.d.	0.02	n.d.	0.15	n.d.
RM867BWD	0.5	0.5	1.2	n.d.	0.05	n.d.	n.d.	n.d.	0.02	n.d.	0.23	n.d.
RM853SSM	0.2	n.d.	0.5	0.2	0.03	n.d.	n.d.	n.d.	0.02	n.d.	0.12	n.d.
RM853SSC	0.2	n.d.	1.1	0.6	0.03	n.d.	n.d.	n.d.	0.02	n.d.	0.14	n.d.
RM853BWD	0.2	n.d.	0.9	0.6	0.03	n.d.	n.d.	n.d.	0.02	n.d.	0.18	n.d.
RM842SSM	0.7	0.6	1.1	0.9	0.11	n.d.	n.d.	n.d.	0.04	n.d.	0.26	n.d.
RM842SSC	0.7	0.6	1.4	1.4	0.11	n.d.	n.d.	n.d.	0.04	n.d.	0.23	n.d.
RM842BWD	0.7	0.6	0.9	0.9	0.11	n.d.	n.d.	n.d.	0.04	n.d.	0.13	n.d.
RM827SSM	0.3	n.d.	4.2	3.6	0.03	n.d.	n.d.	n.d.	n.d.	n.d.	0.25	n.d.
RM827SSC	0.3	n.d.	1.7	1.0	0.03	n.d.	n.d.	n.d.	n.d.	n.d.	0.20	n.d.
RM827BWD	0.3	n.d.	1.0	1.0	0.03	n.d.	n.d.	n.d.	n.d.	n.d.	0.28	n.d.
RM800SSM	0.3	0.3	0.8	0.5	0.15	0.15	0.15	0.03	n.d.	n.d.	0.20	0.02
RM800SSC	0.3	n.d.	1.1	0.7	0.15	0.15	0.14	0.14	n.d.	n.d.	0.32	0.02
RM800BWD	0.3	n.d.	1.2	1.0	0.15	0.15	0.13	0.13	n.d.	n.d.	0.22	0.03
RM779SSM	0.4	0.3	0.6	0.3	0.17	0.17	0.19	0.19	0.06	0.06	0.16	0.03
RM779SSC	0.4	0.3	0.9	0.2	0.17	0.17	0.19	0.19	0.06	0.06	0.16	0.03
RM779BWD	0.4	0.3	1.5	0.2	0.17	0.17	0.14	0.14	0.06	0.06	0.21	0.03
RM756SSM	0.4	0.4	0.8	0.3	0.12	0.12	0.17	0.18	n.d.	n.d.	0.30	0.03
RM756SSC	0.4	0.4	0.9	0.6	0.12	0.12	0.16	0.15	n.d.	n.d.	0.20	0.03
RM756BWD	0.4	0.4	0.8	0.2	0.12	0.12	0.12	0.13	n.d.	n.d.	0.16	n.d.

* Standard elutriate preparation includes a final filtration of the sample. Elutriate concentrations are for the dissolved constituent.

5 REFERENCES

U.S. Army Corps of Engineers. 2008. Using a Hydrolab DS4a and DS5 to directly measure water quality. SOP Number: WQ-21201, Revised October, 2008. Water Quality Unit, Water Control and Water Quality Section, Hydrologic Engineering Branch, Engineering Division, Omaha District, U.S. Army Corps of Engineers.

USEPA and USACE. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Test Manual: Inland Testing Manual. EPA-823-B-98-004, February 1998. U.S. Environmental Protection Agency, Office of Water. Department of Army, U.S. Army Corps of Engineers. Washington, D.C

U.S. Fish and Wildlife Service. 2000. Biological opinion on the operation of the Missouri River Main Stem Reservoir System, operation and maintenance of the Missouri River Bank Stabilization and Navigation Project, and operation of the Kansas River Reservoir System. November 30, 2000. U.S. Fish and Wildlife Service, Region 6, Denver, Colorado, and Region 3, Fort Snelling, Minnesota.

_____. **2003.** U.S. Fish and Wildlife Service 2003 amendment to the 2000 biological opinion on the operation of the Missouri River Main Stem Reservoir System, operation and maintenance of the Missouri River Bank Stabilization and Navigation Project, and operation of the Kansas River Reservoir System. December 16, 2003. U.S. Fish and Wildlife Service.

Plate 1. General sediment sampling location at site RM756 as shown on 2006 aerial photo.

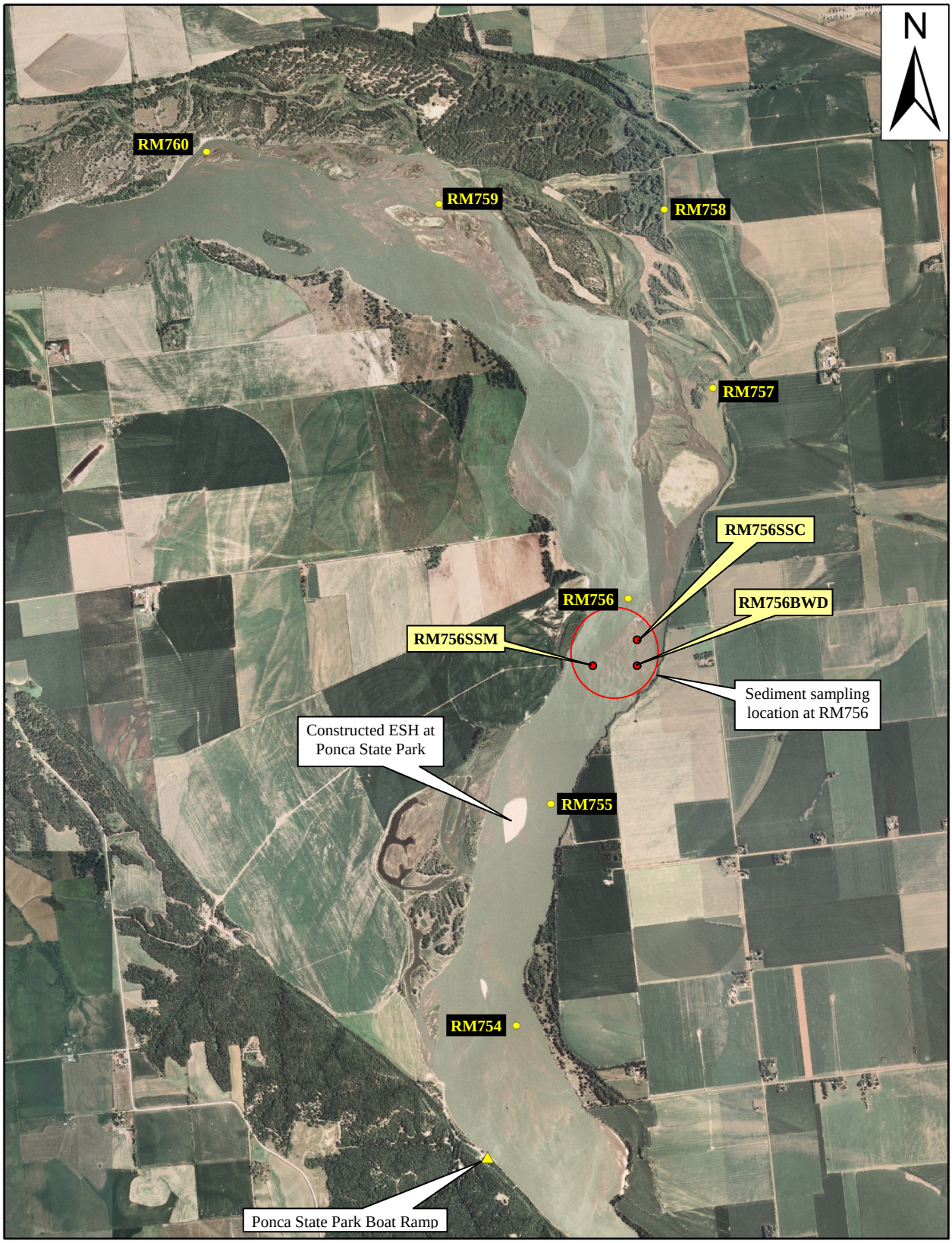

Plate 2. General sediment sampling location at site RM779 as shown on 2006 aerial photo.

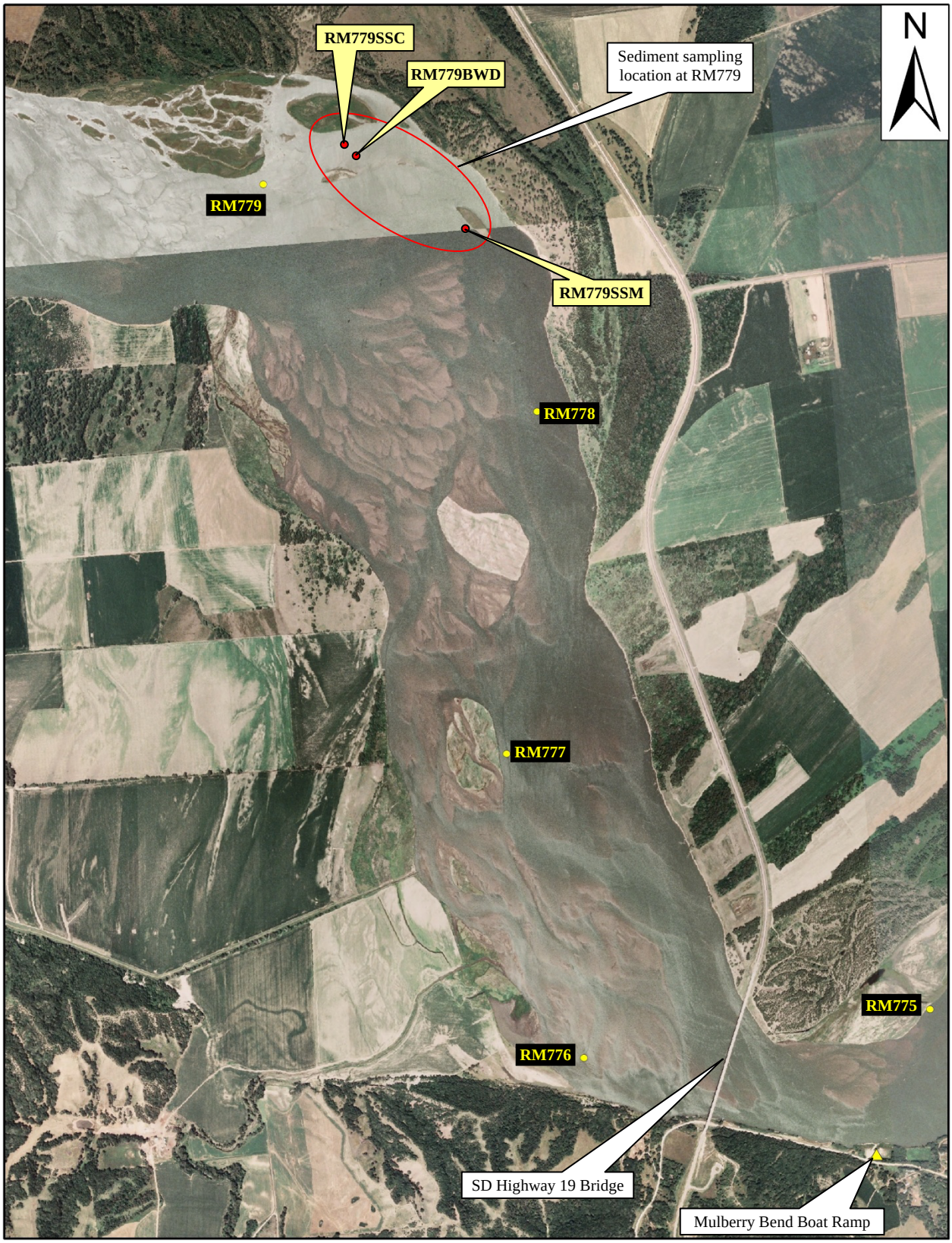

Plate 3. Sediment sampling locations at site RM800 as shown on 2006 aerial photo.

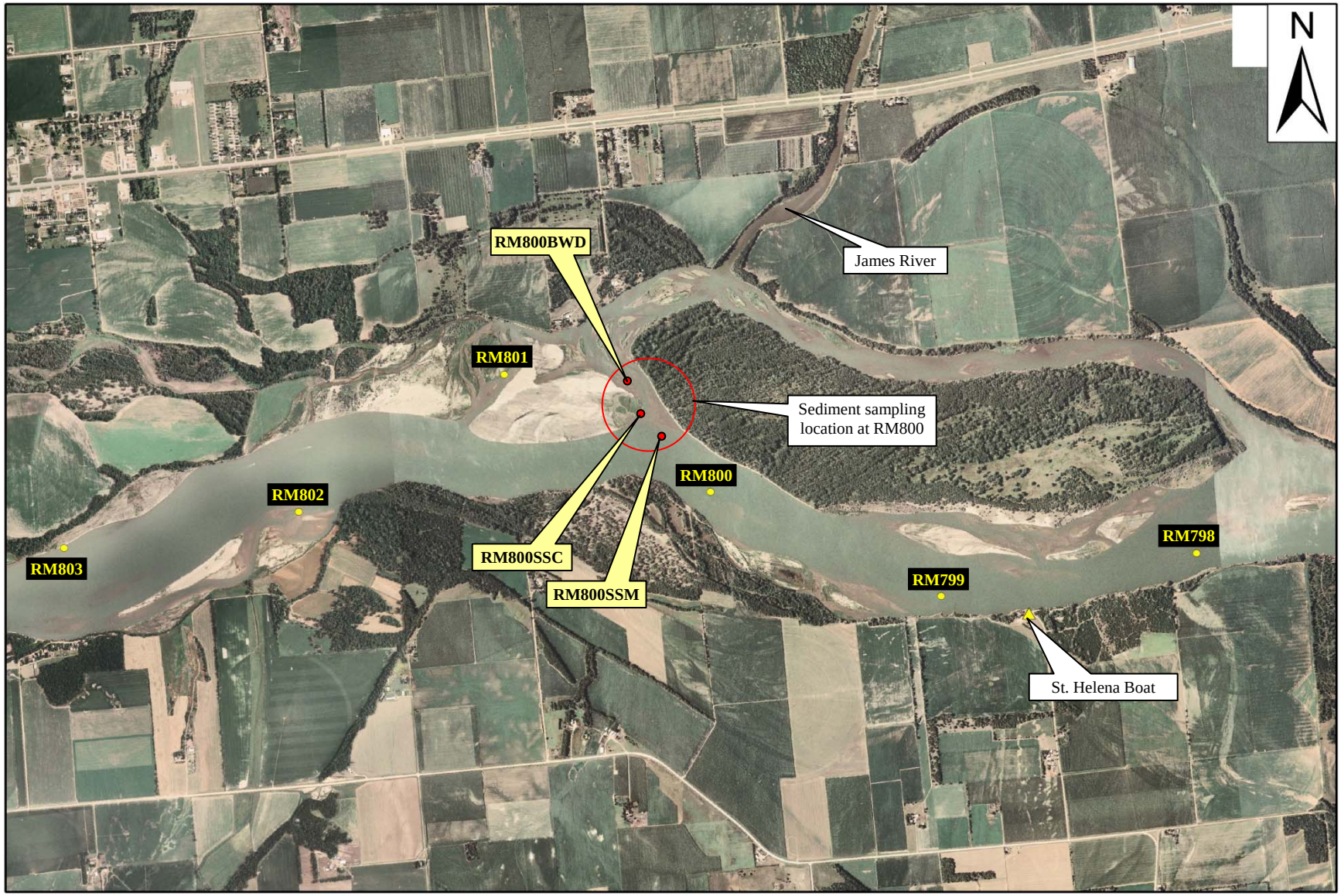

Plate 4. Sediment sampling locations at site RM827 as shown on 2006 aerial photo.

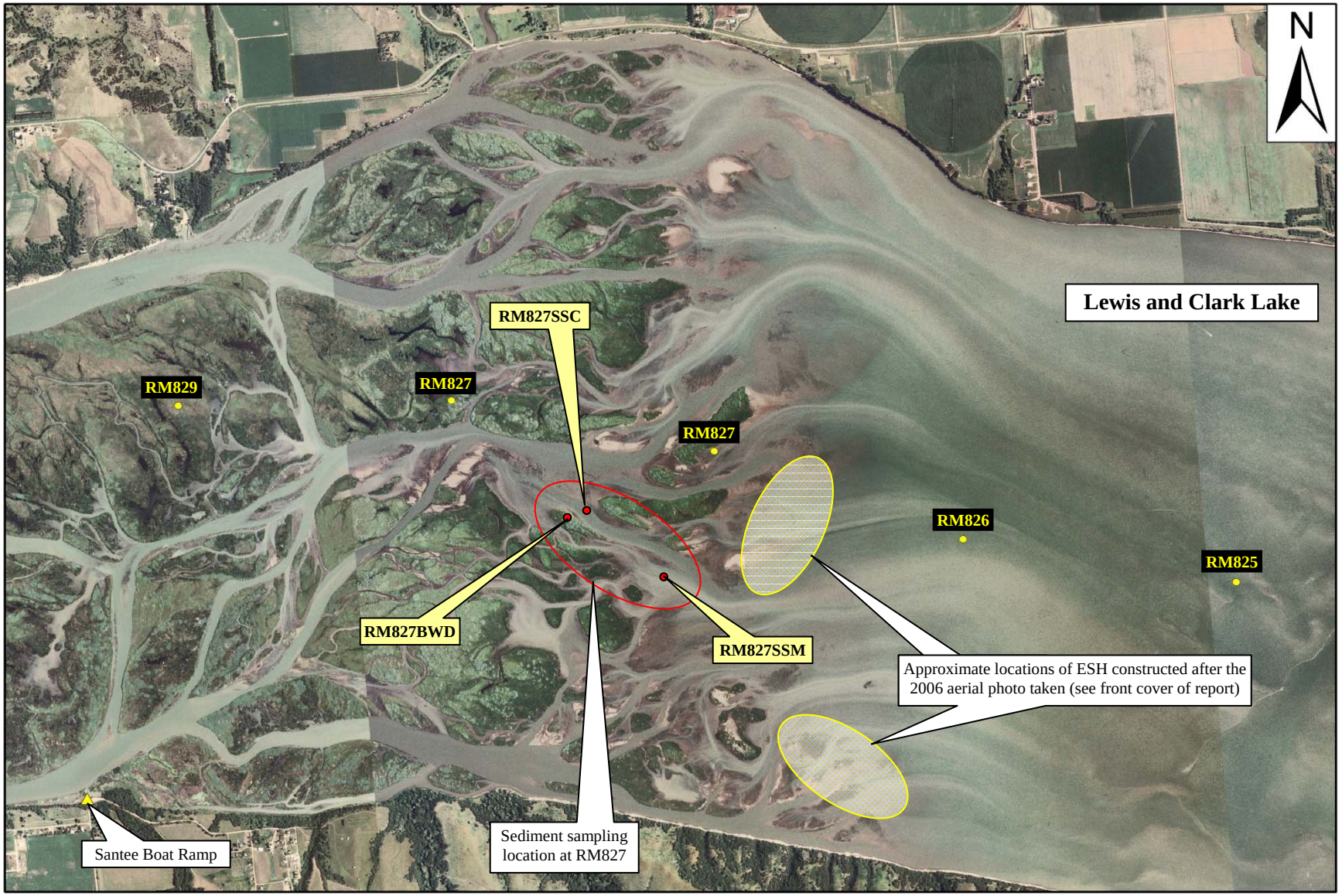

Plate 5. Sediment sampling locations at site RM842 as shown on 2006 aerial photo.

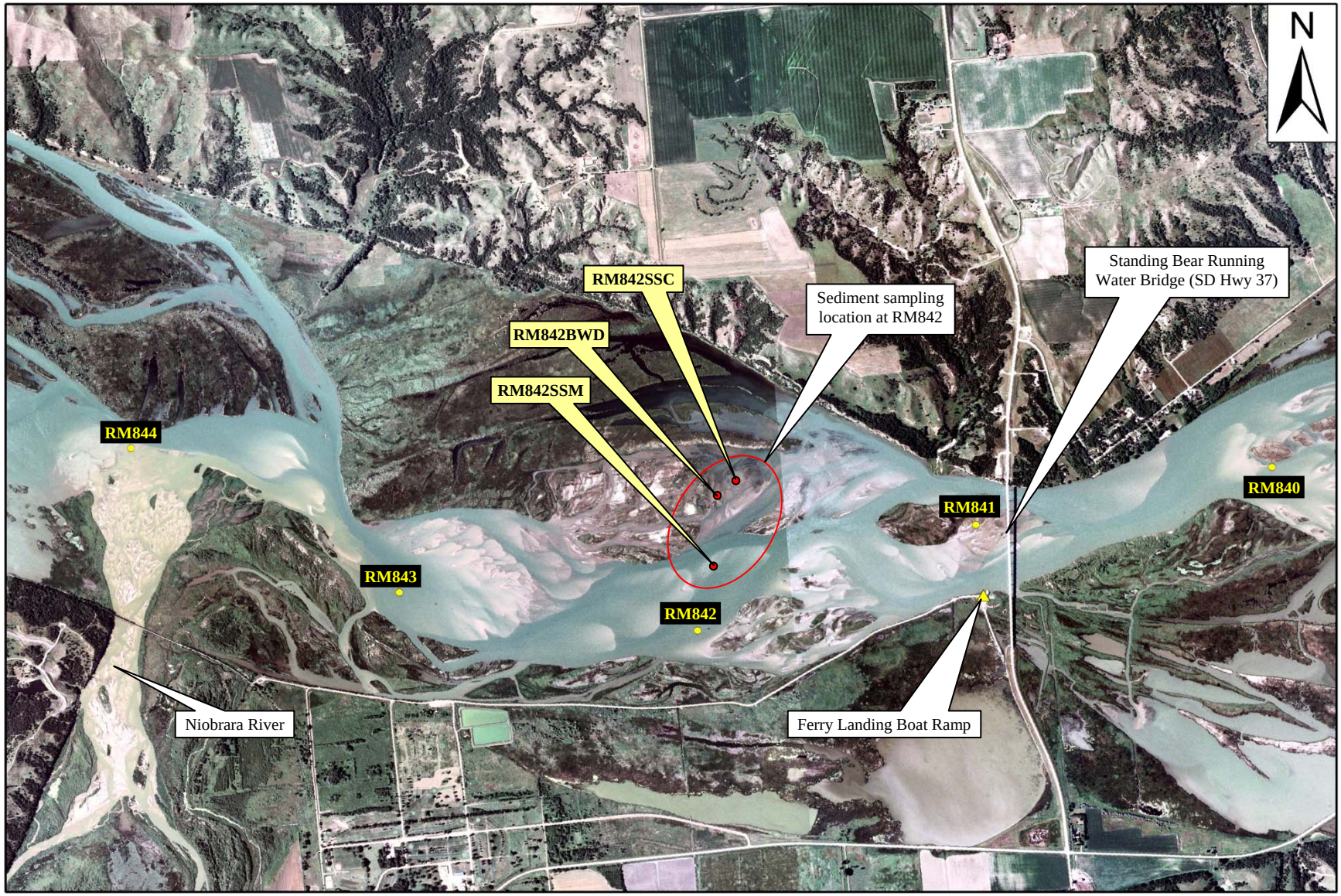

Plate 6. Sediment sampling locations at site RM853 as shown on 2006 aerial photo.

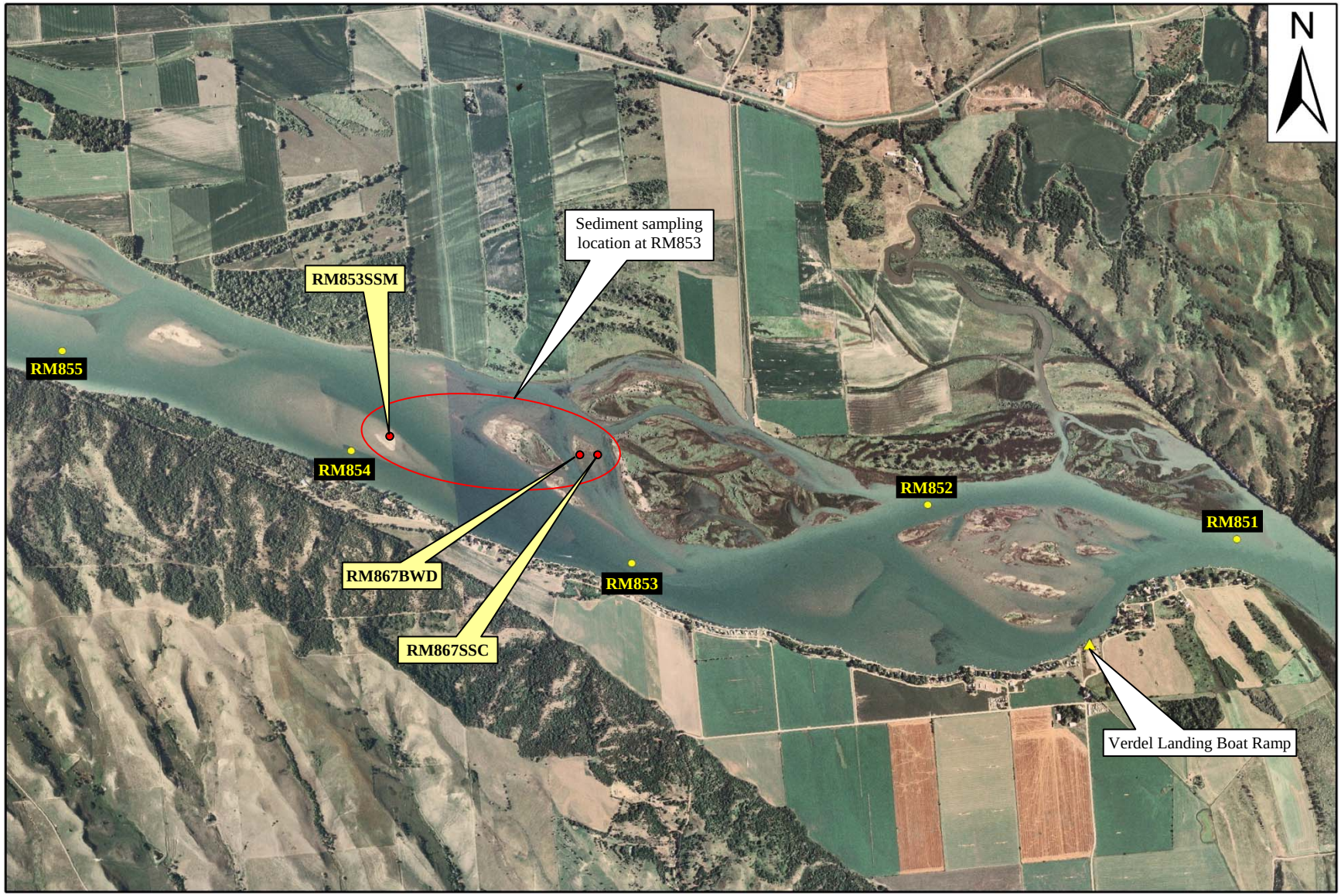

Plate 7. Sediment sampling locations at site RM867 as shown on 2006 aerial photo.

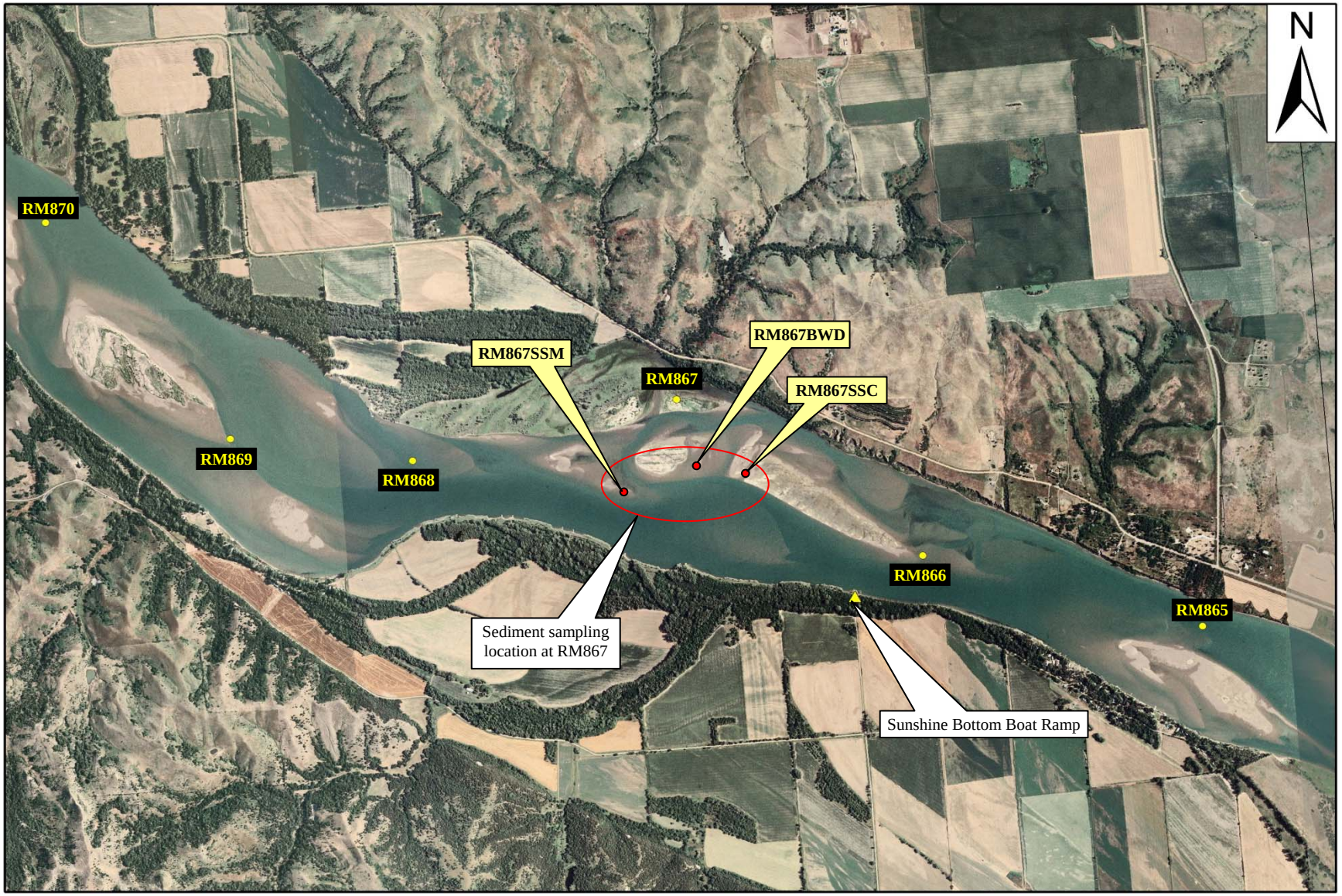

Plate 8. Photograph of site location RM867SSM taken at the time sediment sample collected.

Plate 9. Photograph of site location RM867SSC taken at the time sediment sample collected. (Note: Posted tern/plover sandbar area to the right.)

Plate 10. Photograph of site location RM867BWD taken at the time sediment sample collected.

Plate 11. Photograph of site location RM853SSM taken at the time sediment sample collected.

Plate 12. Photograph of site location RM853SSC taken at the time sediment sample collected.

Plate 13. Photograph of site location RM853BWD taken at the time sediment sample collected.

Plate 14. Photograph of site location RM842SSM taken at the time sediment sample collected. (Note: Standing Bear/Running Water Bridge visible in background.)

Plate 15. Photograph of site location RM842SSC taken at the time sediment sample collected.

Plate 16. Photograph of site location RM842BWD taken at the time sediment sample collected.

Plate 17. Photograph of site location RM827SSM taken at the time sediment sample collected. (Note: Constructed ESH visible in background.)

Plate 18. Photograph of site location RM827SSC taken at the time sediment sample collected.

Plate 19. Photograph of site location RM827BWD taken at the time sediment sample collected.

Plate 20. Photograph of site location RM800SSM taken at the time sediment sample collected.

Plate 21. Photograph of site location RM800SSC taken at the time sediment sample collected.

Plate 22. Photograph of site location RM800BWD taken at the time sediment sample collected.

Plate 23. Photograph of site location RM779SSM taken at the time sediment sample collected.

Plate 24. Photograph of site location RM779SSC taken at the time sediment sample collected.

Plate 25. Photograph of site location RM779BWD was inadvertently not taken or digital file was lost. Site location was similar in appearance to site location RM756BWD (see Plate 28).

Plate 26. Photograph of site location RM756SSC taken at the time sediment sample collected.

Plate 27. Photograph of site location RM756SSC taken at the time sediment sample collected.

Plate 28. Photograph of site location RM756BWD taken at the time sediment sample collected.

APPENDIX A.

Particle Size Distribution Reports Prepared by Midwest Laboratories, Inc. for Collected Sediment Samples

APPENDIX B.

Laboratory Reports Prepared by Midwest Laboratories, Inc. for Analyses of Sediment, Receiving Water, and Elutriate Testing

(Note: Some Sample ID Numbers listed on the Laboratory Reports differ slightly from the Site Numbers given in the report. Sample labels were prepared prior to going in the field to collect sediment samples. Some of the targeted sites locations (i.e. RM) were adjusted to allow targeted habitat types to be sampled. The prepared sample labels taken to the field and used to label the bottles taken to the laboratory did not reflect these adjustments.)

APPENDIX C.

Data Quality Assessment Report

APPENDIX D.

Sampling and Analysis Plan

APPENDIX A.

Particle Size Distribution Reports Prepared by Midwest Laboratories, Inc. for Collected Sediment Samples

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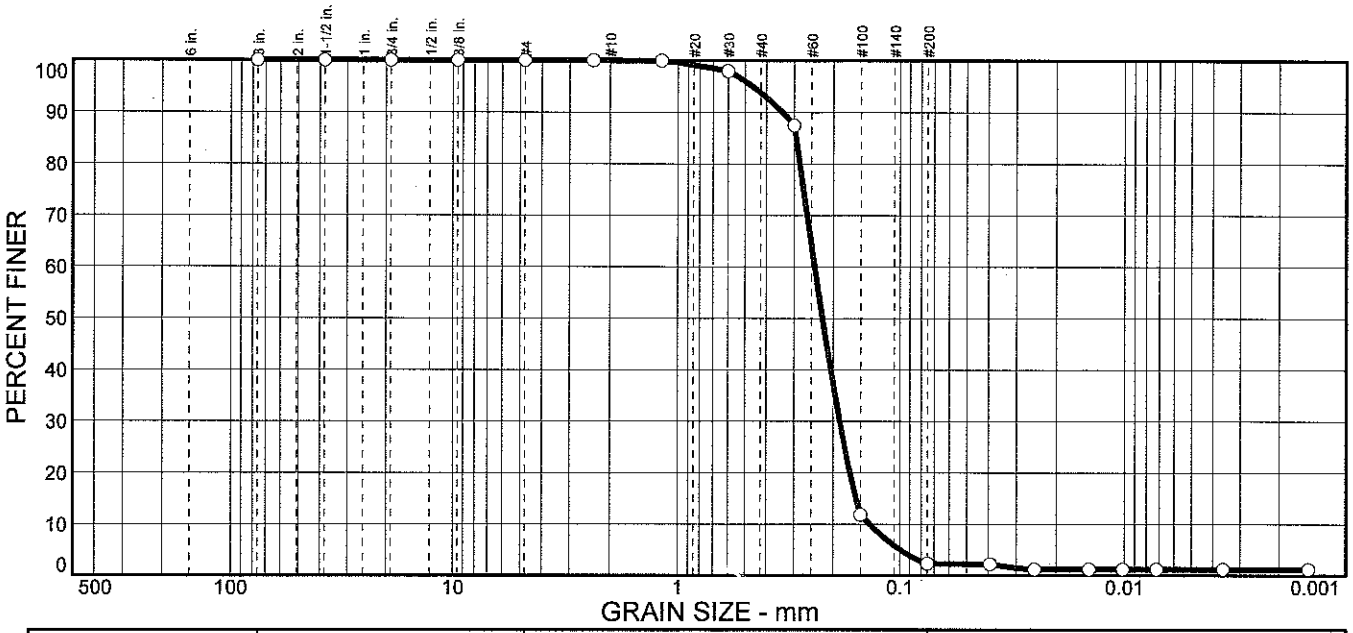
Particle Size Distribution Report

Project: SPS-ESHSED-001 TRIP EDXDEJ072909 **Report No.:** 09-224-2214
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1605410 **Source of Sample:** **Date:** 07/29/2009
Location: RM867SSM **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	6.2	91.5	1.1	1.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.9		
#30	97.9		
#50	87.5		
#100	11.8		
#200	2.3		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.294 D_{60}= 0.243 D_{50}= 0.224
D_{30}= 0.187 D_{15}= 0.157 D_{10}= 0.137
C_u= 1.77 C_c= 1.05

Classification

USCS= AASHTO=

Remarks

Figure

MAS 8-13-09

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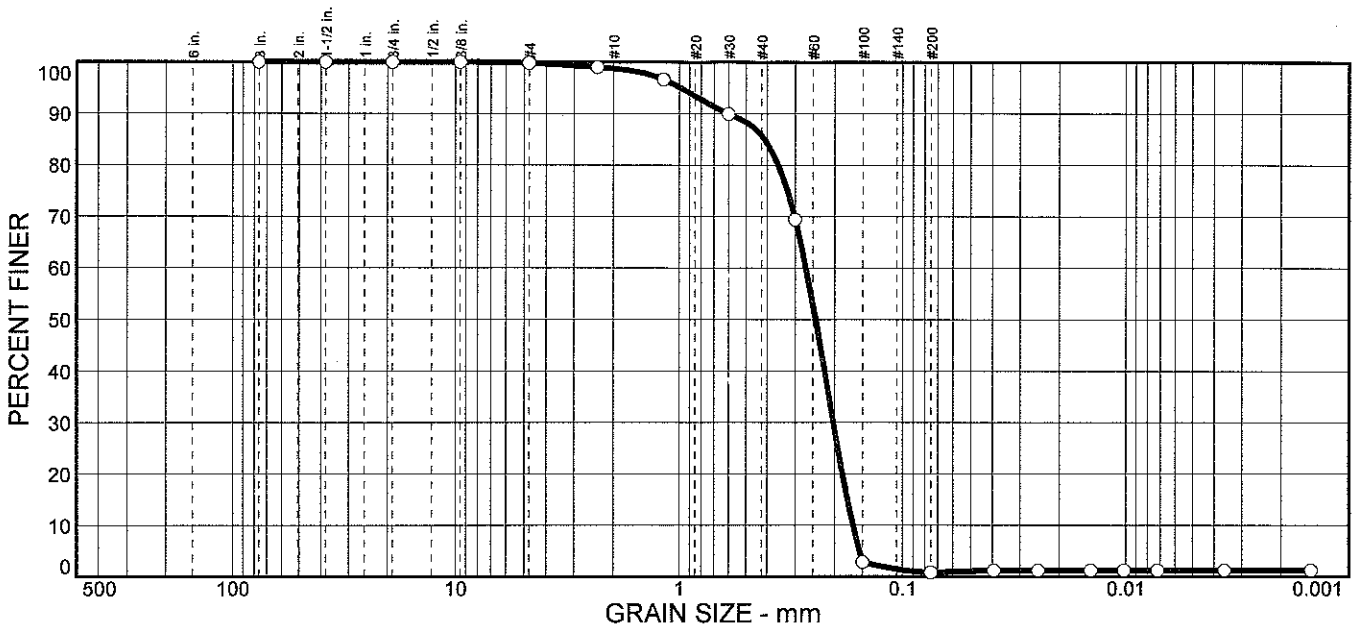
Particle Size Distribution Report

Project: SPS-ESHSED-001 TRIP EDXDEJ072909 **Report No.:** 09-224-2216
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1605411 **Source of Sample:** **Date:** 07/29/2009
Location: RM867SSC **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.2	1.0	13.1	84.9		1.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	99.8		
#8	99.0		
#16	96.6		
#30	89.9		
#50	69.4		
#100	2.8		
#200	0.8		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.413 D_{60}= 0.270 D_{50}= 0.244
D_{30}= 0.204 D_{15}= 0.176 D_{10}= 0.166
C_u= 1.62 C_c= 0.93

Classification

USCS= AASHTO=

Remarks

Figure

mgs 8-13-09

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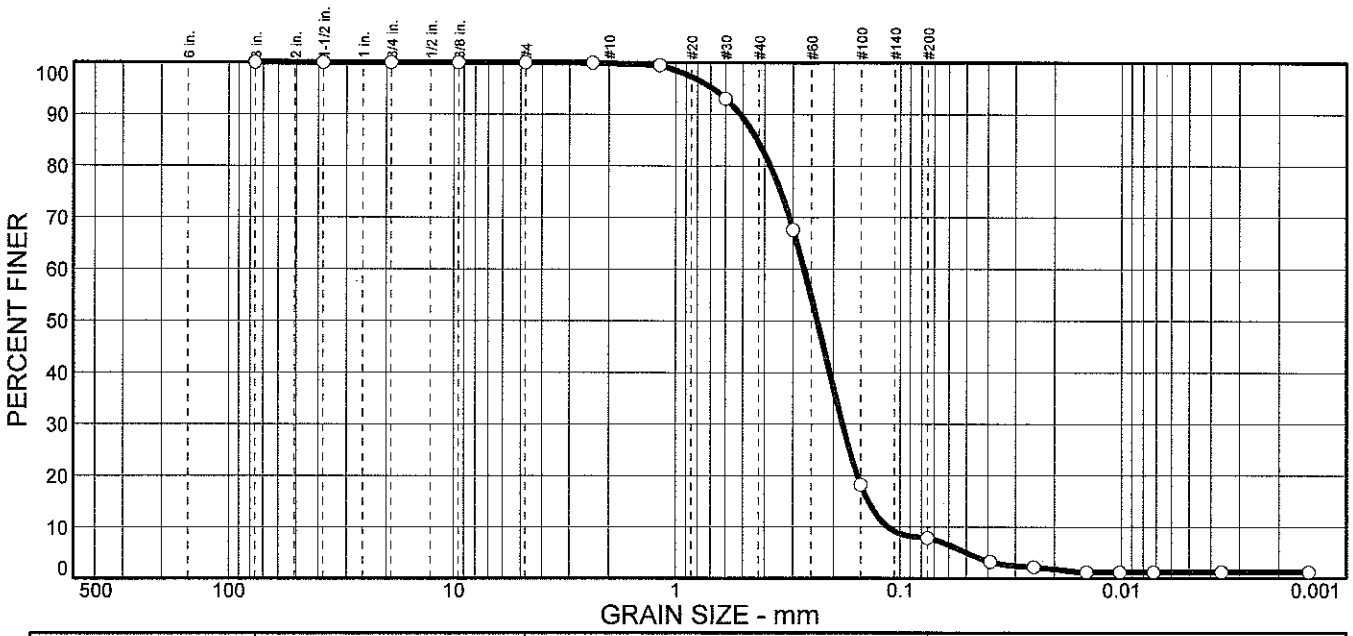
Particle Size Distribution Report

Project: SPS-ESHSED-001 TRIP EDXDEJ072909 **Report No.:** 09-224-2217
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1605412 **Source of Sample:** **Date:** 07/29/2009
Location: RN867BWD **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.2	15.3	76.7	6.6	1.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	99.9		
#16	99.5		
#30	93.0		
#50	67.6		
#100	18.2		
#200	7.8		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.431 D_{60}= 0.269 D_{50}= 0.236
D_{30}= 0.182 D_{15}= 0.139 D_{10}= 0.114
C_u= 2.37 C_c= 1.09

Classification
USCS= AASHTO=

Remarks

Figure

MJS 8-13-09

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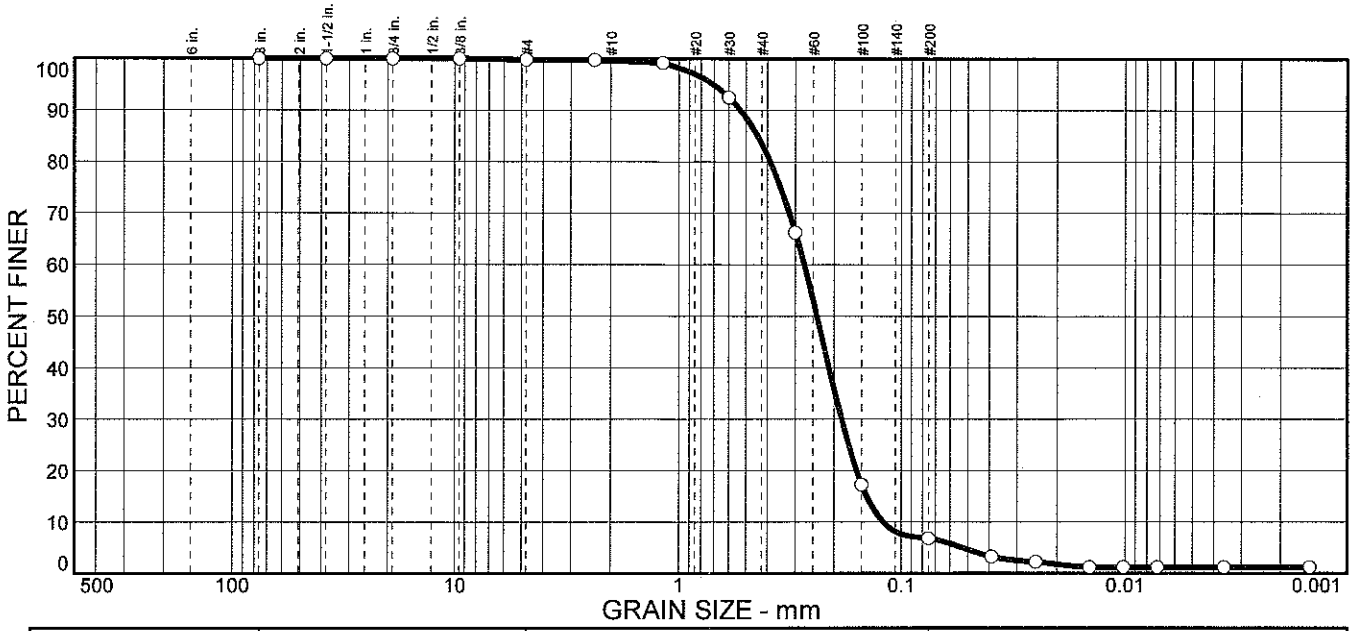
Particle Size Distribution Report

Project: SPS-ESHSED-001 TRIP EDXDEJ072909 **Report No.:** 09-224-2217
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1605412 DUP **Source of Sample:** **Date:** 07/29/2009
Location: RN867BWD DUP **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.2	0.2	16.1	76.7	5.6	1.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	99.8		
#8	99.7		
#16	99.2		
#30	92.5		
#50	66.2		
#100	17.2		
#200	6.8		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.444 D_{60}= 0.274 D_{50}= 0.240
D_{30}= 0.185 D_{15}= 0.143 D_{10}= 0.120
C_u= 2.28 C_c= 1.04

Classification

USCS= AASHTO=

Remarks

Figure

MJS 8-13-09

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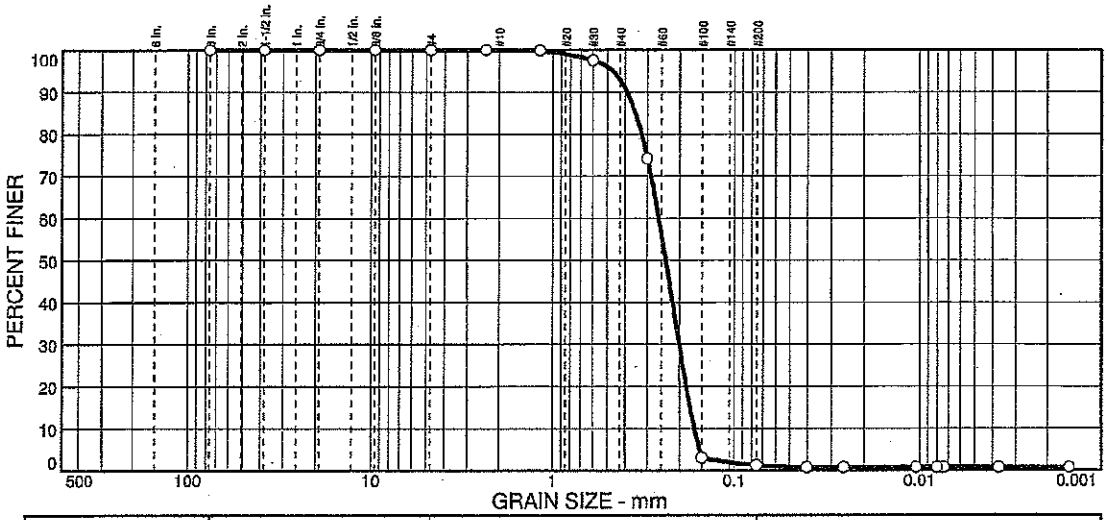
Report Number
09-254-2055

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 EDXDEJ082709 **Report No.:** 09-254-2055
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1618073 **Source of Sample:** **Date:** 08/27/2009
Location: RM852SSM SEDIMENT **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	7.2	91.5	0.5	0.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.9		
#30	97.5		
#50	74.2		
#100	3.1		
#200	1.3		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.350 D_{60}= 0.260 D_{50}= 0.238
D_{30}= 0.201 D_{15}= 0.174 D_{10}= 0.165
C_U= 1.58 C_C= 0.94

Classification
USCS= AASHTO=

Remarks

Figure

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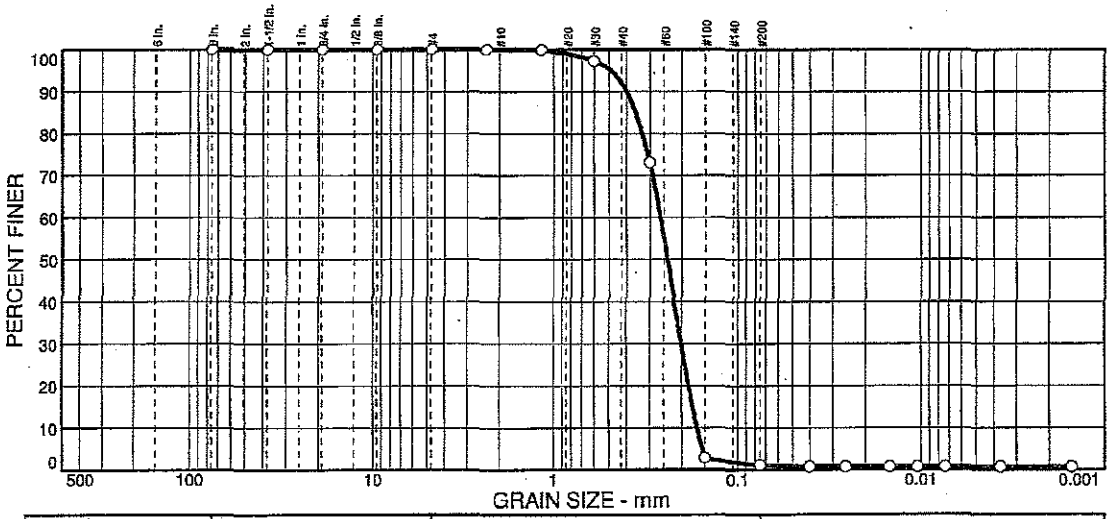
Report Number
09-254-2055

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 EDXDEJ082709 **Report No.:** 09-254-2055
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1618073 DUP **Source of Sample:** **Date:** 08/27/2009
Location: RM852SSM SEDIMENT **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	8.1	90.7	0.4	0.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.9		
#30	97.2		
#50	73.0		
#100	2.8		
#200	1.2		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.358 D_{60}= 0.263 D_{50}= 0.240
D_{30}= 0.202 D_{15}= 0.175 D_{10}= 0.166
C_u= 1.58 C_c= 0.94

Classification
USCS= AASHTO=

Remarks

Figure

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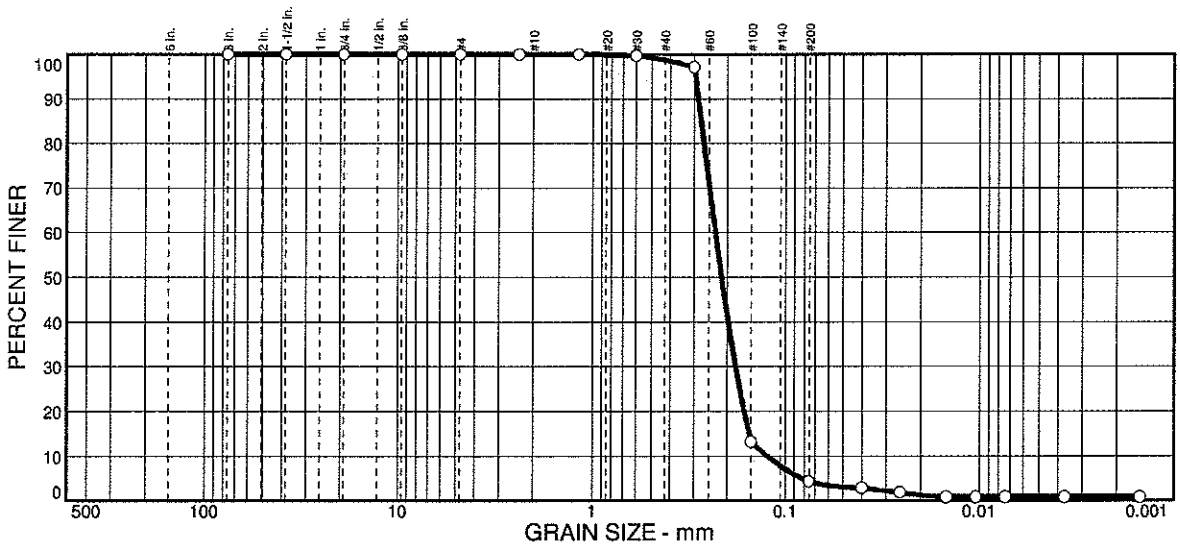
Report Number
09-254-2056

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 EDXDEJ082709 **Report No.:** 09-254-2056
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1618074 **Source of Sample:** **Date:** 08/27/2009
Location: RM852SSC SEDIMENT **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	1.3	94.4	3.5	0.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	100.0		
#30	99.7		
#50	97.1		
#100	13.2		
#200	4.3		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.276 D_{60}= 0.232 D_{50}= 0.216
D_{30}= 0.182 D_{15}= 0.154 D_{10}= 0.124
C_u= 1.87 C_c= 1.15

Classification
USCS= AASHTO=

Remarks

Figure

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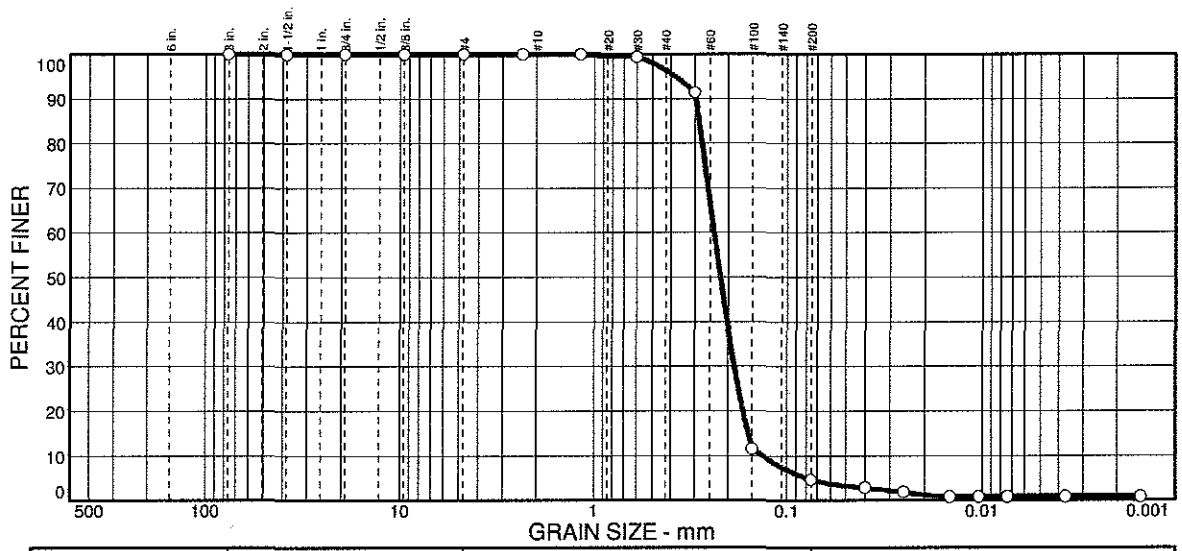
Report Number
09-254-2057

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 EDXDEJ082709 **Report No.:** 09-254-2057
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1618075 **Source of Sample:** **Date:** 08/27/2009
Location: RM852BWD SEDIMENT **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	3.6	91.8	3.8	0.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.9		
#30	99.4		
#50	91.4		
#100	11.5		
#200	4.6		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.287 D_{60}= 0.239 D_{50}= 0.222
D_{30}= 0.187 D_{15}= 0.158 D_{10}= 0.134
C_u= 1.79 C_c= 1.09

Classification
USCS= AASHTO=

Remarks

Figure

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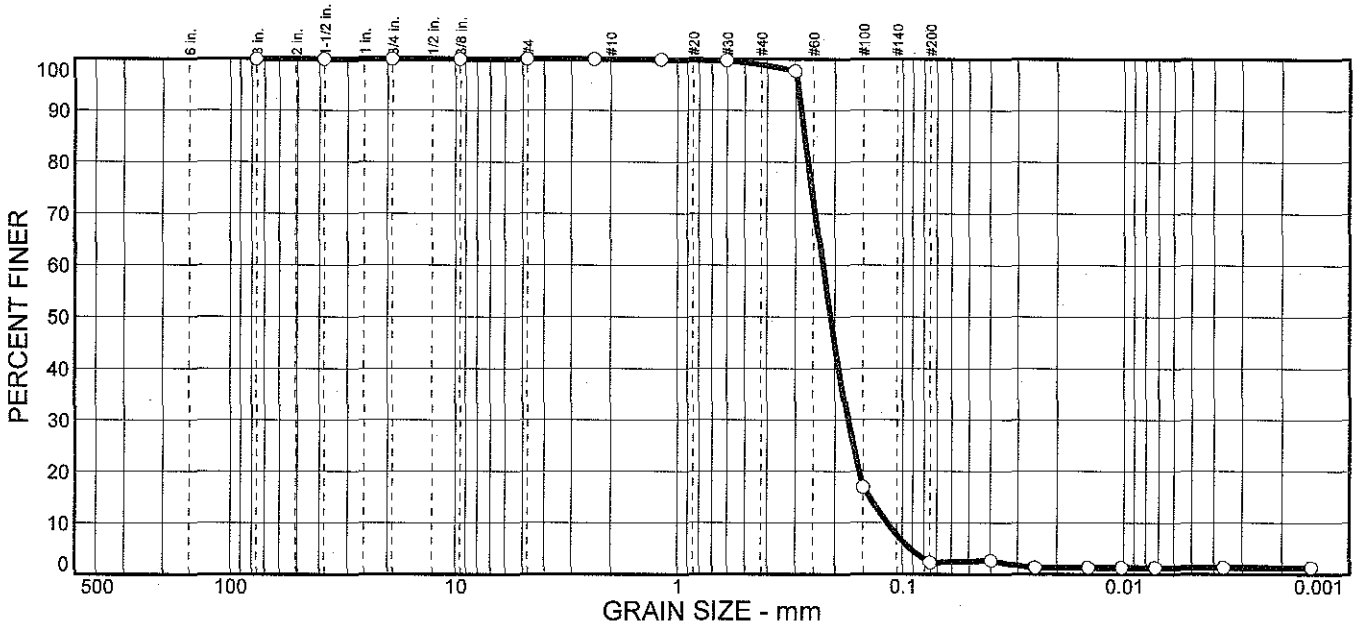
Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ071509 **Report No.:** 09-212-2201
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1600988 **Source of Sample:** **Date:** 07/16/2009
Location: RM842SSM **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	1.1	96.6	1.0	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.9		
#30	99.7		
#50	97.7		
#100	16.9		
#200	2.3		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.274 D_{60}= 0.228 D_{50}= 0.210
D_{30}= 0.175 D_{15}= 0.141 D_{10}= 0.118
C_u= 1.93 C_c= 1.15

Classification

USCS= AASHTO=

Remarks

Figure

MJS 7-3-09

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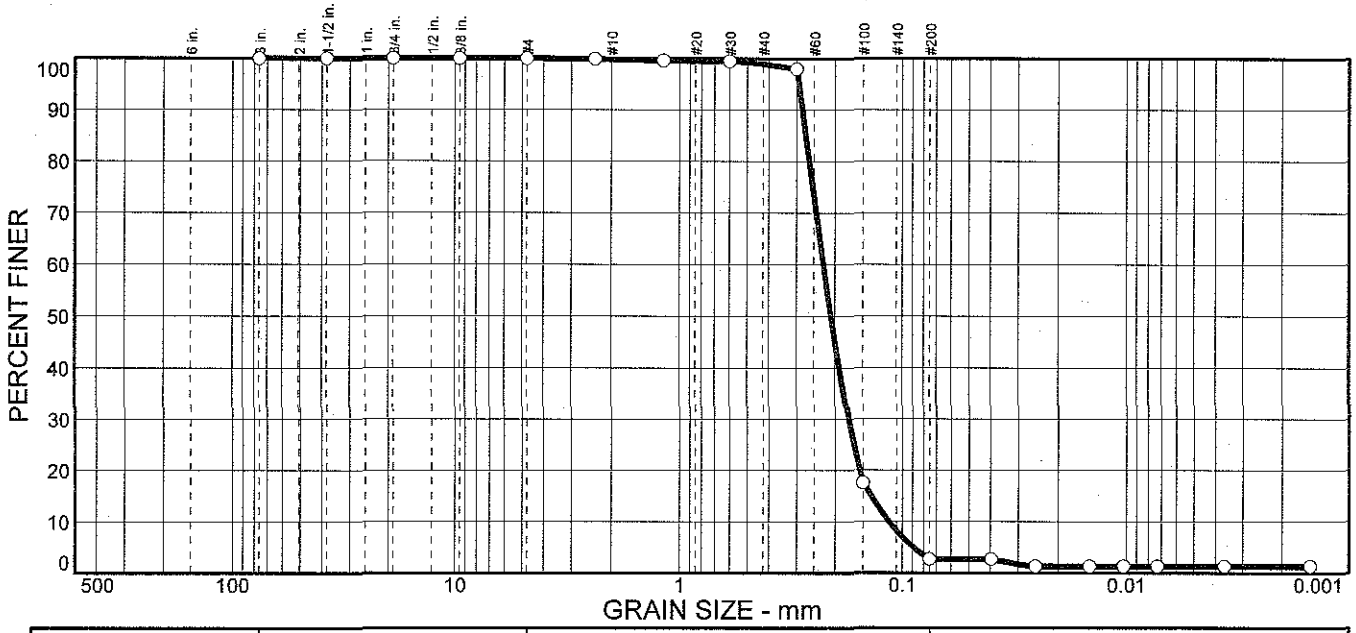
Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ071509 **Report No.:** 09-212-2204
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1600991 **Source of Sample:** **Date:** 07/16/2009
Location: RM842SPLIT **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.2	0.9	96.2	1.4	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	99.9		
#16	99.6		
#30	99.5		
#50	98.0		
#100	17.5		
#200	2.7		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.273 D_{60}= 0.227 D_{50}= 0.209
D_{30}= 0.174 D_{15}= 0.138 D_{10}= 0.115
C_u= 1.97 C_c= 1.17

Classification
USCS= AASHTO=

Remarks

Figure

MJS 7-3-09

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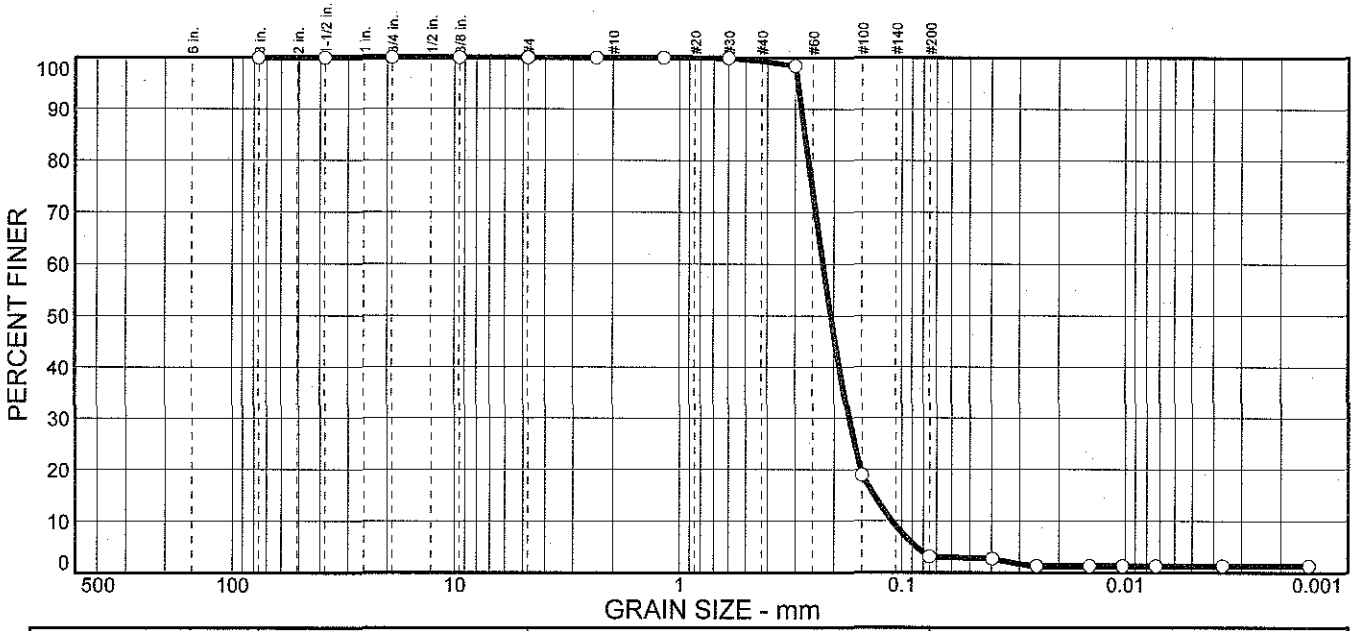
Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ071509 **Report No.:** 09-212-2204
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1600991 DUP **Source of Sample:** **Date:** 07/16/2009
Location: RM842SPILT DUP **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.7	96.2	1.8	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	100.0		
#30	99.9		
#50	98.4		
#100	18.9		
#200	3.1		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.272 D_{60}= 0.225 D_{50}= 0.207
D_{30}= 0.172 D_{15}= 0.133 D_{10}= 0.111
C_u= 2.03 C_c= 1.19

Classification
USCS= AASHTO=

Remarks

Figure

MJS 7-3-09

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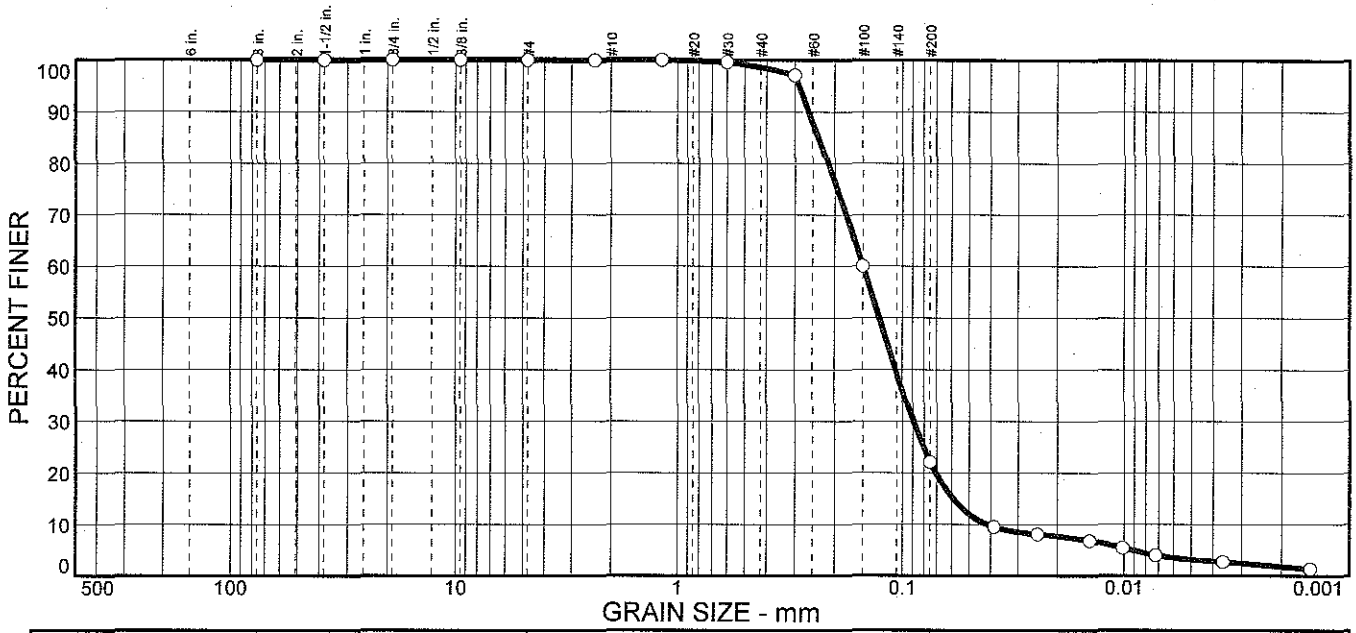
Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ071509 **Report No.:** 09-212-2202
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1600989 **Source of Sample:** **Date:** 07/16/2009
Location: RM842SSC **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	1.4	76.5	19.0	3.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	100.0		
#30	99.6		
#50	97.1		
#100	60.0		
#200	22.1		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.236 D_{60}= 0.150 D_{50}= 0.127
D_{30}= 0.0894 D_{15}= 0.0593 D_{10}= 0.0416
C_u= 3.61 C_c= 1.28

Classification

USCS= AASHTO=

Remarks

Figure

MJS 7-3-07

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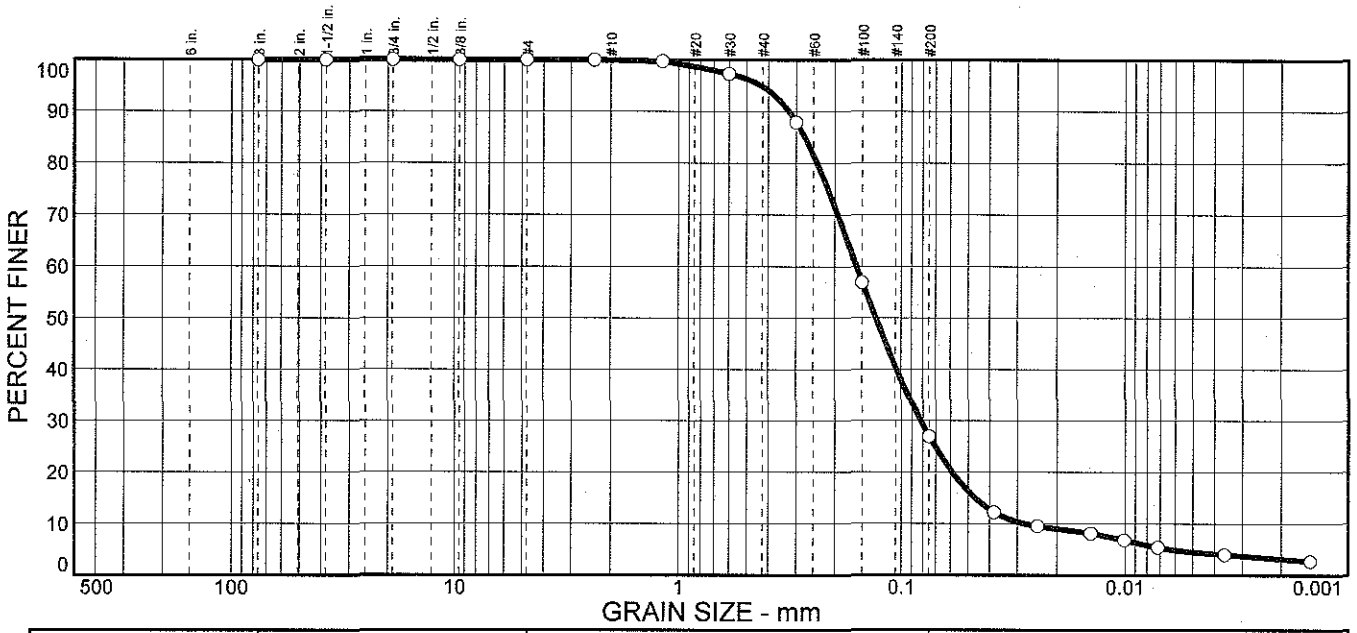
Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ071509 **Report No.:** 09-212-2203
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1600990 **Source of Sample:** **Date:** 07/16/2009
Location: RM842BWD **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	5.1	68.0	22.4	4.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.7		
#30	97.3		
#50	87.9		
#100	56.9		
#200	26.9		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.275 D_{60}= 0.160 D_{50}= 0.130
D_{30}= 0.0819 D_{15}= 0.0467 D_{10}= 0.0281
C_u= 5.68 C_c= 1.50

Classification

USCS= AASHTO=

Remarks

Figure

MJS 7-3-09

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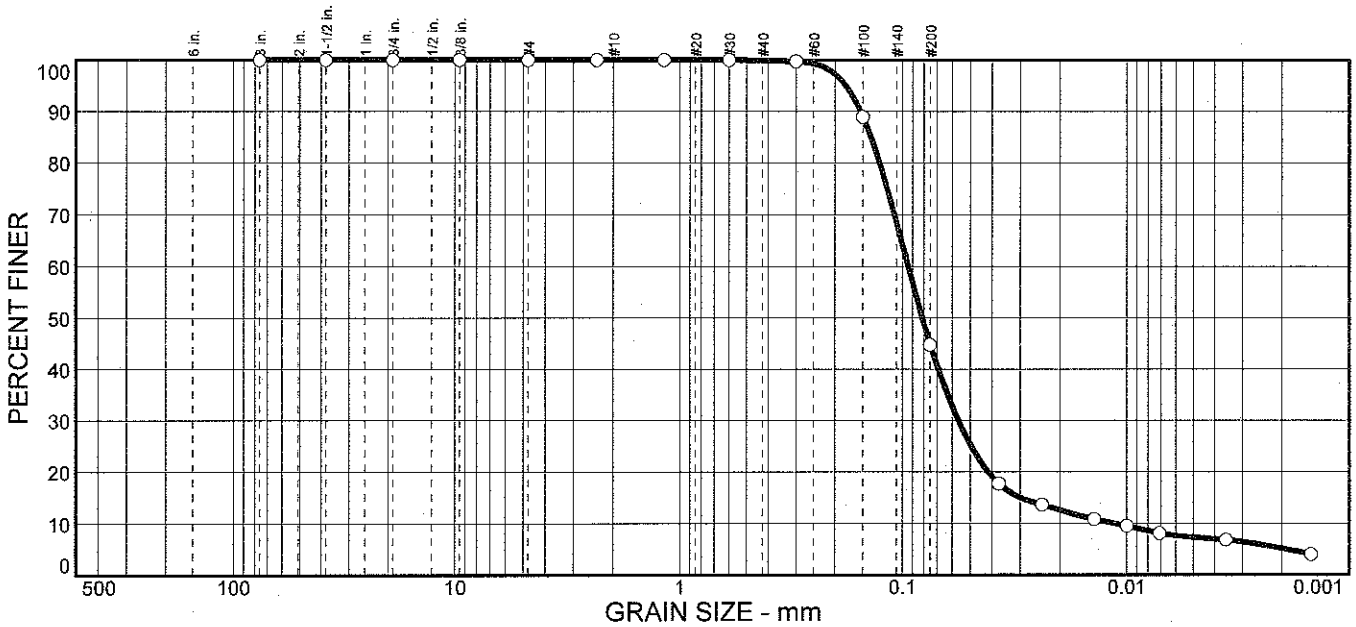
Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ071509 **Report No.:** 09-212-2197
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1600977 **Source of Sample:** **Date:** 07/16/2009
Location: RM828SSM **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.1	55.2	37.4	7.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	100.0		
#30	100.0		
#50	99.7		
#100	88.9		
#200	44.7		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.138 D_{60}= 0.0942 D_{50}= 0.0815
D_{30}= 0.0565 D_{15}= 0.0300 D_{10}= 0.0114
C_u= 8.28 C_c= 2.98

Classification
USCS= AASHTO=

Remarks

Figure

MS 7-3-09

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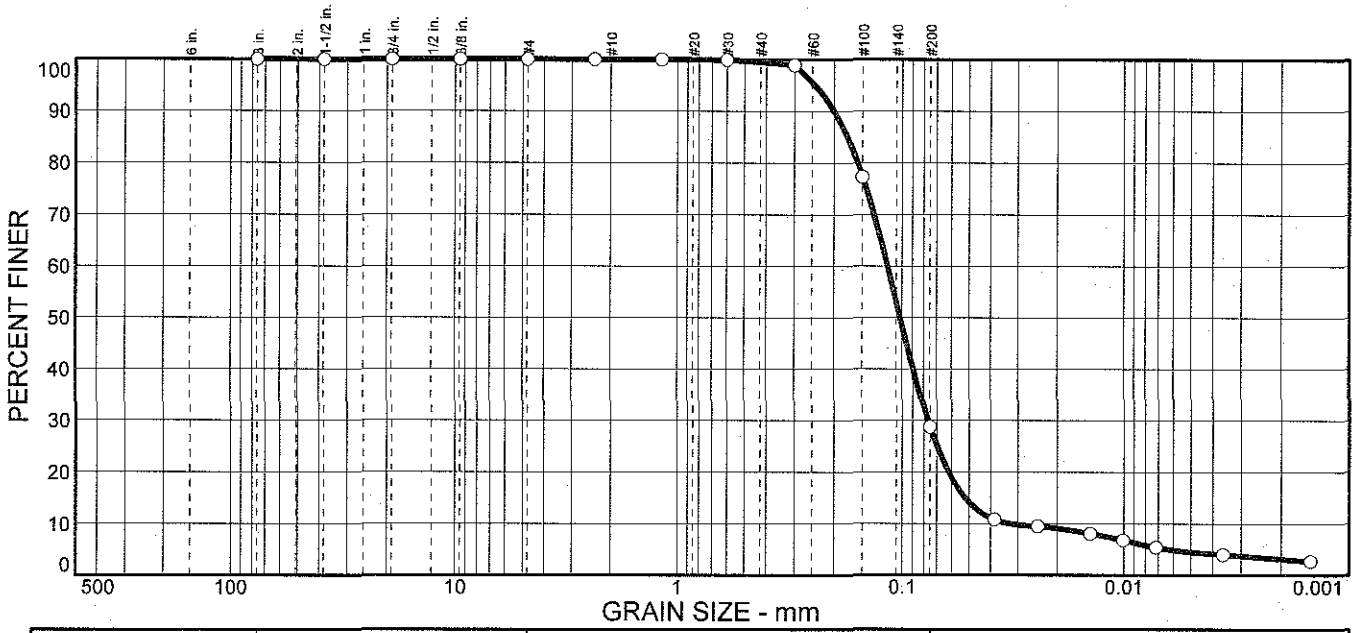
Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ071509 **Report No.:** 09-212-2199
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1600978 **Source of Sample:** **Date:** 07/16/2009
Location: RM828SSC **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.5	70.8	24.2	4.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	100.0		
#30	99.9		
#50	98.9		
#100	77.3		
#200	28.7		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.175 D_{60}= 0.116 D_{50}= 0.102
D_{30}= 0.0767 D_{15}= 0.0522 D_{10}= 0.0326
C_u= 3.57 C_c= 1.55

Classification
USCS= AASHTO=

Remarks

Figure

MJS 7-3-09

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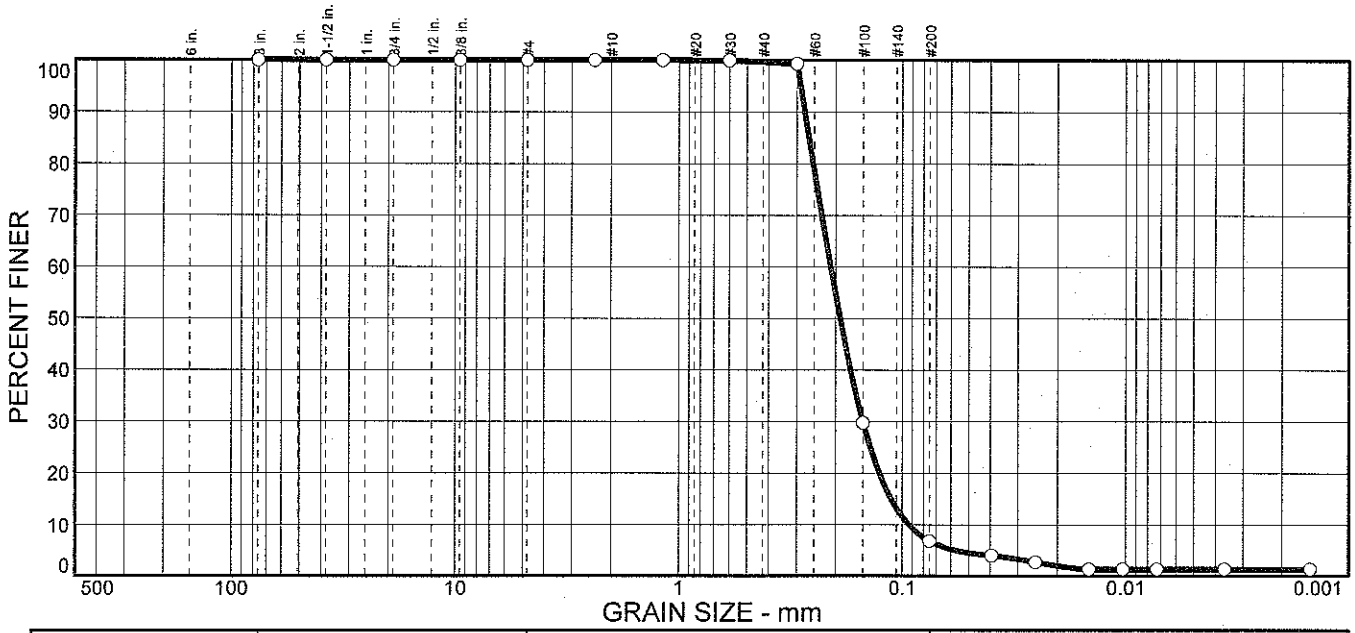
Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ071509 **Report No.:** 09-212-2200
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1600979 **Source of Sample:** **Date:** 07/16/2009
Location: RM828BWD **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.3	92.9	5.5	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	100.0		
#30	99.9		
#50	99.3		
#100	29.7		
#200	6.8		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.265 D_{60}= 0.211 D_{50}= 0.191
D_{30}= 0.151 D_{15}= 0.112 D_{10}= 0.0933
C_u= 2.27 C_c= 1.15

Classification

USCS= AASHTO=

Remarks

Figure

MJS 7-3-09

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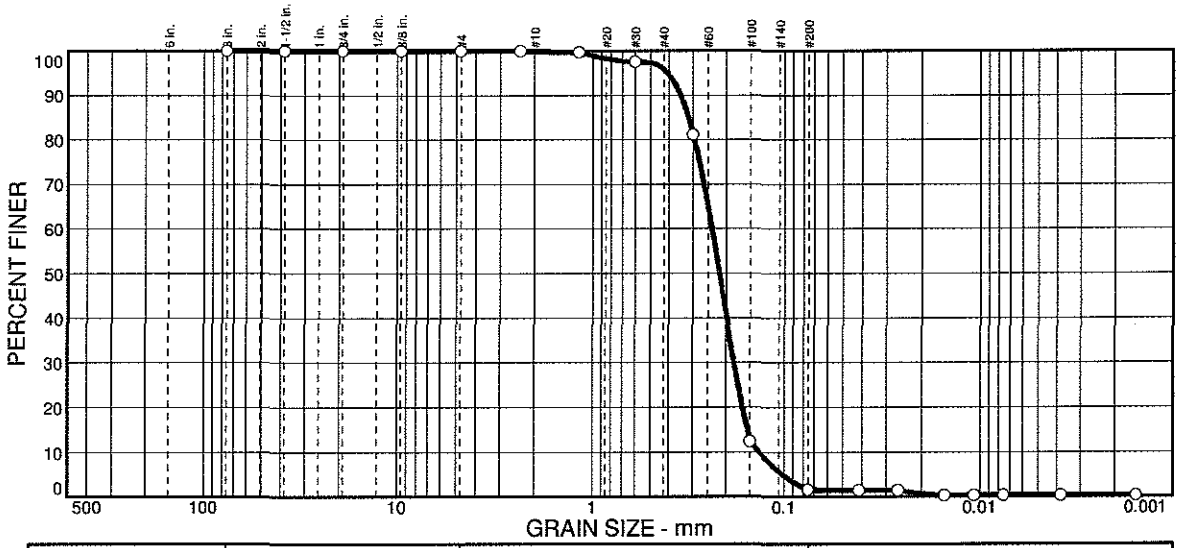
Report Number
09-342-2219

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2219
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653229 **Source of Sample:** **Date:** 11/23/2009
Location: RM801SSM **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.2	4.1	94.1	1.3	0.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	99.9		
#16	99.6		
#30	97.5		
#50	81.1		
#100	12.4		
#200	1.6		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.318 D_{60}= 0.240 D_{50}= 0.219
D_{30}= 0.183 D_{15}= 0.155 D_{10}= 0.135
C_u= 1.78 C_c= 1.03

Classification
USCS= AASHTO=

Remarks

Figure

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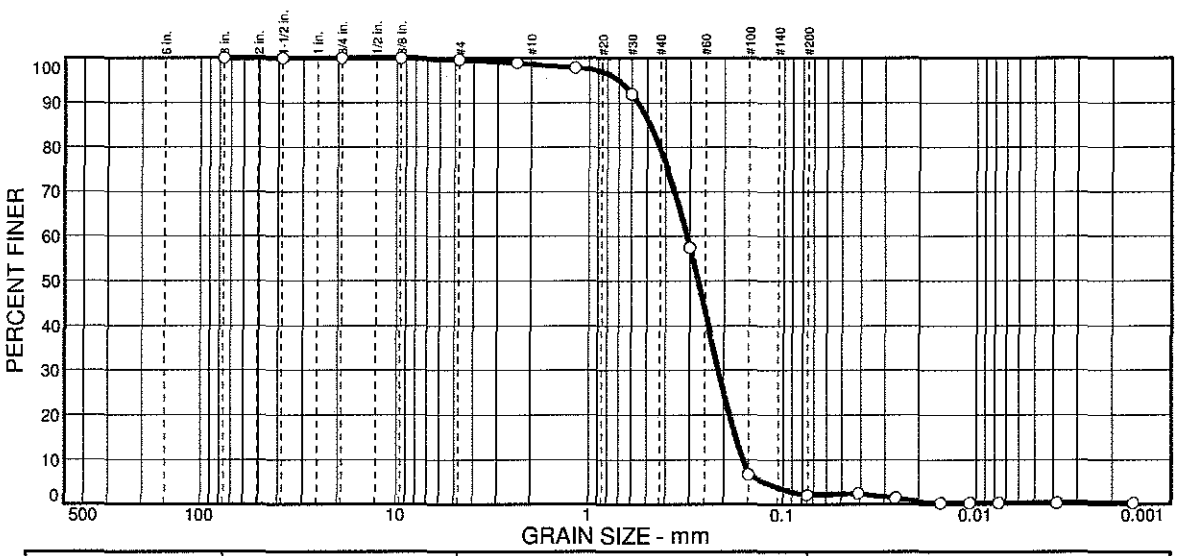
Report Number
09-342-2220

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2220
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653230 **Source of Sample:** **Date:** 11/23/2009
Location: RM801SSC **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.4	1.0	19.5	77.0	1.8	0.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	99.6		
#8	98.9		
#16	97.8		
#30	91.9		
#50	57.4		
#100	6.6		
#200	2.1		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.484 D_{60}= 0.311 D_{50}= 0.273
D_{30}= 0.214 D_{15}= 0.175 D_{10}= 0.161
C_u= 1.93 C_c= 0.92

Classification
USCS= AASHTO=

Remarks

Figure

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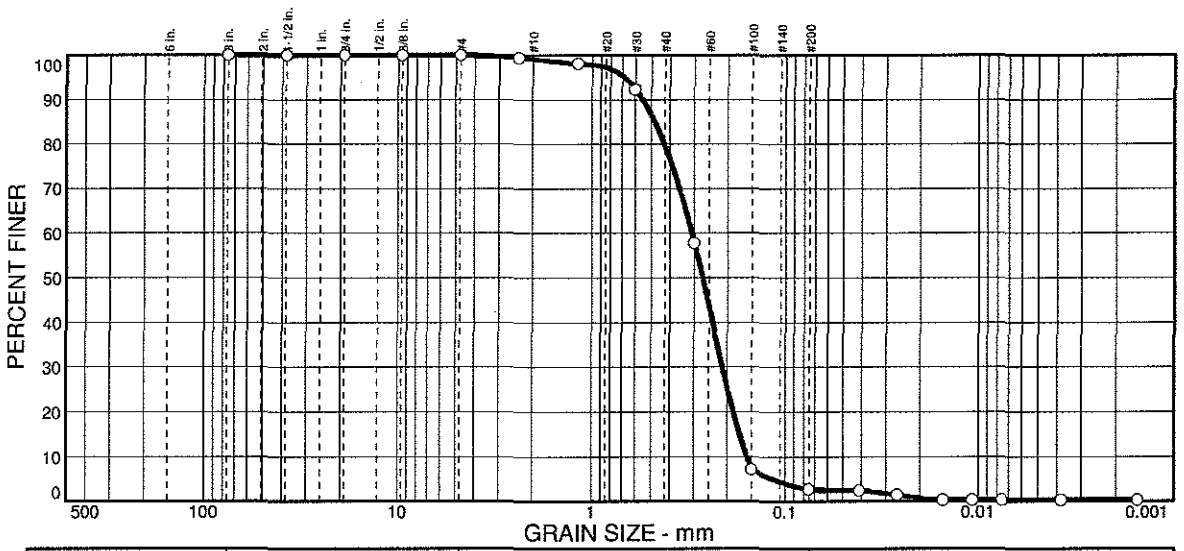
Report Number
09-342-2220

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2220
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653230 DUP **Source of Sample:** **Date:** 11/23/2009
Location: RM801SSC DUP **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.9	19.5	76.9	2.4	0.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	99.4		
#16	98.1		
#30	92.3		
#50	57.8		
#100	7.1		
#200	2.7		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.479 D_{60}= 0.309 D_{50}= 0.272
D_{30}= 0.213 D_{15}= 0.174 D_{10}= 0.160
C_u= 1.94 C_c= 0.92

Classification
USCS= AASHTO=

Remarks

Figure

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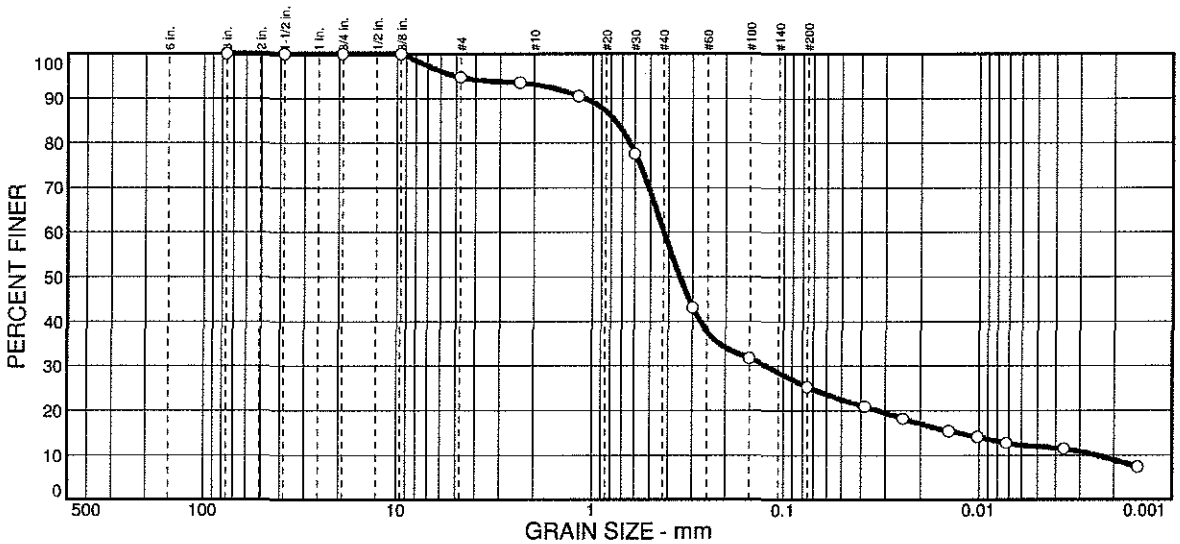
Report Number
09-342-2221

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2221
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653231 **Source of Sample:** **Date:** 11/23/2009
Location: RM801BWD **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	5.3	1.6	32.9	34.9	13.3	12.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	94.7		
#8	93.5		
#16	90.5		
#30	77.6		
#50	43.1		
#100	31.7		
#200	25.3		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.764 D_{60}= 0.423 D_{50}= 0.351
D_{30}= 0.123 D_{15}= 0.0129 D_{10}= 0.0025
C_u= 170.83 C_c= 14.48

Classification
USCS= AASHTO=

Remarks

Figure

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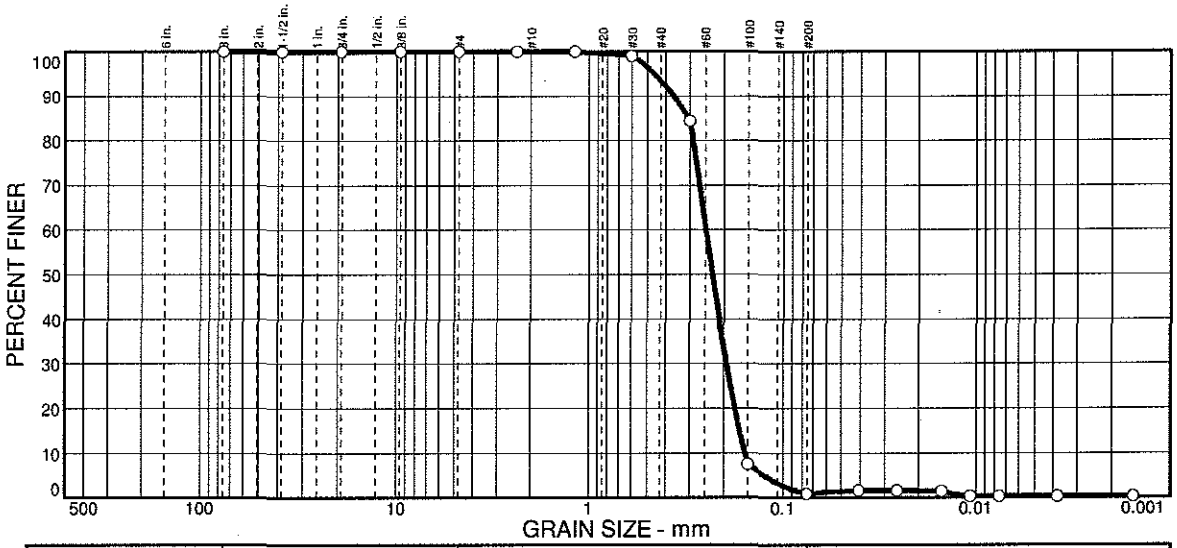
Report Number
09-342-2216

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2216
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653226 **Source of Sample:** **Date:** 11/23/2009
Location: RM779SSM **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	6.5	92.6	0.6	0.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.9		
#30	99.0		
#50	84.4		
#100	7.4		
#200	0.9		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.306 D_{60}= 0.249 D_{50}= 0.231
D_{30}= 0.195 D_{15}= 0.167 D_{10}= 0.156
C_u= 1.60 C_c= 0.98

Classification
USCS= AASHTO=

Remarks

Figure

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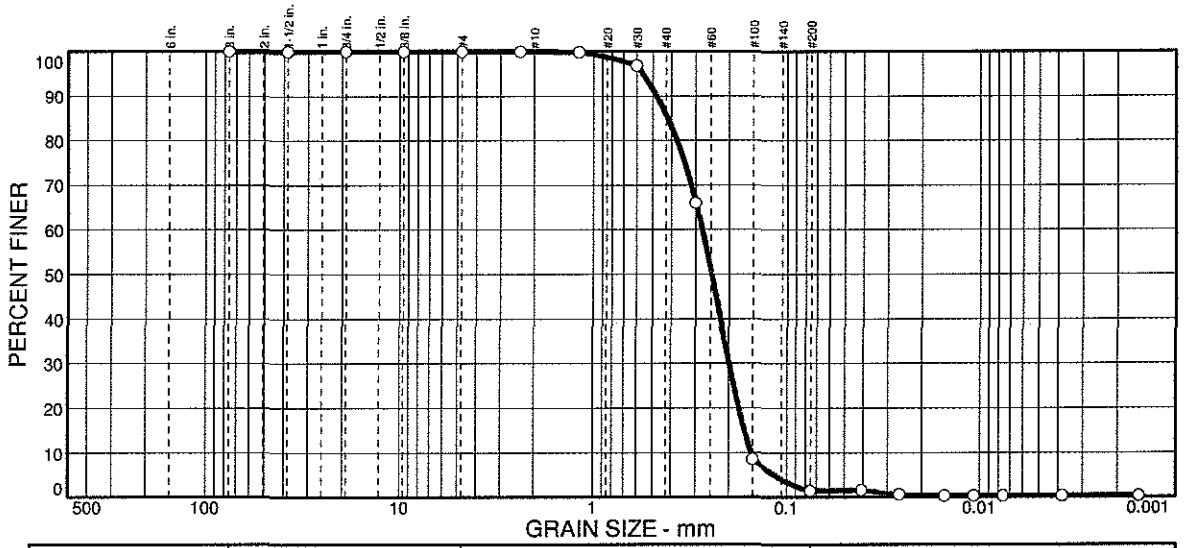
Report Number
09-342-2217

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2217
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653227 **Source of Sample:** **Date:** 11/23/2009
Location: RM779SSC **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	14.4	84.2	1.1	0.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.8		
#30	96.8		
#50	66.0		
#100	8.5		
#200	1.4		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.419 D_{60}= 0.278 D_{50}= 0.249
D_{30}= 0.200 D_{15}= 0.167 D_{10}= 0.154
C_u= 1.81 C_c= 0.93

Classification
USCS= AASHTO=

Remarks

Figure

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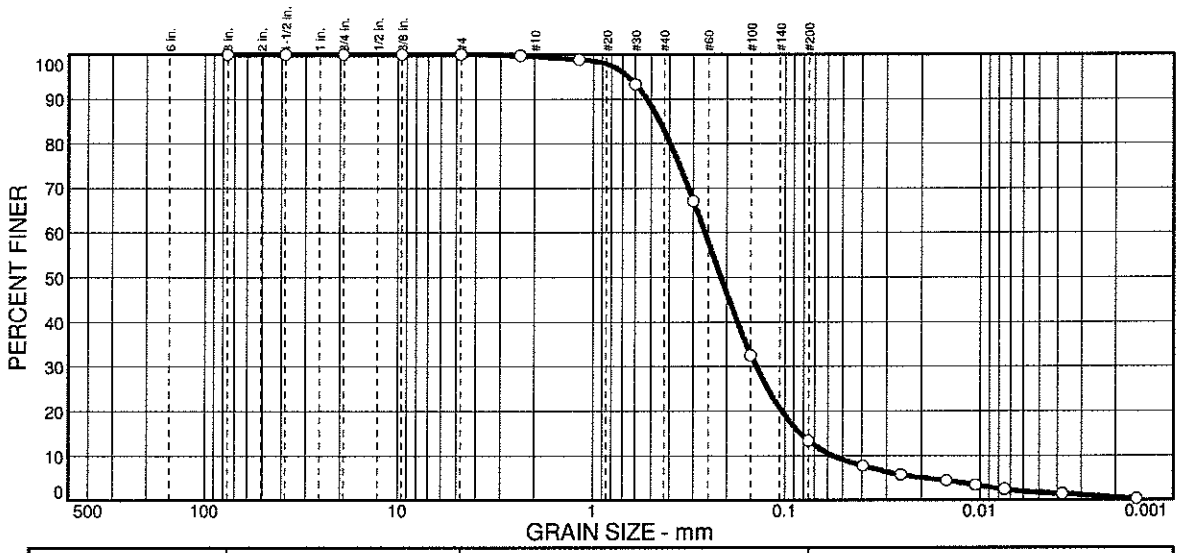
Report Number
09-342-2218

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2218
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653228 **Source of Sample:** **Date:** 11/23/2009
Location: RM779BWD **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.5	16.8	69.4	11.6	1.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	99.7		
#16	98.8		
#30	93.3		
#50	67.1		
#100	32.5		
#200	13.3		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.451 D_{60}= 0.261 D_{50}= 0.216
D_{30}= 0.141 D_{15}= 0.0829 D_{10}= 0.0565
C_u= 4.62 C_c= 1.35

Classification
USCS= AASHTO=

Remarks

Figure

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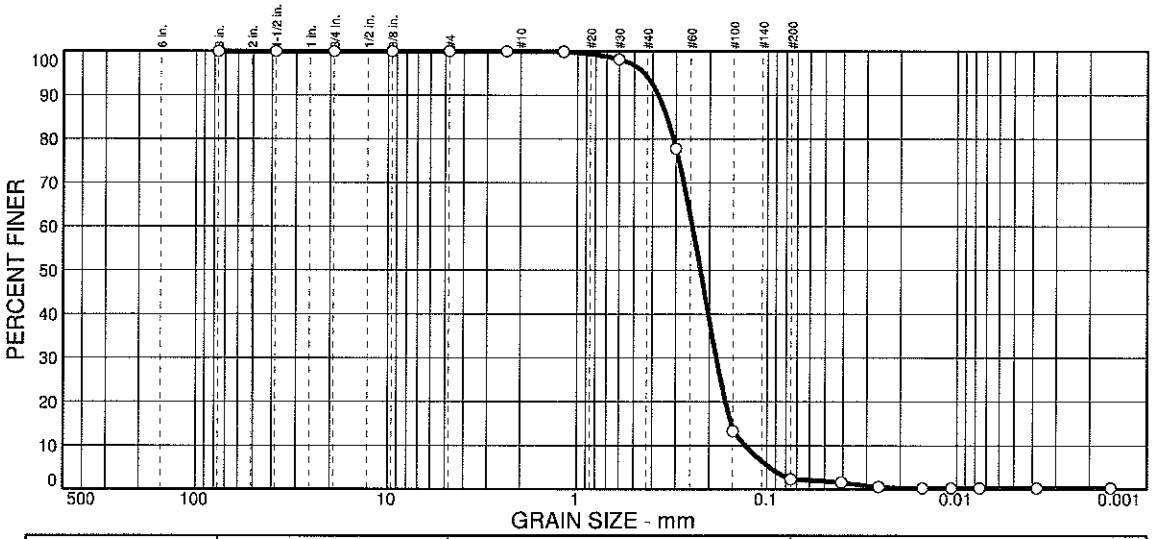
Report Number
09-342-2213

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2213
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653223 **Source of Sample:** **Date:** 11/23/2009
Location: RM757SSM **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	5.9	91.8	2.0	0.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.9		
#30	98.2		
#50	77.8		
#100	13.3		
#200	2.3		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.335 D_{60}= 0.246 D_{50}= 0.223
D_{30}= 0.184 D_{15}= 0.154 D_{10}= 0.129
C_u= 1.91 C_c= 1.06

Classification
USCS= AASHTO=

Remarks

Figure

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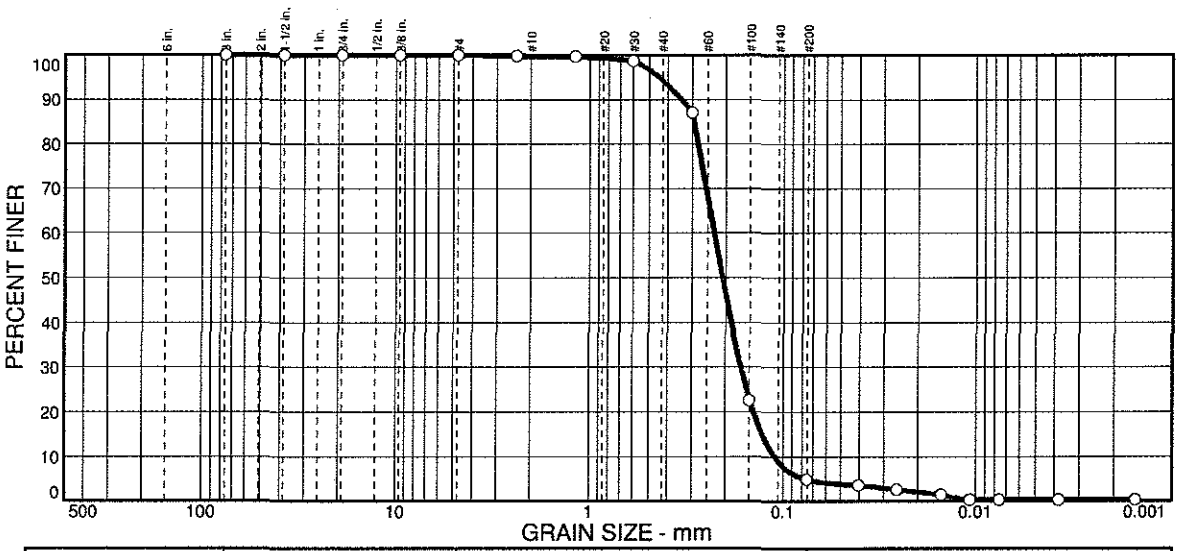
Report Number
09-342-2214

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2214
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653224 **Source of Sample:** **Date:** 11/23/2009
Location: RM757SSC **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.2	5.5	89.4	4.6	0.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	99.8		
#16	99.6		
#30	98.7		
#50	87.0		
#100	22.6		
#200	4.9		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.294 D_{60}= 0.232 D_{50}= 0.210
D_{30}= 0.167 D_{15}= 0.129 D_{10}= 0.111
C_u= 2.08 C_c= 1.08

Classification
USCS= AASHTO=

Remarks

Figure

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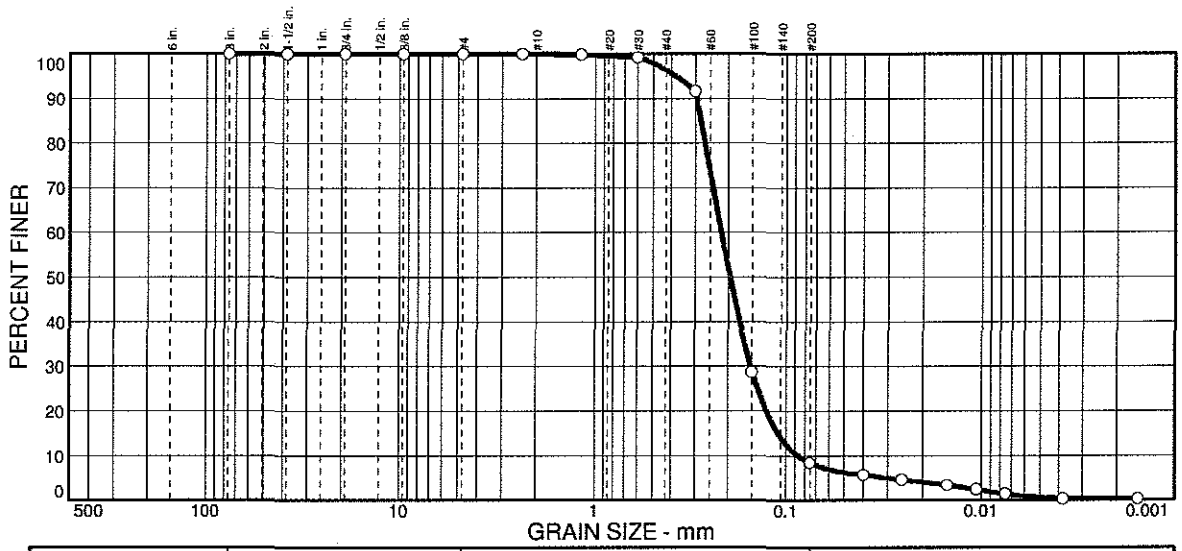
Report Number
09-342-2215

Particle Size Distribution Report

Project: ESH CREATION SPS-ESHSED-001 TRIP EDXDEJ112309 **Report No.:** 09-342-2215
Client: US ARMY CORPS OF ENGINEERS

Sample No: 1653225 **Source of Sample:** **Date:** 11/23/2009
Location: RM757BWD **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	3.7	87.9	7.8	0.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100.0		
1.5 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	100.0		
#8	100.0		
#16	99.8		
#30	99.2		
#50	91.6		
#100	28.7		
#200	8.4		

* (no specification provided)

Soil Description

Atterberg Limits
PL= LL= PI=

Coefficients
D_{85}= 0.281 D_{60}= 0.220 D_{50}= 0.197
D_{30}= 0.153 D_{15}= 0.110 D_{10}= 0.0867
C_u= 2.53 C_c= 1.23

Classification
USCS= AASHTO=

Remarks

Figure

APPENDIX B.

Laboratory Reports Prepared by Midwest Laboratories, Inc. for Analyses of Sediment, Receiving Water, and Elutriate Testing

(Note: Some Sample ID Numbers listed on the Laboratory Reports differ slightly from the Site Numbers given in the report. Sample labels were prepared prior to going in the field to collect sediment samples. Some of the targeted sites locations (i.e. RM) were adjusted to allow targeted habitat types to be sampled. The prepared sample labels taken to the field and used to label the bottles taken to the laboratory did not reflect these adjustments.)

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Report #: 09-224-2224
09-224-2222
09-244-2114
09-223-2104

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ072909

Lab Number:							1605407	1605406	1605413/1605800	1605413/1605803
Sample ID:							RM867SSM	RM867NS	RM867SSM	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	n.d.	152	---	169
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	2,523	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	n.d.	---	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.03J	n.d.	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	0.6 J
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	8.49	n.d.	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	0.15	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	9,338	60	---	60
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	9	---	13
Chlorophyll	SM 10200	-	-	1	3	µg/L	---	1 J	---	---
Chromium	EPA 200.7	0.2	1		10	mg/kg µg/L	0.15	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	4.7	n.d.	---	20
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	11,993	n.d.	---	130
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.49 J	---	n.d.
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	74.7	0.54	1.40	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	7.97	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	3,021	20.5	---	20.7
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	439	n.d.	---	30
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	15.3	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	n.d.	0.05J	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-160.1	-187.9	---	-134.7
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	7.9	8.28	---	8.14
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	4	---	4
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	626	---	673
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.6	---	n.d.
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	300	2.8	4.6	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	365	0.02J	0.18	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	13	134	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	28	26	29
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	5.6	5.0	5.9
Chloroform	EPA 524.2			0.1	1	µg/L	---	157	138	149
Total trihalomethanes	EPA 524.2				1	µg/L	---	191	170	184
True Color	ASTM D1209-05	1	5	1	5	APHA	---	5	---	6
Turbidity	EPA 180.1	-	1	-	3	NTU	---	<1	205	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	29.9	40	---	110

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-224-2224

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 11/17/09
Date Received: 07/29/09
Date Sampled: 07/29/09

Lab number: 1605407 **Sample ID:** RM867SSM

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 8/11/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-224-2222

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ072909

Date Reported: 11/17/09
Date Received: 07/29/09

Lab number: 1605406 **Sample ID:** RM867NS-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 8/11/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-244-2114

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ072909

Date Reported: 11/18/09
Date Received: 07/29/09

Lab number: 1605413 **Sample ID:** RM867SSM ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 8/11/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-224-2225
09-224-2222
09-273-2298
09-223-2100

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ072909

Lab Number:						1605408	1605406	1605414/1605801	1605414/1605804
Sample ID:						RM867SSC	RM867NS	RM867SSC	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	n.d.	152	—	164
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	1,990	n.d.	—	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	—	n.d.	—	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.03J	n.d.	—
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	—	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	10.4	n.d.	—	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	—	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	0.17	n.d.	—	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	8,500	60	—	60
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	—	9	—	11
Chlorophyll	SM 10200	-	-	1	3	µg/L	—	1 J	—	—
Chromium	EPA 200.7	0.2	1		10	mg/kg µg/L	4.3	n.d.	—	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	4.3	n.d.	—	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	—	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	13,102	n.d.	—	50
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	—	0.49 J	—	n.d.
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	76.2	0.54	0.99	—
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	6.73	n.d.	—	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	1,902	20.5	—	20.7
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	833	n.d.	—	10
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	—	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	16.5	n.d.	—	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	—	n.d.	—	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	n.d.	0.05J	n.d.	—
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	—	n.d.	—	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	—	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	—	n.d.* Page 4
Oxidation reduction potential	SM 2580B	—	—	—	—	mV	-179	-187.9	—	-140.6
Particle Size	Sieve	—	—	—	—	---	See Attached	—	—	—
pH	SM 4500-H	0.1		0.2		—	7.5	8.28	—	8.19
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	0.64	4	—	4
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	—	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	—	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	—	626	—	626
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	—	2.6	—	n.d.
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	200	2.8	5.6	—
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	—	n.d.	—	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	322	0.02J	0.15	—
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	—	13	97	—
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	—	28	26	28
Bromoform	EPA 524.2			0.25	1	µg/L	—	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	—	5.6	n.d.	6.2
Chloroform	EPA 524.2			0.1	1	µg/L	—	157	135	148
Total trihalomethanes	EPA 524.2				1	µg/L	—	191	166	182
True Color	ASTM D1209-05	1	5	1	5	APHA	—	5	—	6
Turbidity	EPA 180.1	-	1	-	3	NTU	—	<1	130	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	31.6	40	—	100

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-224-2222

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ072909

Date Reported: 11/17/09
Date Received: 07/29/09

Lab number: 1605406 **Sample ID:** RM867NS-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 8/11/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-224-2225

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEJ072909

Date Reported: 08/12/09
Date Received: 07/29/09
Date Sampled: 07/29/09

Lab number: 1605408 **Sample ID:** RM867SSC

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 8/11/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-273-2298

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ072909

Date Reported: 11/18/09
Date Received: 07/29/09

Lab number: 1605414 **Sample ID:** RM867SSC ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 8/14/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-224-2226
09-224-2222
09-244-2115
09-223-2101

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ072909

Lab Number:						1605409	1605406	1605415/1605802	1605415/1605805
Sample ID:						RN867BWD	RM867NS	RN867BWD	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	1,630	152	---	178
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	2,250	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	n.d.	---	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.03J	0.05J	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	1 J
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	11	n.d.	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	0.22	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	9,883	60	---	60
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	9	---	16
Chlorophyll	SM 10200	-	-	1	3	µg/L	---	1 J	---	---
Chromium	EPA 200.7	0.2	1		10	mg/kg µg/L	5	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	4.7	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	13,230	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.49 J	---	n.d.
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	15.8	0.54	1.20	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	6.64	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	2,716	20.5	---	17.7
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	511	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	15	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	n.d.	0.05J	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-140.0	-187.9	---	-135.2
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	7.7	8.28	---	7.96
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	1.23	4	---	3
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	626	---	786
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.6	---	1.1
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	290	2.8	2.1	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	406	0.02J	0.23	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	13	237	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	28	23	29
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	5.6	n.d.	n.d.
Chloroform	EPA 524.2			0.1	1	µg/L	---	157	114	159
Total trihalomethanes	EPA 524.2				1	µg/L	---	191	141	192
True Color	ASTM D1209-05	1	5	1	5	APHA	---	5	---	7
Turbidity	EPA 180.1	-	1	-	3	NTU	---	<1	298	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	34.0	40	---	80

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-224-2226

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEJ072909

Date Reported: 08/12/09
Date Received: 07/29/09
Date Sampled: 07/29/09

Lab number: 1605409 **Sample ID:** RN867BWD

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 8/11/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-224-2222

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ072909

Date Reported: 11/17/09
Date Received: 07/29/09

Lab number: 1605406 **Sample ID:** RM867NS-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 8/11/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-244-2115

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

Date Reported: 11/18/09
Date Received: 07/29/09

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ072909

Lab number: 1605415 **Sample ID:** RN867BWD ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 8/11/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-257-2176
09-257-2183
09-257-2184
09-273-2295

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEK082709

Lab Number:						1618070	1618069	1618076/1618079	1618079
Sample ID:						RM852SSM	RM852	RM852SSM	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	281	156	---	169
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	1,879	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.08 J	---	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.1	n.d.	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	8.94	2	---	1 J
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	0.15	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	7,591	61	---	58
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	9	---	15
Chlorophyll	SM 10200	-	-	1	3	µg/L	---	<1	---	---
Chromium	EPA 200.7	0.2	1		10	mg/kg µg/L	4.3	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	4.22	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	12,905	40	---	20
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	n.d.	---	0.23 J
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	129	0.2J	0.52	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	4.57	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	1,756	21.4	---	20.4
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	492	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	15	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	n.d.	0.03J	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	n.d.	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-160.2	-170.4	---	-109.5
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.6	8.07	---	8.35
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	2	---	2 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	570	---	630
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.8	---	2.8
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	110	3.02	3.2	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	295	0.02J	0.12	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	n.d.	33	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	25	34	27
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	6.0	6	6
Chloroform	EPA 524.2			0.1	1	µg/L	---	134	262	149
Total trihalomethanes	EPA 524.2				1	µg/L	---	165	302	182
True Color	ASTM D1209-05	1	5	1	5	APHA	---	6	---	6
Turbidity	EPA 180.1	-	1	-	3	NTU	---	<1	159	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	33.3	60	---	80

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-257-2176

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 08/27/09
Date Received: 08/28/09
Date Sampled: 08/27/09

Lab number: 1618070 **Sample ID:** RM852SSM

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 9/8/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-257-2183

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 11/18/09
Date Received: 08/28/09

Lab number: 1618069 **Sample ID:** RM852-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 9/8/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-273-2295

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 11/17/09
Date Received: 08/28/09

Lab number: 1618079 **Sample ID:** RM852SSM ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 9/8/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-257-2177, 09-257-2183, 09-257-2185, 09-273-2296

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEK082709

Lab Number:						1618071	1618069	1618077/1618080	1618080
Sample ID:						RM852SSC	RM852	RM852SSC	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	1,131	156	---	167
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	2,881	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.08 J	---	0.11
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.1	0.10	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	7.18	2	---	1
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	0.22	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	7,944	61	---	61
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	9	---	12
Chlorophyll	SM 10200	-	-	1	3	µg/L	---	<1	---	---
Chromium	EPA 200.7	0.2	1		10	mg/kg µg/L	6.3	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	4.08	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	10,071	40	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	n.d.	---	0.60
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	119	0.2J	1.13	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	5.60	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	3,165	21.4	---	18
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	325	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	14	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	n.d.	0.03J	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	n.d.	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-179.8	-170.4	---	-117.0
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.2	8.07	---	8.18
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	2	---	3
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	570	---	694
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.8	---	2.5
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	260	3.02	2.3	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	355	0.023	0.14	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	n.d.	104	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	25	34	22
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	6.0	6.0	5.0
Chloroform	EPA 524.2			0.1	1	µg/L	---	134	222	95
Total trihalomethanes	EPA 524.2				1	µg/L	---	165	262	122
True Color	ASTM D1209-05	1	5	1	5	APHA	---	6	---	8
Turbidity	EPA 180.1	-	1	-	3	NTU	---	<1	232	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	29.8	60	---	190

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-257-2177

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 08/27/09
Date Received: 08/28/09
Date Sampled: 08/27/09

Lab number: 1618071 **Sample ID:** RM852SSC

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 9/8/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-257-2183

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 11/18/09
Date Received: 08/28/09

Lab number: 1618069 **Sample ID:** RM852-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 9/8/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-273-2296

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 09/30/09
Date Received: 08/28/09

Lab number: 1618080 **Sample ID:** RM852SSC ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 9/8/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-257-2178
09-257-2183
09-273-2297
09-273-2296

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEK082709

Lab Number:							1618072	1618069	1618081/1618078	1618081
Sample ID:							RM852SWD	RM852	RM852BWD	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	795	156	---	169
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	2,848	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.08 J	---	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.1	n.d.	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	8.06	2	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	0.18	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	8,160	61	---	64
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	9	---	13
Chlorophyll	SM 10200	-	-	1	3	µg/L	---	<1	---	---
Chromium	EPA 200.7	0.2	1		10	mg/kg µg/L	6.3	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	4.04	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	10,444	40	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	n.d.	---	0.60
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	128	0.2J	0.85	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	5.27	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	3,166	21.4	---	19.4
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	354	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	14	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	n.d.	0.03J	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-160.1	-170.4	---	-115.9
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	7.9	8.07	---	7.99
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	2	---	2 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	570	---	598
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.8	---	2
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	300	3.02	2.1	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	365	0.02J	0.18	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	n.d.	207	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	25	32	20
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	6.0	5.0	n.d.
Chloroform	EPA 524.2			0.1	1	µg/L	---	134	192	89
Total trihalomethanes	EPA 524.2				1	µg/L	---	165	229	113
True Color	ASTM D1209-05	1	5	1	5	APHA	---	6	---	9
Turbidity	EPA 180.1	-	1	-	3	NTU	---	<1	248	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	29.9	60	---	80

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-257-2178

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 11/17/09
Date Received: 08/28/09
Date Sampled: 08/27/09

Lab number: 1618072 **Sample ID:** RM852BWD

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 9/8/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-257-2183

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 11/18/09
Date Received: 08/28/09

Lab number: 1618069 **Sample ID:** RM852-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 9/8/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-273-2296

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 09/30/09
Date Received: 08/28/09

Lab number: 1618081 **Sample ID:** RM852BWD ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 9/8/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-216-2049
09-217-2214
09-217-2104
09-217-2216

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ071509

Lab Number:						1600984	1600983	1600992/1601475	1600992
Sample ID:						RM842SSM	RM842	RM842	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	362	154	---	168
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	1,657	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	n.d.	---	0.2
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.03J	0.3	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.9 J	---	0.5J
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	1 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	2,339	57	---	60
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	n.d.	---	18
Chlorophyll	SM 10200	-	-	1	3	µg/L	---	1	---	---
Chromium	EPA 200.7	0.2	1		10	mg/kg µg/L	5.1	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	2.75	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	3,047	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.6	---	0.90
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	59.3	0.73	1.13	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	1,046	19.5	---	20.5
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	106	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	7.7	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.1	0.11	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	n.d.	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-83.6	-46.7	---	-74.9
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.2	8.25	---	8.09
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	3	---	3
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	534	---	534
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.6	---	3
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	400	2.71	3	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	131	0.04J	0.26	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	4 J	275	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	26	29	28
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	n.d.	n.d.	n.d.	n.d.
Chloroform	EPA 524.2			0.1	1	µg/L	---	137	162	229
Total trihalomethanes	EPA 524.2				1	µg/L	---	168	196	261
True Color	ASTM D1209-05	1	5	1	5	APHA	---	5	---	5
Turbidity	EPA 180.1	-	1	-	3	NTU	---	3	269	1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	18.4	70	---	90

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-216-2049

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/19/09
Date Received: 07/17/09
Date Sampled: 07/16/09

Lab number: 1600984 **Sample ID:** RM828SSM

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 7/27/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-217-2214

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

Date Reported: 08/17/09
Date Received: 07/17/09

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Lab number: 1600983 **Sample ID:** RM842-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-217-2216

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/19/09
Date Received: 07/17/09

Lab number: 1600992 **Sample ID:** RM842SSM ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-212-2184
09-217-2219
09-217-2108
09-217-2214

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ071509

Lab Number:							1600987	1600983	1600995/1601717	1600995
Sample ID:							RM842SPLIT	RM842	RM842SPLIT	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	317	154	---	170
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	1,754	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	n.d.	---	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.03J	n.d.	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.9 J	---	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	1 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	2,478	57	---	63
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	n.d.	---	22
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	1	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	2.7	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	1.43	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	3,299	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.6	---	0.9
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	74.5	0.73	0.91	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	1,115	19.5	---	20.1
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	113	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	3.5	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.1	0.11	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	n.d.	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-87.5	-46.7	---	-30.1
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.2	8.25	---	8.05
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	3	---	3
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	534	---	594
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.6	---	3.3
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	400	2.71	3.3	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	126	0.04J	0.28	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	4 J	196	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	26	33	30
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	n.d.	n.d.	n.d.
Chloroform	EPA 524.2			0.1	1	µg/L	---	137	271	282
Total trihalomethanes	EPA 524.2				1	µg/L	---	168	309	315
True Color	ASTM D1209-05	1	5	1	5	APHA	---	5	---	6
Turbidity	EPA 180.1	-	1	-	3	NTU	---	3	301	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	10.3	70	---	90

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-212-2184

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/19/09
Date Received: 07/17/09
Date Sampled: 07/16/09

Lab number: 1600987 **Sample ID:** RM842SPLIT

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 7/27/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-217-2218

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/21/09
Date Received: 07/17/09

Lab number: 1600994 **Sample ID:** RM8842BWD ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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REPORT OF ANALYSIS

Report Number: 09-217-2214

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

Date Reported: 08/17/09
Date Received: 07/17/09

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Lab number: 1600983 **Sample ID:** RM842-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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Report #: 09-212-2257
09-217-2214
09-217-2217
09-217-2105

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ071509

Lab Number:						1600985	1600983	1600993/1601476	1600993
Sample ID:						RM842SSC	RM842	RM842SSC	Elutriate
Parameter	**Method**	**Method Detection Limit**		**Laboratory Reporting Limit**		**Units**	**Soil**	**Receiving Water**	**Pre-Elutriate Water**	**Elutriate Water**
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	2,318	154	---	157
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	4,484	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	n.d.	---	0.57
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.03J	0.57	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.9 J	---	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	1 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	14,558	57	61	61
Chemical Oxygen Demand-COD	ASTM 1252	-	-	2	5	mg/L	---	n.d.	---	17
Chlorophyll	SM 10200	-	-	1	3	µg/L	---	1	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	8.3	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	6.86	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	11,405	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.6	---	1.4
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	323	0.73	1.43	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	7.6	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	5,515	19.5	---	19.5
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	368	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	15	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.1	0.11	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	n.d.	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-56	-46.7	---	-40.7
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	7.7	8.25	---	7.81
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	3	---	3
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	534	---	808
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.6	---	3.0
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	5,700	2.71	3.0	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	379	0.04J	0.23	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	4 J	240	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	26	29	26
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	n.d.	n.d.	n.d.
Chloroform	EPA 524.2			0.1	1	µg/L	---	137	162	186
Total trihalomethanes	EPA 524.2				1	µg/L	---	168	196	215
True Color	ASTM D1209-05	1	5	1	5	APHA	---	5	---	8
Turbidity	EPA 180.1	-	1	-	3	NTU	---	3	325	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	34.3	70	---	120

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-212-2257

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/19/09
Date Received: 07/17/09
Date Sampled: 07/16/09

Lab number: 1600985 **Sample ID:** RM842SSC

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 7/27/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-217-2214

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/17/09
Date Received: 07/17/09

Lab number: 1600983 **Sample ID:** RM842-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-217-2217

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

Date Reported: 08/21/09
Date Received: 07/17/09

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Lab number: 1600993 **Sample ID:** RM842SSC ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-212-2258
09-217-2214
09-217-2106
09-217-2218

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ071509

Lab Number:							1600986	1600983	1600994/1601477	1600994
Sample ID:							RM842BWD	RM842	RM842BWD	Elutriate
Parameter	**Method**	**Method Detection Limit**		**Laboratory Reporting Limit**		**Units**	**Soil**	**Receiving Water**	**Pre-Elutriate Water**	**Elutriate Water**
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	3,446	154	---	157
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	4,697	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	n.d.	---	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.03J	0.12	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.9 J	---	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	1 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	17,145	57	---	64
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	n.d.	---	13
Chlorophyll	SM 10200	-	-	1	3	µg/L	---	1 J	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	8.6	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	8.22	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	12,071	n.d.	---	n.d.
Kjeldahl Nitrogen	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.6	---	0.91
Kjeldahl Nitrogen	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	281	0.73	0.91	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	7.0	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	5,453	19.5	---	16.8
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	445	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	16	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.2	0.11	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	n.d.	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-99.8	-46.7	---	-30.5
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	7.5	8.25	---	7.31
Selenium	EPA 200.8	1	3	1	3	mg/kg µg/L	n.d.	3	---	2 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	534	---	532
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.6	---	n.d.
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	7,000	2.71	2.8	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	436	0.04J	0.13	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	4 J	173	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	26	13	28
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	n.d.	2.7	n.d.
Chloroform	EPA 524.2			0.1	1	µg/L	---	137	46	202
Total trihalomethanes	EPA 524.2				1	µg/L	---	168	62	234
True Color	ASTM D1209-05	1	5	1	5	APHA	---	5	---	n.d.
Turbidity	EPA 180.1	-	1	-	3	NTU	---	3	167	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	37.7	70	---	120

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-212-2258

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/19/09
Date Received: 07/17/09
Date Sampled: 07/16/09

Lab number: 1600986 **Sample ID:** RM842BWD

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 7/27/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-217-2214

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/17/09
Date Received: 07/17/09

Lab number: 1600983 **Sample ID:** RM842-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-217-2218

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/21/09
Date Received: 07/17/09

Lab number: 1600994 **Sample ID:** RM8842BWD ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-212-2181
09-212-2180
09-217-2101
09-217-2211

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ071509

Lab Number:							1600974	1600973	1600980/1601472	1600980
Sample ID:							RM828SSM	RM828	RM828	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
		soil	water	soil	water	---	---	---	---	---
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	3,522	149	---	199
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	6,498	n.d.	---	n.d.
Ammonia as N, - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.03 J	---	3.3
Ammonia as N, - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	34.2	0.03J	3.6	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	18,660	54	61	57
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	14	---	16
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	6	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	10	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	10.4	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	11,914	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	n.d.	---	3.6
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	406	0.27J	4.18	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	7.0	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	6,463	17.7	22.3	18.7
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	556	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	14	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.2	0.03J	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	n.d.	-42.5	---	-81.8
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	7.5	8.1	---	7.33
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	3	---	2 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	464	---	462
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	3.8	---	2.2
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	7,200	3.96	3.1	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	360	n.d.	0.25	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	21	242	---
THMFP - Bromodichloromethane	EPA 524.2	-	0.15	-	1	µg/L	---	22	22	22
THMFP - Bromoform	EPA 524.2	-	0.25	-	1	µg/L	---	n.d.	n.d.	n.d.
THMFP - Chlorodibromomethane	EPA 524.2	-	16	-	1	µg/L	n.d.	n.d.	n.d.	n.d.
THMFP - Chloroform	EPA 524.2	-	0.1	-	1	µg/L	---	133	98	134
Total THM Formation Potential	EPA 524.2	-	0.66	-	5	µg/L	---	155	124	159
True Color	ASTM D1209-05	1	5	1	5	APHA	---	9	---	5
Turbidity	EPA 180.1	-	1	-	3	NTU	---	22	287	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	41.0	100	---	120

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-212-2181

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
CENWO-ED-HA
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/19/09
Date Received: 07/17/09
Date Sampled: 07/16/09

Lab number: 1600974 **Sample ID:** RM828SSM

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 7/27/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-212-2180

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
CENWO-ED-HA
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/17/09
Date Received: 07/17/09

Lab number: 1600973 **Sample ID:** RM828-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-217-2211

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
CENWO-ED-HA
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/17/09
Date Received: 07/17/09

Lab number: 1600980 **Sample ID:** RM828SSM ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-212-2182
09-212-2102
09-218-2168
09-212-2180

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ071509

Lab Number:							1600975	1600973	1600981/1601473	1600981
Sample ID:							RM828SSC	RM828	RM828	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
		soil	water	soil	water	---	---	---	---	---
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	3,237	149	---	184
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	4,900	n.d.	---	n.d.
Ammonia as N, - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.03 J	---	n.d.
Ammonia as N, - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	18.5	0.03J	n.d.	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Arsenic	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	11,369	54	---	61
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	14	---	13
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	6	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	7	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	6.12	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	9,363	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	n.d.	---	1.04
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	396	0.27J	1.7	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	4,055	17.7	---	19.7
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	374	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	11	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.7	0.03J	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-190	-42.5	---	-80.1
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	7.6	8.1	---	7.45
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	3	---	2 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	464	---	512
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	3.8	---	4.1
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	5,600	3.96	4.0	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	310	n.d.	0.2	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	21	247	---
THMFP - Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	22	22	20
THMFP - Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
THMFP - Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	n.d.	n.d.	n.d.	n.d.
THMFP - Chloroform	EPA 524.2			0.1	1	µg/L	---	133	96	131
Total THM Formation Potential	EPA 524.2	-	0.66	-	5	µg/L	---	155	122	154
True Color	ASTM D1209-05	1	5	1	5	APHA	---	9	---	5
Turbidity	EPA 180.1	-	1	-	3	NTU	---	22	226	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	29.2	100	---	120

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-212-2182

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
CENWO-ED-HA
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. #: ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/19/09
Date Received: 07/17/09
Date Sampled: 07/16/09

Lab number: 1600975 **Sample ID:** RM828SSC

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 7/27/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-212-2180

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
CENWO-ED-HA
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEEI
(402) 995-2310

91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/17/09
Date Received: 07/17/09

Lab number: 1600973 **Sample ID:** RM828-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-218-2168

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
CENWO-ED-HA
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEEI
(402) 995-2310

PO/Proj. #: ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/17/09
Date Received: 07/17/09

Lab number: 1600981 **Sample ID:** RM828SSC ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 7/27/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.001	0.01	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.001	0.01	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.001	0.01	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.001	0.01	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.001	0.01	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.001	0.01	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.001	0.01	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.001	0.01	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.001	0.01	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.001	0.01				

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Report #: 09-212-2183
09-212-2103
09-217-2213
09-212-2180

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ071509

Lab Number:							1600976	1600973	1600982/1601474	1600982
Sample ID:							RM828BWD	RM828	RM828	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
		soil	water	soil	water	---	---	---	---	---
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	1,044	149	---	167
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	2,624	n.d.	0.20	n.d.
Ammonia as N, - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.03J	---	0.1
Ammonia as N, - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.03J	n.d.	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	0.7 J
Arsenic	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	6,654	54	---	70
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	14	---	23
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	6	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	5.3	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	2.79	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	7,099	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	n.d.	---	1.0
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	204	0.27J	1.0	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	2,677	17.7	---	16.8
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	193	n.d.	---	340
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	7.6	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.2	0.03J	n.d.	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	-51	-42.5	---	-78.2
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	7.7	8.1	---	7.62
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	3	---	2 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	464	---	460
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	3.8	---	4.9
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	4,400	3.96	4.4	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	238	n.d.	0.28	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	21	330	---
THMFP - Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	22	21	23
THMFP - Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
THMFP - Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	n.d.	n.d.	n.d.	n.d.
THMFP - Chloroform	EPA 524.2			0.1	1	µg/L	---	133	186	135
Total THM Formation Potential	EPA 524.2				1	µg/L	---	155	209	161
True Color	ASTM D1209-05	1	5	1	5	APHA	---	9	---	9
Turbidity	EPA 180.1	-	1	-	3	NTU	---	22	273	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	18.8	100	---	110

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-212-2183

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
CENWO-ED-HA
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Pro ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/19/09
Date Received: 07/17/09
Date Sampled: 07/16/09

Lab number: 1600976 **Sample ID:** RM828BWD

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 7/27/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-212-2180

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
CENWO-ED-HA
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/17/09
Date Received: 07/17/09

Lab number: 1600973 **Sample ID:** RM828-MISSOURI RIVER RECEIVING WATER

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-217-2213

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
CENWO-ED-HA
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Prc ESH CREATION
SPS-ESHSED-001
EDXDEJ071509

Date Reported: 08/21/09
Date Received: 07/17/09

Lab number: 1600982 **Sample ID:** RM828BWD ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 7/24/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.001	0.01	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.001	0.01	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.001	0.01	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.001	0.01	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.001	0.01	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.001	0.01	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.001	0.01	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.001	0.01	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.001	0.01	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.001	0.01				

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Report #: 09-352-2147
09-348-2097
09-357-2211

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ112309

Lab Number:							1653220	1653213	1653238	1653238
Sample ID:							RM801SSM	RM801	RM801SSM	Elutriate
Parameter	**Method**	**Method Detection Limit**		**Laboratory Reporting Limit**		**Units**	**Soil**	**Receiving Water**	**Pre-Elutriate Water**	**Elutriate Water**
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	363	152	---	175
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	2,015	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.07J	---	0.24
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	2.9	0.07J	0.22	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.5 J	---	n.d.
Arsenic	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	7,265	57	---	58
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	12	---	4 J
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	5	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	4.7	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	2.6	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	8,813	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.26J	---	0.5
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	90	0.30J	0.83	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	2,011	19.6	---	23.2
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	287	n.d.	---	30
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	10.9	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	0.15	---	0.03J
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.10	0.15	0.15	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	0.02 J
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	283	287	---	245
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.3	8.31	---	8.28
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	2	---	2 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	480	---	504
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.9	---	3.1
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	2,300	3.2	5.0	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	0.02J
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	264	n.d.	0.20	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	4	168	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	26.8	28.5	28.4
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	3.1 J	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	n.d.	n.d.	4.4 J
Chloroform	EPA 524.2			0.1	1	µg/L	---	152	247	196
Total trihalomethanes	EPA 524.2				1	µg/L	---	183	279	245
True Color	ASTM D1209-05	1	5	1	5	APHA	---	6	---	7
Turbidity	EPA 180.1	-	1	-	3	NTU	---	7	192	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	23.1	10	---	n.d.

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-352-2147

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/18/09
Date Received: 11/24/09
Date Sampled: 11/23/09

Lab number: 1653220 **Sample ID:** RM801SSM

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-348-2097

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 01/04/10
Date Received: 11/24/09

Lab number: 1653213 **Sample ID:** RM801

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-357-2211

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/23/09
Date Received: 11/24/09

Lab number: 1653238 **Sample ID:** RM801SSM ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-352-2148
09-348-2097
09-357-2212

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ112309

Lab Number:							1653221	1653213	1653239	1653239
Sample ID:							RM801SSC	RM801	RM801SSC	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	307	152	---	172
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	1,391	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.07	---	0.36
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.07	0.41	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.5 J	---	0.6 J
Arsenic	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2	---	2 J
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	5,816	57	---	62
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	12	---	28
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	5	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	3.4	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	2.1	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	8,404	n.d.	---	10 J
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	n.d.	---	0.7
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	92.1	0.30J	1.12	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	1,365	19.6	---	22.1
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	224	n.d.	---	40
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	9.4	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	0.15	---	0.14
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.15	0.15	0.14	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	0.02
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	194	287	---	239
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.3	8.31	---	8.33
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	2	---	1 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	480	---	512
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.9	---	3.4
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	1,500	3.2	7.9	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	0.04J
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	243	n.d.	0.32	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	4	287	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	26.8	26.4	27.2
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	n.d.	2.2 J	3.6 J
Chloroform	EPA 524.2			0.1	1	µg/L	---	152	300	191
Total trihalomethanes	EPA 524.2				1	µg/L	---	183	329	222
True Color	ASTM D1209-05	1	5	1	5	APHA	---	6	---	8
Turbidity	EPA 180.1	-	1	-	3	NTU	---	7	291	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	19.4	10	---	n.d.

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-352-2148

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/18/09
Date Received: 11/24/09
Date Sampled: 11/23/09

Lab number: 1653221 **Sample ID:** RM801SSM

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-348-2097

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

Date Reported: 01/04/10
Date Received: 11/24/09

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Lab number: 1653213 **Sample ID:** RM801

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-357-2212

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/23/09
Date Received: 11/24/09

Lab number: 1653239 **Sample ID:** RM801SSC ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-352-2149
09-348-2097
09-357-2213

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ112309

Lab Number:						1653222	1653213	1653240	1653240
Sample ID:						RM801BWD	RM801	RM801BWD	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	5,301	152	---	187
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	3,122	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.07	---	0.74
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	20.9	0.07	0.71	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.5 J	---	0.8 J
Arsenic	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2	---	2 J
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	12,665	57	---	62
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	12	---	10
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	5	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	5.4	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	4.6	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron	EPA 200.7	4	7	10	20	mg/kg µg/L	9,907	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	n.d.	---	1.0
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	827	0.3J	1.2	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	3,178	19.6	---	26.4
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	557	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	10	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	0.15	---	0.13
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	0.73	0.15	0.13	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	0.03
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	147	287	---	227
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.3	8.31	---	8.17
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	2	---	2 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	480	---	660
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	2.9	---	3.7
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	10,900	3.2	7.1	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	0.04J
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	332	n.d.	0.22	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	4	198	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	26.8	27	29
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	n.d.	n.d.	3.0 J
Chloroform	EPA 524.2			0.1	1	µg/L	---	152	314	214
Total trihalomethanes	EPA 524.2				1	µg/L	---	183	343	246
True Color	ASTM D1209-05	1	5	1	5	APHA	---	6	---	11
Turbidity	EPA 180.1	-	1	-	3	NTU	---	7	195	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	26.3	10	---	n.d.

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-352-2149

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/18/09
Date Received: 11/24/09
Date Sampled: 11/23/09

Lab number: 1653222 **Sample ID:** RM801BWD

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-348-2097

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 01/04/10
Date Received: 11/24/09

Lab number: 1653213 **Sample ID:** RM801

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-357-2213

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/23/09
Date Received: 11/24/09

Lab number: 1653240 **Sample ID:** RM801BWD ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-348-2205
09-348-2096
09-357-2208

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ112309

Lab Number:						1653217	1653212	1653235	1653235
Sample ID:						RM779SSM	RM779	RM779SSM	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	200	160	---	166
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	1,923	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.06 J	---	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.07J	n.d.	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.5 J	---	0.6 J
Arsenic	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	2 J
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	5,709	60	---	69
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	13	---	16
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	7	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	4.4	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	2.1	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	8,560	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.32J	---	0.31J
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	87.9	0.40J	0.64	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	1,913	22.2	---	26.3
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	222	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	10.3	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	0.17	---	0.19
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	0.74	0.17	0.19	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	0.03
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	275	290	---	272
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.3	8.28	---	8.4
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	1 J	---	1 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	518	---	520
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	3.3	---	3.7
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	1,500	4.12	4.8	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	0.06	---	0.03J
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	316	0.06	0.16	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	12	103	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	29	31	30.5
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	n.d.	n.d.	n.d.
Chloroform	EPA 524.2			0.1	1	µg/L	---	166	219	174
Total trihalomethanes	EPA 524.2				1	µg/L	---	200	254	210
True Color	ASTM D1209-05	1	5	1	5	APHA	---	6	---	8
Turbidity	EPA 180.1	-	1	-	3	NTU	---	21	101	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	23.9	n.d.	---	n.d.

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09/348/2205

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/14/09
Date Received: 11/24/09
Date Sampled: 11/23/09

Lab number: 1653217 **Sample ID:** RM779SSM

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-348-2096

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 01/04/10
Date Received: 11/24/09

Lab number: 1653212 **Sample ID:** RM779

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-257-2208

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEK082709

Date Reported: 12/23/09
Date Received: 11/24/09

Lab number: 1653235 **Sample ID:** RM779SSM ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-352-2145
09-348-2096
09-357-2209

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ112309

Lab Number:							1653218	1653212	1653236	1653236
Sample ID:							RM779SSC	RM779	RM779SSC	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	244	160	---	168
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	1,621	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.06 J	---	0.08 J
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	n.d.	0.07J	n.d.	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.5 J	---	0.7 J
Arsenic	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	2 J
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	5,879	60	---	64
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	13	---	18
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	7	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	3.6	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	1.9	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	7,498	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.32J	---	0.2J
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	72.9	0.40J	0.89	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	1,687	22.2	---	24.1
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	217	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	9.5	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	0.17	---	0.19
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.24	0.17	0.19	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	0.03
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	258	290	---	271
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.4	8.28	---	8.36
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	1 J	---	3 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	518	---	520
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	3.3	---	2.9
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	1,900	4.12	4.8	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	0.06	---	0.02J
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	248	0.06	0.16	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	12	103	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	29	28	28.7
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	n.d.	n.d.	n.d.
Chloroform	EPA 524.2			0.1	1	µg/L	---	166	198	164
Total trihalomethanes	EPA 524.2				1	µg/L	---	200	230	197
True Color	ASTM D1209-05	1	5	1	5	APHA	---	6	---	7
Turbidity	EPA 180.1	-	1	-	3	NTU	---	21	195	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	20.0	n.d.	---	n.d.

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-352-2145

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/18/09
Date Received: 11/24/09
Date Sampled: 11/23/09

Lab number: 1653218 **Sample ID:** RM779SSC

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-348-2096

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

Date Reported: 01/04/10
Date Received: 11/24/09

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Lab number: 1653212 **Sample ID:** RM779

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-257-2209

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/23/09
Date Received: 11/24/09

Lab number: 1653236 **Sample ID:** RM779SSC ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-352-2146
09-348-2096
09-357-2210

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ112309

Lab Number:							1653219	1653212	1653237	1653237
Sample ID:							RM779BWD	RM779	RM779BWD	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	3,245	160	---	175
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	2,876	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.06J	---	0.79
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	5.9	0.07J	0.76	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	0.5 J	---	0.2 J
Arsenic	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	1 J
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	10,655	60	---	58
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	13	---	18
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	7	---	9
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	5.6	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	3.9	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	9,635	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.32J	---	0.2J
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	194	0.40J	1.48	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	3,031	22.2	---	24.5
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	324	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	12	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	0.17	---	0.14
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	0.79	0.17	0.14	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	n.d.	---	0.03
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	162	290	---	230
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.1	8.28	---	8.23
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	1 J	---	1 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	518	---	534
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	3.3	---	3.4
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	3,900	4.12	6.8	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	0.06	---	0.02J
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	303	0.06	0.21	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	12	205	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	29	27.6	28.8
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	n.d.	3.1 J	4.4 J
Chloroform	EPA 524.2			0.1	1	µg/L	---	166	237	177
Total trihalomethanes	EPA 524.2				1	µg/L	---	200	268	211
True Color	ASTM D1209-05	1	5	1	5	APHA	---	6	---	8
Turbidity	EPA 180.1	-	1	-	3	NTU	---	21	232	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	28.3	n.d.	---	n.d.

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-352-2146

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/18/09
Date Received: 11/24/09
Date Sampled: 11/23/09

Lab number: 1653219 **Sample ID:** RM779BWD

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-348-2096

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 01/04/10
Date Received: 11/24/09

Lab number: 1653212 **Sample ID:** RM779

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-257-2210

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/23/09
Date Received: 11/24/09

Lab number: 1653237 **Sample ID:** RM779BWD ELUTRIATE

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-348-2202
09-348-2095
09-342-2173

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ112309

Lab Number:							1653214	1653211	1653232	1653232
Sample ID:							RM757SSM	RM-757	RM757SSM	Elutriate
Parameter	**Method**	**Method Detection Limit**		**Laboratory Reporting Limit**		**Units**	**Soil**	**Receiving Water**	**Pre-Elutriate Water**	**Elutriate Water**
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	291	174	---	189
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	1,992	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.07	---	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	2.9	0.1	n.d.	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	6,643	65	---	71
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	14	---	23
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	9	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	4.7	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	2.1	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	8,329	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.4J	---	0.3
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	119	0.4J	0.77	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	2,251	26.2	---	27.2
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	202	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	10.3	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	0.12	---	0.18
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	2.90	0.12	0.17	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	0.03	---	0.03 J
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	277	295	---	281
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.3	8.24	---	8.34
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	2 J	---	2
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	586	---	556
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	4.6	---	3.9
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	2,000	4.93	6.4	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	0.05
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	244	n.d.	0.30	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	17	261	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	36	32	39.6
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	5.8	n.d.	6.8
Chloroform	EPA 524.2			0.1	1	µg/L	---	189	196	211
Total trihalomethanes	EPA 524.2				1	µg/L	---	231	231	257
True Color	ASTM D1209-05	1	5	1	5	APHA	---	8	---	8
Turbidity	EPA 180.1	-	1	-	3	NTU	---	17	286	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	18.3	10	---	n.d.

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

Midwest Laboratories, Inc.
13611 "B" Street • Omaha, Nebraska 68144-3693 • (402) 334-7770 • FAX (402) 334-9121
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REPORT OF ANALYSIS

Report Number: 09-348-2202

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/14/09
Date Received: 11/24/09
Date Sampled: 11/23/09

Lab number: 1653214 **Sample ID:** RM757SSM

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-342-2173

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

Date Reported: 12/30/09
Date Received: 11/24/09

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Lab number: 1653232 **Sample ID:** RM757SSM

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-348-2095

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 01/04/10
Date Received: 11/24/09

Lab number: 1653211 **Sample ID:** RM757

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-348-2203
09-348-2095
09-357-2206

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ112309

Lab Number:							1653215	1653211	1653233	1653233
Sample ID:							RM757SSC	RM-757	RM757SSM	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	691	174	---	182
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	2,400	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.07	---	0.27
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	0.88	0.1	0.25	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	7,910	65	---	70
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	14	---	10
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	9	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	5.8	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	2.5	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	7,275	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.4J	---	0.6
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	88.5	0.4J	0.9	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	2,717	26.2	---	27.2
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	236	n.d.	---	n.d.
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	10.8	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	0.12	---	0.15
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	1.2	0.12	0.16	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	0.03	n.d.	0.03 J
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	279	295	---	283
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8.2	8.24	---	8.15
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	2 J	---	1
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	586	---	602
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	4.6	---	4.0
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	2,400	4.93	5.6	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	0.03 J
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	310	n.d.	0.2	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	17	161	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	36	29	33.7
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	5.8	n.d.	6.1
Chloroform	EPA 524.2			0.1	1	µg/L	---	189	142	161
Total trihalomethanes	EPA 524.2				1	µg/L	---	231	175	200
True Color	ASTM D1209-05	1	5	1	5	APHA	---	8	---	8
Turbidity	EPA 180.1	-	1	-	3	NTU	---	17	204	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	24.0	10	---	n.d.

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-348-2203

Reported to:
US ARMY CORPS OF
ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/14/09
Date Received: 11/24/09
Date Sampled: 11/23/09

Lab number: 1653215 **Sample ID:** RM757SSC

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-357-2206

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/23/09
Date Received: 11/24/09

Lab number: 1653233 **Sample ID:** RM757SSC

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-348-2095

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 01/04/10
Date Received: 11/24/09

Lab number: 1653211 **Sample ID:** RM757

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

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Report #: 09-348-2204
09-348-2095
09-357-2207

USACE
DAVE JENSEN
106 SOUTH 15TH STREET
OMAHA NE 68102

Project Name: ESH CREATION
Project #: SPS-ESHSED-001
Trip Number: EDXDEJ112309

Lab Number:							1653216	1653211	1653234	1653234
Sample ID:							RM757BWD	RM-757	RM757BWD	Elutriate
Parameter	Method	Method Detection Limit		Laboratory Reporting Limit		Units	Soil	Receiving Water	Pre-Elutriate Water	Elutriate Water
Alkalinity	SM 2320 B	-	4	-	10	mg/kg mg/L	2,516	174	---	183
Aluminum	EPA 200.7	2	25	10	75	mg/kg µg/L	3,003	n.d.	---	n.d.
Ammonia as N - Dissolved	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	---	0.07	---	n.d.
Ammonia as N - Total	EPA 350.2	0.2	0.02	1	0.1	mg/kg mg/L	2.6	0.1	0.25	---
Antimony	EPA 200.8	1	0.5	5	2	mg/kg µg/L	n.d.	n.d.	---	0.7 J
Arsenic Total	EPA 200.8	1	1	5	3	mg/kg µg/L	n.d.	2 J	---	n.d.
Beryllium	EPA 200.7	0.1	2	0.5	5	mg/kg µg/L	n.d.	n.d.	---	n.d.
Cadmium	EPA 200.8	0.5	0.2	2	1	mg/kg µg/L	n.d.	n.d.	---	n.d.
Calcium	EPA 200.7	5	1	25	3	mg/kg mg/L	9,942	65	---	70
Chemical Oxygen Demand-COD	ASTM 1252	-	3	-	10	mg/L	---	14	---	4J
Chlorophyll	SM 10200	-	1	-	3	µg/L	---	9	---	---
Chromium	EPA 200.7	0.2	1	1	10	mg/kg µg/L	6.5	n.d.	---	n.d.
Copper	EPA 200.7	0.2	1	1.0	5	mg/kg µg/L	3.2	n.d.	---	n.d.
Cyanide	SM 4500 CN-E	0.5	8	3	20	mg/kg µg/L	n.d.	n.d.	---	n.d.
Iron, Total	EPA 200.7	4	7	10	20	mg/kg µg/L	9,557	n.d.	---	n.d.
Kjeldahl Nitrogen - Dissolved	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	---	0.4J	---	0.15 J
Kjeldahl Nitrogen - Total	EPA 351.3	2	0.2	10	0.5	mg/kg mg/L	183	0.4J	0.76	---
Lead	EPA 200.7	1	0.5	5	2	mg/kg µg/L	6.4	n.d.	---	n.d.
Magnesium	EPA 200.7	2	1	10	3	mg/kg mg/L	3,217	26.2	---	28.7
Manganese	EPA 200.7	1	2	5	10	mg/kg µg/L	265	n.d.	---	20
Mercury	EPA 245.1	0.2	0.02	1	0.05	mg/kg µg/L	n.d.	n.d.	---	n.d.
Nickel	EPA 200.7	0.2	10	2	30	mg/kg µg/L	11.6	n.d.	---	n.d.
Nitrate/Nitrite Nitrogen - Dissolved	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	---	0.12	---	0.13
Nitrate/Nitrite Nitrogen - Total	EPA 353.2	0.2	0.02	1	0.05	mg/kg mg/L	2.81	0.12	0.12	---
Orthophosphate phosphorus	SM 4500 P		0.02		0.05	mg/kg µg/L	---	0.03	---	n.d.
Organochlorine Pesticides	EPA 8081			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Polychlorinated Biphenyls (PCB's)	EPA 8082			*	*	---	n.d.* Page 2	n.d.* Page 3	---	n.d.* Page 4
Oxidation reduction potential	SM 2580B	---	---	---	---	mV	280	295	---	277
Particle Size	Sieve	---	---	---	---	---	See Attached	---	---	---
pH	SM 4500-H	0.1		0.2		---	8	8.24	---	8.05
Selenium	EPA 200.8	1	1	4	3	mg/kg µg/L	n.d.	2 J	---	2 J
Silver	EPA 200.7	1	3	5	10	mg/kg µg/L	n.d.	n.d.	---	n.d.
Thallium	EPA 200.7	1	0.5	5.0	2	mg/kg µg/L	n.d.	n.d.	---	n.d.
Total Dissolved Solids	SM 2540D			5.0	20	mg/L	---	586	---	594
Dissolved Organic Carbon - DOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	---	4.6	---	3.9
Total Organic Carbon - TOC	EPA 415.1	2	0.2	10.0	1	mg/kg mg/L	3,600	4.93	5.7	---
Dissolved Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	---	n.d.	---	n.d.
Total Phosphorus	SM 4500 P-F	0.2	0.02	1	0.05	mg/kg mg/L	306	n.d.	0.16	---
Total Suspended Solids	SM 2540D	-	4	-	10	mg/L	---	17	136	---
Bromodichloromethane	EPA 524.2			0.15	1	µg/L	---	36	29	31.8
Bromoform	EPA 524.2			0.25	1	µg/L	---	n.d.	n.d.	n.d.
Chlorodibromomethane	EPA 524.2			0.16	1	µg/L	---	5.8	n.d.	5.3
Chloroform	EPA 524.2			0.1	1	µg/L	---	189	151	155
Total trihalomethanes	EPA 524.2				1	µg/L	---	231	185	192
True Color	ASTM D1209-05	1	5	1	5	APHA	---	8	---	8
Turbidity	EPA 180.1	-	1	-	3	NTU	---	17	204	<1
Zinc	EPA 200.7	1	10	5	30	mg/kg µg/L	26.9	10	---	n.d.

n.d. = Not Detected
--- Test not requested/Applicable
J = Estimated concentration below laboratory reporting limit.
* See attached report
Note: Pre-Elutriate water analysis was performed on unfiltered elutriate extract.

Prem N. Arora

Prem N. Arora, Environmental Project Manager
Midwest Laboratories, Inc.

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REPORT OF ANALYSIS

Report Number: 09-348-2204

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEERS
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/14/09
Date Received: 11/24/09
Date Sampled: 11/23/09

Lab number: 1653216 **Sample ID:** RM757BWD

Method: EPA 8081/8082 **Units:** µg/Kg **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)	Analysis	Level Found	Method Detection Limit	Reporting Limit (µg/L)
4,4'-DDE	n.d.	0.789	9.9	Endosulfan I	n.d.	0.615	5.1
4,4'-DDD	n.d.	0.611	9.9	Endosulfan II	n.d.	0.733	9.9
4,4'-DDT	n.d.	0.952	9.9	Endosulfan sulfate	n.d.	0.945	9.9
4,4'-Methoxychlor	n.d.	1.173	51	Endrin	n.d.	0.964	9.9
Aldrin	n.d.	0.645	5.1	Endrin aldehyde	n.d.	0.985	9.9
Aroclor 1016	n.d.	15.402	50	Endrin ketone	n.d.	0.795	9.9
Aroclor 1221	n.d.	14.013	50	Heptachlor	n.d.	0.508	5.1
Aroclor 1232	n.d.	9.776	50	Heptachlor epoxide	n.d.	0.745	5.1
Aroclor 1242	n.d.	9.943	50	alpha-Chlordane	n.d.	0.730	5.1
Aroclor 1248	n.d.	11.144	50	alpha-BHC	n.d.	0.323	5.1
Aroclor 1254	n.d.	15.475	50	beta- BHC	n.d.	0.905	5.1
Aroclor 1260	n.d.	14.811	50	delta-BHC	n.d.	1.733	5.1
Aroclor 1262	n.d.	8.240	50	gama-BHC (Lindane)	n.d.	0.562	5.1
Aroclor 1268	n.d.	9.896	50	gama-(Chlordane)	n.d.	0.745	5.1
Dieldrin	n.d.	0.691	9.9				

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REPORT OF ANALYSIS

Report Number: 09-357-2207

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/PROJ#: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 12/23/09
Date Received: 11/24/09

Lab number: 1653234 **Sample ID:** RM757

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr5 **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.171	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.30	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	1.00				

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REPORT OF ANALYSIS

Report Number: 09-348-2095

Reported to: US ARMY CORPS OF ENGINEERS
DAVE JENSEN
1616 CAPITOL AVE 5TH FLOOR
OMAHA NE 68102

For: (20061) US ARMY CORPS OF ENGINEE
(402) 995-2310

PO/Proj. #: 91554383 ESH CREATION
SPS-ESHSED-001
EDXDEJ112309

Date Reported: 01/04/10
Date Received: 11/24/09

Lab number: 1653211 **Sample ID:** RM757

Method: EPA 8081A/8082 **Units:** µg/L **Analyst:** awr **Date of Analysis:** 12/2/2009

Analysis	Level Found	Method Detection Limit	Reporting Limit	Analysis	Level Found	Method Detection Limit	Reporting Limit
4,4'-DDE	n.d.	0.005	0.10	Endosulfan I	n.d.	0.006	0.05
4,4'-DDD	n.d.	0.005	0.10	Endosulfan II	n.d.	0.003	0.1
4,4'-DDT	n.d.	0.004	0.10	Endosulfan sulfate	n.d.	0.01	0.1
4,4'-Methoxychlor	n.d.	0.005	0.50	Endrin	n.d.	0.003	0.1
Aldrin	n.d.	0.008	0.50	Endrin aldehyde	n.d.	0.011	0.1
Aroclor 1016	n.d.	0.110	1.00	Endrin ketone	n.d.	0.006	0.1
Aroclor 1221	n.d.	0.194	2.00	Heptachlor	n.d.	0.009	0.05
Aroclor 1232	n.d.	0.110	1.00	Heptachlor epoxide	n.d.	0.007	0.05
Aroclor 1242	n.d.	0.107	1.00	alpha-Chlordane	n.d.	0.011	0.05
Aroclor 1248	n.d.	0.218	1.00	alpha-BHC	n.d.	0.009	0.05
Aroclor 1254	n.d.	0.155	1.00	beta- BHC	n.d.	0.009	0.05
Aroclor 1260	n.d.	0.129	1.00	delta-BHC	n.d.	0.014	0.05
Aroclor 1262	n.d.	0.157	1.00	gama-BHC (Lindane)	n.d.	0.035	0.05
Aroclor 1268	n.d.	0.236	1.00	gama-(Chlordane)	n.d.	0.006	0.05
Dieldrin	n.d.	0.004	0.01				

APPENDIX C.

Data Quality Assessment Report

Data Quality Assessment Report

for

Project Number SPS-ESHSED-001

2009 Elutriate Sampling – Emergent Sandbar (ESH) Creation

Assessment of the Existing Condition of the Missouri River Sediments from Fort Randall Dam to Ponca State Park, Nebraska

July 2010

Water Control and Water Quality Section
Hydrologic Engineering Branch
Engineering Division
Omaha District
U.S. Army Corps of Engineers

1. SCOPE AND APPLICABILITY

1.1. BACKGROUND

The U.S. Army Corps of Engineers' Omaha District (District) conducts elutriate testing of sediments to evaluate potential dredge material for contamination. Elutriate testing of the collected sediment samples is conducted pursuant to the Inland Testing Manual, "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual (USEPA and USACE, 1998).

All water quality data collected by the District's Water Control and Water Quality Section goes through a Data Quality Review (DQR) process prior to data finalization and utilization for assessments and reporting. Part of the DQR process includes the creation of a Data Quality Assessment Report (DQAR). The DQAR is used to document overall quality of a water quality dataset with respect to established Data Quality Indicators and Measurement Quality Objectives.

1.2. PURPOSE

This DQAR documents the quality of data collected under the Sampling and Analysis Plan (SAP) for water quality monitoring project number SPS-ESHSED-001, "2009 Elutriate Sampling – Emergent Sandbar Habitat (ESH) Creation: Assessment of the Existing Condition of Missouri River Sediment from Fort Randall Dam to Ponca State Park, Nebraska." The quality of the collected data was assessed according to water quality Standard Operating Procedure (SOP) WQ-27202, "Data Quality Review" (USACE, 2010). Field data and laboratory analyses were assessed for completeness, correctness, and representativeness. Any missing or incorrect data were identified and addressed. Field and laboratory split samples prepared as part of the data collection were used to assess precision. Systematic and random sampling errors were identified and quantified as major or minor. This report serves as a "usability screening" and is not intended to determine the "ultimate usability" of the dataset.

2. LOCATION AND DATES OF SAMPLING

Data were collected at 3 locations at 7 sites along the Missouri River from Fort Randall Dam to Ponca State Park, Nebraska. Sampling occurred on July 16 and 29, August 27, and November 23, 2009. Core samples of alluvial sediment and grab samples of Missouri River water were collected. GPS locations of sampled sites and field measurements of Missouri River water quality conditions were taken. All targeted sites and locations in the SAP were sampled (Table 1).

Table 1. Field determined latitude and longitude for sediment sampling site locations.

Site	Location	Latitude*	Longitude*
RM867	SSM – Main Channel	42° 55’ 40.6” N	98° 25’ 18.4” W
RM867	SSC – Side Channel	42° 55’ 41.0” N	98° 24’ 50.2” W
RM867	BWD – Backwater/Detritus	42° 55’ 43.2” N	98° 25’ 00.5” W
RM853	SSM – Main Channel	42° 50’ 36.8” N	98° 11’ 42.3” W
RM853	SSC – Side Channel	42° 50’ 31.0” N	98° 10’ 53.2” W
RM853	BWD – Backwater/Detritus	42° 50’ 31.8” N	98° 11’ 00.1” W
RM842	SSM – Main Channel	42° 45’ 58.8” N	98° 00’ 33.1” W
RM842	SSC – Side Channel	42° 46’ 13.1” N	98° 00’ 24.6” W
RM842	BWD – Backwater/Detritus	42° 46’ 10.7” N	98° 00’ 30.7” W
RM827	SSM – Main Channel	42° 51’ 06.4” N	97° 47’ 38.4” W
RM827	SSC – Side Channel	42° 51’ 22.5” N	97° 47’ 57.7” W
RM827	BWD – Backwater/Detritus	42° 51’ 21.0” N	97° 48’ 02.0” W
RM800	SSM – Main Channel	42° 51’ 45.3” N	97° 17’ 41.5” W
RM800	SSC – Side Channel	42° 51’ 49.7” N	97° 17’ 49.3” W
RM800	BWD – Backwater/Detritus	42° 51’ 55.1” N	97° 17’ 49.8” W
RM779	SSM – Main Channel	42° 45’ 10.9” N	96° 57’ 36.3” W
RM779	SSC – Side Channel	42° 45’ 25.3” N	96° 57’ 56.9” W
RM779	BWD – Backwater/Detritus	42° 45’ 24.6” N	96° 57’ 56.3” W
RM756	SSM – Main Channel	42° 37’ 56.9” N	96° 41’ 47.7” W
RM756	SSC – Side Channel	42° 37’ 56.0” N	96° 41’ 39.3” W
RM756	BWD – Backwater/Detritus	42° 37’ 59.5” N	96° 41’ 38.6” W

* NAD27 CONUS

3. DATA QUALITY ASSESSMENT

3.1 TECHNICAL CRITERIA FOR DATA QUALITY ASSESSMENT

3.1.1 Precision

The precision of the methods used for collecting and analyzing the sediment and prepared elutriate samples were assessed using the split field sediment sample (i.e. RM842SSM), and the particle size duplicate (split) samples (i.e., RM867BWD, RM852SSM, RM842SSM - Field Split, and RM801SSC). The difference in analytical results for the split samples were quantified as the relative percent difference (RPD) between the paired samples. The RPD for the split samples were calculated as follows:

$$\text{RPD} = 100\%\left(\frac{|x1 - x2|}{\bar{x}}\right) \qquad \textit{(equation 1)}$$

where: $x1$ and $x2$ are the values of the original and split samples, and $\bar{x}$ is the mean of the two values.

3.1.2 Representativeness

For the purposes of this project, representativeness is defined as how well the sampled population (i.e., collected sediment samples) reflects the target population (e.g., Missouri River

alluvial sediments). Two sources of error may affect the representativeness of the sampled population: sampling error and measurement error.

Sampling error is caused by the natural variability inherent among samples from a population. In alluvial sediment monitoring situations it is largely dependent on the amount of spatial and temporal variability present in the target population. Measurement error refers to the inaccuracies and errors that can and should be avoided by using sound data collection techniques and analytical methods.

3.2 PRECISION

3.2.1 Particle Size Split Samples

Table 2 presents the sample measurements and calculated RPD values for the split particle size samples. All the calculated RPD values were considered minor. The higher RPD values were associated with lower measurements and the higher RPD values were attributed to differences in small values.

Table 2. Measured particle size percent composition for collected and split Missouri River alluvial sediment samples and calculated RPD values for the paired samples.

		%Gravel		%Sand			%Fines	
Sample	**%Cobble**	**Coarse**	**Fine**	**Coarse**	**Medium**	**Fine**	**Silt**	**Clay**
RM867BWD	0	0	0	0.2	15.3	76.7	6.6	1.2
Lab Split	0	0	0.2	0.2	16.1	76.7	5.6	1.2
RPD	0%	0%	-----	0%	5%	0%	16%	0%
RM852SSM	0	0	0	0	7.2	91.5	0.5	0.8
Lab Split	0	0	0	0	8.1	90.7	0.4	0.8
RPD	0%	0%	0%	0%	12%	1%	22%	0%
RM842SSM	0	0	0	0	1.1	96.6	1	1.3
Field Split	0	0	0	0.2	0.9	96.2	1.4	1.3
RPD	0%	0%	0%	-----	20%	0%	33%	0%
RM842SSM	0	0	0	0.2	0.9	96.2	1.4	1.3
Lab Split	0	0	0	0	0.7	96.2	1.8	1.3
RPD	0%	0%	0%	-----	25%	0%	25%	0%
RM801SSC	0	0	0.4	1	19.5	77	1.8	0.3
Lab Split	0	0	0	0.9	19.5	76.9	2.4	0.3
RPD	0%	0%	-----	11%	0%	0%	29%	0%

3.2.2 Sediment, Pre-Elutriate, and Elutriate Samples

Table 3 presents sample measurements and calculated RPD values for collected alluvial sediment samples. All the calculated RPD values were considered minor. It is noted that the RPD values for several metals (i.e., chromium, copper, nickel, and zinc) were greater than 50%. This is attributed to the difficulty of homogenizing the composite sediment sample and the general variable occurrence of these metals in the environment. The relative values of these metals were low, and the “small” difference in the split samples seemingly resulted in higher RPD values.

Table 3. Measured constituents for the alluvial sediment sample and split collected at site RM842SSM and the RPD value calculated for the paired samples.

Parameter	RM842SSM	Split	RPD
Alkalinity (mg/kg)	362	317	13%
Aluminum (mg/kg)	1,657	1,754	6%
Antimony (mg/kg)	0	0	0%
Arsenic (mg/kg)	0	0	0%
Beryllium (mg/kg)	0	0	0%
Cadmium (mg/kg)	0	0	0%
Calcium (mg/kg)	2,339	2,478	6%
Chromium (mg/kg)	5.1	2.7	62%
Copper (mg/kg)	2.76	1.43	63%
Cyanide (mg/kg)	0	0	0%
Iron (mg/kg)	3,047	3,299	8%
Lead (mg/kg)	0	0	0%
Magnesium (mg/kg)	1,046	1,115	6%
Manganese (mg/kg)	106	113	6%
Mercury (mg/kg)	0	0	0%
Nickel (mg/kg)	7.7	3.5	75%
Organochlorine Pesticides (mg/kg)	0	0	0%
Oxidation Reduction Potential (mV)	-83.6	-87.5	5%
PCBs (mg/kg)	0	0	0%
pH (S.U.)	8.2	8.2	0%
Selenium (mg/kg)	0	0	0%
Silver (mg/kg)	0	0	0%
Thallium (mg/kg)	0	0	0%
Total Ammonia (mg/kg)	0	0	0%
Total Kjeldahl Nitrogen (mg/kg)	59.3	74.5	23%
Total Nitrate/Nitrite Nitrogen (mg/kg)	1.1	1.1	0%
Total Organic Carbon (mg/kg)	400	400	0%
Total Phosphorus (mg/kg)	131	126	4%
Zinc (mg/kg)	18.4	10.3	56%

Table 4 presents sample measurements and calculated RPD values for the prepared standard elutriate samples. All the calculated RPD values were considered minor.

Table 5 presents sample measurements and calculated RPD values for the prepared pre-elutriate samples. All the calculated RPD values were considered minor.

3.3 REPRESENTATIVENESS

To address temporal variation, this project collected all alluvial sediments within a 5-month period. Spatial variation was addressed by the a priori identification of three habitat types of alluvial sediment to be sampled: 1) shallow submerged sandbar in main river channel (SSM), 2) shallow "side-channel" area (SSC), and 3) depositional backwater area with vegetative growth and accumulated detritus (BWD). It is believed these three location types characterize the sediment conditions that could be dredged for ESH creation. Measurement error was controlled by ensuring that SOPs and the project SAP were followed.

Table 4. Measured dissolved constituents for the elutriate samples prepared from sediment and split samples collected at site RM842SSM and the RPD value calculated for the paired samples.

Parameter	RM842SSM	Split	RPD
Alkalinity (mg/l)	168	170	1%
Aluminum (ug/l)	0	0	0%
Ammonia (mg/l)	0.2	0	-----
Antimony (ug/l)	0.5	0	-----
Arsenic (ug/l)	0	0	0%
Beryllium (ug/l)	0	0	0%
Cadmium (ug/l)	0	0	0%
Calcium (mg/l)	60	63	5%
Chemical Oxygen Demand (mg/l)	18	22	20%
Chromium (ug/l)	0	0	0%
Copper (ug/l)	0	0	0%
Cyanide (ug/l)	0	0	0%
Iron (ug/l)	0	0	0%
Kjeldahl Nitrogen (mg/l)	0.9	0.9	0%
Lead (ug/l)	0	0	0%
Magnesium (mg/l)	20.5	20.1	2%
Manganese (ug/l)	0	0	0%
Mercury (ug/l)	0	0	0%
Nickel (ug/l)	0	0	0%
Nitrate/Nitrite Nitrogen (mg/l)	0	0	0%
Organic Carbon (mg/l)	3	3.3	10%
Organochlorine Pesticides (ug/l)	0	0	0%
Oxidation Reduction Potential (mV)	-74.9	-30.1	85%
PCBs (ug/l)	0	0	0%
pH (S.U.)	8.09	8.05	0%
Phosphorus (mg/l)	0	0	0%
Phosphorus-Ortho (mg/l)	0	0	0%
Selenium (ug/l)	3	3	0%
Silver (ug/l)	0	0	0%
Thallium (ug/l)	0	0	0%
THM Formation Potential (ug/l)	261	315	19%
Total Dissolved Solids (mg/l)	534	594	11%
True Color (S.U.-APHA)	5	6	18%
Zinc (ug/l)	90	90	0%

Table 5. Measured total constituents for the pre-elutriate samples prepared from sediment and split samples collected at site RM842SSM and the RPD value calculated for the paired samples.

Parameter	RM842SSM	Split	RPD
Ammonia (mg/l)	0.3	0	-----
Nitrate/Nitrite Nitrogen (mg/l)	0	0	0%
Organic Carbon (mg/l)	3	3.3	10%
Phosphorus (mg/l)	0.26	0.26	0%
THM Formation Potential (ug/l)	196	309	45%
Total Suspended Solids (mg/l)	275	196	34%
Turbidity (NTU)	269	301	11%

RFERENCES

U.S. Army Corps of Engineers. 2010. Data Quality Review – SOP Number: WQ-27202. Water Quality Unit, Water Control and Water Quality Section, Hydrologic Engineering Branch, Engineering Division, Omaha District, U.S. Army Corps of Engineers.

USEPA and USACE. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Test Manual: Inland Testing Manual. EPA-823-B-98-004, February 1998. U.S. Environmental Protection Agency, Office of Water. Department of Army, U.S. Army Corps of Engineers. Washington, D.C

APPENDIX D.

Sampling and Analysis Plan

SAMPLING AND ANALYSIS PLAN

for

2009 Elutriate Sampling – Emergent Sandbar Habitat (ESH) Creation

Assessment of the Existing Condition of Missouri River Sediments from Fort Randall Dam to Ponca State Park, Nebraska

Project Number: SPS-ESHSED-001

Prepared By:

Water Quality Unit
Water Control and Water Quality Section
Hydrologic Engineering Branch
U.S. Army Corps of Engineers – Omaha District

May 2009

USACE – Water Quality Unit Sampling Coordinator	5/26/09 Date
USACE – Water Quality Unit Team Leader	5/28/09 Date
USACE – Chief, Water Control and Water Quality Section	5-28-09 Date
USACE – Chief, Sedimentation & Channel Stabilization Section	28 May 09 Date
USACE – Natural Resources Section	5/27/09 Date
USACE – Planning	5/27/09 Date

Distribution List:

U.S. Army Corps of Engineers – Omaha District – ED – Hydrologic Engineering Branch

Dave Jensen (Water Quality Unit)
Bill Otto (Water Quality Unit)
John Hargrave (Water Quality Unit)
Dan Pridal (Sedimentation & Channel Stabilization Section)

U.S. Army Corps of Engineers – Omaha District – OD – Natural Resources Section

Kelly Crane

U.S. Army Corps of Engineers – Omaha District – Planning Branch

Luke Wallace

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1. PROJECT DESCRIPTION

1.1. BACKGROUND INFORMATION

1.1.1. Missouri River Biological Opinion

The U.S. Fish and Wildlife Service (USFWS) issued a Biological Opinion (BiOp) with recommendations for the U.S. Army Corps of Engineers' (Corps) operations of the Missouri River Mainstem System for protection and enhancement of threatened and endangered species. The BiOp found that the Corps' operations on the Missouri River were not likely to jeopardize the endangered interior least tern *(Sterna antillarum)* and threatened piping plover *(Charadrius melodus)* populations if the Reasonable and Prudent Alternative (RPA) set forth in the BiOp was implemented. The RPA includes recommendations for the mechanical creation and maintenance of Emergent Sandbar Habitat (ESH) as nesting habitat for these two species in terms of habitat acres per river mile. In accordance with the BiOp, the Corps is conducting ongoing efforts to create and/or reclaim a sufficient amount of ESH to stabilize, and eventually recover, interior least tern and piping plover populations along the Missouri River.

The BiOp separates the Missouri River from Ponca, NE upstream to Fort Randall Dam into three separate segments: 1) Segment 10 - Ponca, NE to Gavins Point Dam; 2) Segment 9 – Gavins Point Dam to the Niobrara River; and 3) Segment 8 – Niobrara River to Fort Randall Dam (Figure 1). All three segments are identified as "High Priority" reaches for the interior least tern and piping plover. ESH goals of 40 acres per river mile by the year 2005 and 80 acres per river mile by the year 2015 have been established for Segments 9 and 10. ESH goals of 10 acres per river mile by the year 2005 and 20 acres per river mile by the year 2015 have been established for Segment 8. Existing ESH acreages within these segments are currently below these goals.

1.1.2. Past Construction of ESH on the Missouri River

Past construction of ESH on the Missouri River by the Corps has utilized hydraulic dredges, sand scrapers, bulldozers and other construction equipment to build up sandbars. Hydraulic dredges are used to pump and place material to build up existing shallowly submerged sandbars. The hydraulic dredges typically use a cutter-head to break up sediment and a pump and pipeline to transport the dredged material to the deposition site. The dredged material is usually mined from "sediments" within the "high-water elevation" of the Missouri River. It is believed that using deposited material from the "river channel" emulates a natural process of redistribution of sediments within the river, and results in no net addition or removal of sediment from the system. Sand Scrapers, bulldozers and other construction equipment are used to form the dredged sand to the specified elevations in order to create sandbars that closely resemble naturally formed ESH.

Avoiding bottom sediments high in organic matter and utilizing coarser, "sandy" material for fill material improves the habitat quality of the ESH created. Coarser fill material is easier to "work" and contour and is better suited for the construction of ESH. Typically, coarser material also contains significantly less nutrients and seed stocks which should slow down the encroachment of vegetation on the created sandbars. This maximizes the time period the created sandbars provide quality habitat for the terns and plovers, and extends the time before control measures are needed to manage encroaching vegetation.

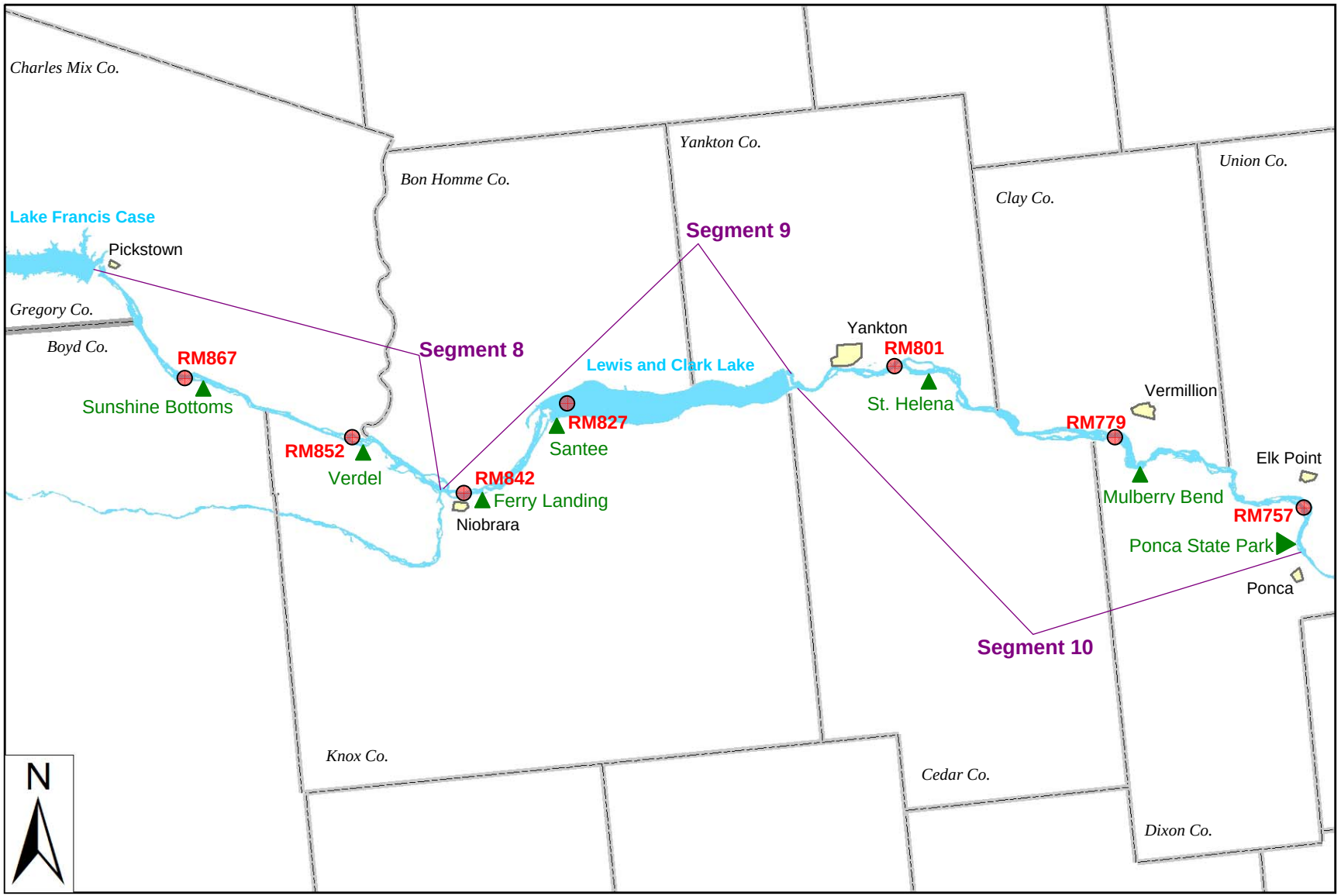


Figure 1. Locations of representative sites (by RM) and boat ramps on BiOp segments 8, 9, and 10 of the Missouri River.

1.2. SECTION 404 PERMITTING REQUIREMENTS

The requirements for a USACE Individual Section 404 permit must be met for most dredging activities conducted on the Missouri River. To meet the Section 404 Individual Permit requirements, a Section 401 Certification must be obtained from the appropriate States that "certifies" that the proposed actions will not "violate" State water quality standards. To facilitate review of past "Shallow Water Habitat" (SWH) projects for Section 401 Certification, "elutriate sampling" of material from the proposed dredging sites has been conducted. It has been recently requested by the State of Nebraska that elutriate sampling also be conducted on ESH projects. It has also been suggested by Nebraska that representative "elutriate samples" could be collected from the three priority segments to ascertain that sediment contamination was not a concern within the segments. This information could then be utilized to facilitate Section 401 Certification of future ESH projects on Segment 8, 9, and 10. This monitoring project plan was developed to collect representative sediment samples from Segments 8, 9, and 10 as identified in the BiOp. The collected sediment samples will be of the appropriate materials for elutriate analysis pursuant to the Inland Testing Manual, "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual (USEPA and USACE, 1998).

1.3. SPECIFIC WATER QUALITY CONCERNS

The States of Nebraska and South Dakota have not identified any portions of Segments 8, 9, or 10 as an impaired waterbody pursuant to Section 303(d) of the Federal Clean Water Act. Neither State has issued fish consumption advisories applicable to the three segments.

In a 401 Certification letter for a proposed Corps ESH project at RM842, the State of Nebraska stated the following:

> *"In order to establish certainty of compliance, an elutriate test must be conducted first on appropriate samples of the sediment which will be discharged to the waterway. The test should cover the following contaminants:*
>
> *Heavy metals: lead, arsenic, mercury, chromium, zinc, copper*
>
> *Ammonia*
>
> *Persistent pesticides such as:*
>
> *Chlordane, Dieldrin, Aldrin, DDT and its metabolites*
>
> *PCB's*
>
> *If the concentration of any of these pollutants is sufficient to cause violation of Title 117 – Nebraska Surface Water Quality Standards when the sediments are discharged to the river, the applicant must make arrangements for disposal elsewhere or revise the discharge schedule and/or volume to bring it into compliance."*

Some public drinking water facilities that use the Missouri River and Lewis and Clark Lake for source water have expressed concerns that creation of ESH increases the loading of organic matter in their raw water supply. They believe this may cause them to exceed drinking water standards for trihalomethanes (THMs) in their treated water. Increasing the amount of organic matter in water can increase the levels of THM precursors. This may pose a problem for facilities with inadequate treatment processes as THMs can form when the water is chlorinated.

1.4. REPRESENTATIVE SITES TO CHARACTERIZE MISSOURI RIVER SEGMENTS

1.4.1. Segment 10

Three sites have been identified for sediment sampling and elutriate testing to characterize Segment 10: RM757, RM779, and RM801. The site at RM757 is about 3.5 miles upstream from the Ponca State Park boat ramp (Figure 1 and Attachment1). This site is believed to represent conditions downstream of the Vermillion River. The site at RM 779 is about 3.5 miles upstream of the Mulberry Bend boat ramp (Figure 1 and Attachment 2). This site is believed to represent conditions downstream of the James River and upstream of the Vermillion River. The site at RM801 is about 2 miles upstream of the St. Helena boat ramp and is immediately above the confluence of the James River (Figure 1 and Attachment 3). The site is believed to represent conditions from just downstream of Gavins Point Dam to the James River.

1.4.2. Segment 9

Two sites have been identified for sediment sampling and elutriate testing to characterize Segment 9: RM827 and RM842. The site at RM827 is about 2 miles downstream of the Santee boat ramp (Figure 1 and Attachment 4). This site is believed to represent conditions in the "delta area" of Lewis and Clark Lake. The site at RM 842 is about 1 mile upstream of the Ferry Landing boat ramp (Figure 1 and Attachment 5). This site is believed to represent conditions downstream from the confluence of the Niobrara River to the "delta area" of Lewis and Clark Lake.

1.4.3. Segment 8

Two sites have been identified for sediment sampling and elutriate testing to characterize Segment 8: RM852 and RM867. The site at RM852 is about 1 mile upstream from the Verdel boat ramp (Figure 1 and Attachment 6). This site is believed to represent conditions in the lower half of Segment 8. The site at RM 867 is about 1 mile upstream of the Sunshine Bottoms boat ramp (Figure 1 and Attachment 7). This site is believed to represent conditions in the upper half of Segment 8.

2. PROJECT/TASK ORGANIZATION AND RESPONSIBILITIES

The USACE's Water Control and Water Quality Section will conduct the sampling required to facilitate elutriate testing of sediment samples collected at the representative sites.

Staff Responsibilities and Contacts for Sampling:
Sample Collection: Dave Jensen (995-2310), Bill Otto (995-2313), John Hargrave (995-2347), Jim Laney (996-3733)
Sampling Coordination: Dave Jensen
Data Quality Review: Dave Jensen
Laboratory Analysis: Midwest Laboratories, Prem Arora (829-9878)

3. DATA QUALITY OBJECTIVES

The data collected through this monitoring project will be used to assess sediment conditions at representative sites in Segments 8, 9, and 10 of the Missouri River. The data will be used to characterize sediment conditions in each of the three segments. The sediment

condition characterization will be provided to the State of Nebraska to facilitate Section 401 water quality certification review of future ESH projects on the three segments. The information will also be used by the Corps to plan future ESH creation on Segments 8, 9, and 10.

4. DATA COLLECTION APPROACH

4.1. DATA COLLECTION DESIGN

Sediment samples will be collected at eight sites (RM757, RM779, RM801, RM827, RM842, RM852, and RM867) on the Missouri River. At each site three locations will be sampled: 1) shallowly submerged sandbar in main river channel (SSM), 2) shallowly submerged "chute" area between emergent sandbars (SSC), and 3) depositional backwater area with accumulated detritus (BWD). It is believed these three types of locations will characterize the sediment types that could be dredged for ESH creation. Potential SSM, SSC, and BWD sampling locations at each of the seven sites are shown in Attachments 1 through 7. At each location at each site, core samples will be collected to represent the location (i.e., SSM, SSC, and BWD). The separate core samples at each location will be combined into one composite sample for analyses.

4.2. MEASUREMENT AND SAMPLING METHODS

4.2.1. Receiving Water Sample

Water from the Missouri River will be collected at each site and will be used to prepare elutriate samples (see Section 1.2). The laboratory requires 4-gallons of receiving water for each 1-gallon of sediment to be analyzed. In addition to the 4-gallons of water for each 1-gallon of sediment, an additional 1-gallon of receiving water is required for "background" analysis. The receiving water will be collected from the main river channel at each site.

At the time the receiving water is collected, the following field measurements will be taken: water temperature, dissolved oxygen, pH, conductivity, oxidation-reduction potential, turbidity, and chlorophyll *a*. The measurements will be obtained with a "HydroLab" equipped with a MS5 DataSonde and Surveyor data logger in accordance with the Water Quality Unit's SOP Number WQ-21201, Using a "Hydrolab DS4a and DS5" to Directly Measure Water Quality (USACE, 2008). Measurements will be taken by immersion of the DataSonde directly into the river, or a plastic bucket will be used to collect a near-surface water sample. The Hydrolab would then be immediately placed in the plastic bucket and the measurements taken. Measurements will be appropriately recorded on a field sheet (Attachment 8).

4.2.2. Sediment Samples for Elutriate Sample Preparation

Sediment samples will be collected for elutriate analysis. The sediment samples will be collected at three locations at each of seven sites (i.e., RM757, RM779, RM801, RM828, RM842, RM852, and RM867) for a total of 21 sediment samples. Digital pictures will be taken of all sampled locations. The equipment, supplies, and procedures to be used to collect the sediment samples are as follows.

4.2.2.1. Sampling Equipment and Supplies

<u>Supplies and Miscellaneous Equipment</u>

- 1 gallon wide mouth glass jars
- 1 gallon narrow mouth glass jugs

- Sample bottle labels
- ARF
- Field sheets
- GPS device
- 5 gallon buckets
- Shovel
- Tarp
- Hammer, screwdriver, trowel
- Scrub brush
- Cooler with Ice
- Waders and rain gear

"Emergent" Sediment Sampling Equipment

- Gas powered auger and gasoline mix
- 2-inch stainless steel corer head
- Auger extensions

"Submerged" Sediment Sampling Equipment

- 2-inch stainless steel Ogeechee sand corer (36-inch and 48-inch)
- Extension handle and segments
- Hand corer head
- Ogeechee slide hammer
- Polyethylene liner tubes and caps, core catchers, nose pieces
- Core sample removal tool

4.2.2.2. "Emergent" Sediment Collection Procedure – Composite Sample

- Select sample site and record general information (including Latitude/Longitude) on the field sheet.
- Remove any vegetation near the proposed boring site.
- Set out equipment near boring site. Using a tarp can help keep vegetation and other material away from the collection bucket.
- Attach the corer to the auger head and bore down and collect sample in approximately one-foot increments to a total depth of 3 to 4 feet.
- After each coring suspend the corer over a clean 5-gallon collection bucket. Make sure the power head is away from the collection bucket and deposit the sample into the bucket.
- Heavy clays may require a trowel, screwdriver, hammer and/or wooden stake to remove the sample from the corer.
- When all cores from one site have been collected in the bucket, thoroughly mix the collected soil and transfer it to a wide mouth glass jar. Affix the sample label to the jar (easier if done prior to filling the jar with soil).
- Clean the coring device, tools and sample collection bucket between sample locations.
- Deliver the samples and an analytical request form to the laboratory analyzing the samples.

4.2.2.3. "Submerged" Sediment Collection Procedure – Composite Sample

- Select sample site and record general information (including Latitude/Longitude) on the field sheet.
- Stage collection equipment on a nearby bank or in a small boat anchored at sample site.

- Locate selected boring site with an appropriate marker (e.g., survey marker, pipe, etc.)
- Attach the appropriate head assembly and extensions to corer.
- If possible, collect a 2 to 3 foot sediment core sample in one "increment" using the slide hammer if necessary. If the sediment core can't be collected in one "increment" because of consolidation of the sediment, carefully remove the corer, process the sample, and reinsert the corer in the bore hole. Proceed until a sediment core is collected to a 2 to 3 foot depth. If a rock of other buried obstruction is encountered, start a new coring and continue until enough sediment is collected to create the composite sample.
- After each coring suspend the corer over a clean 5-gallon collection bucket and deposit the collected sample into the bucket. Use the core sample removal tool as necessary
- When all cores from one site have been collected in the bucket, thoroughly mix the collected sediment and transfer it to a wide mouth glass jar. Affix the sample label to the jar (easier if done prior to filling the jar with soil).
- Clean the coring device, tools and sample collection bucket between sample locations.
- Deliver the samples and an analytical request form to the laboratory analyzing the samples.

4.2.3. Elutriate Samples

4.2.3.1. Standard Elutriate Samples

Standard elutriate samples will be prepared in accordance with the "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual: Inland Testing Manual" (USEPA and USACE, 1998). The elutriate sample will be prepared by using water collected on site from the Missouri River River. The sample will be prepared by sub-sampling approximately 1-liter of the collected sediment sample from the well-mixed original sample. The sediment material and unfiltered receiving water are then combined in a sediment-to-water ratio of 1:4 on a volume basis at room temperature (22 $\pm$ 2°C). This is best accomplished by volumetric displacement. After the correct ratio is achieved, the mixture is stirred vigorously for 30 minutes with a mechanical stirrer/shaker. After the 30 minute mixing period, the mixture is allowed to settle for at least one hour. The supernatant will then be siphoned off and filtered through a 0.45 micron filter. The filtered water is the elutriate sample that will be analyzed.

4.2.3.2. Pre-Elutriate Samples

The pre-elutriate samples will be prepared the same as standard elutriate samples up through the point of vigorous mixing for 30 minutes. At that time the mixture will be allowed to settle "10 minutes" (allow heavier, coarse material to settle). A sub-sample will be siphoned off without filtration and identified as a pre-elutriate sample.

4.3. SAMPLE HANDLING, CUSTODY, AND TRANSPORT

The collected samples will be transported by Water Control and Water Quality Section personnel to Midwest Laboratories, Inc. in Omaha, Nebraska for analysis. An Analytical Request Form (ARF) will be completed and submitted with the samples delivered to the laboratory (Attachment 9).

4.4. PARAMETERS TO BE MEASURED AND ANALYZED

The parameters that will be measured or analyzed for the different types of samples are listed in Tables 1 through 5.

4.5. ANALYTICAL METHODS

Tables 2 through 5 list the methods that will be used by Midwest laboratories to analyze the samples for the required parameters. A maximum laboratory turn-around time of 30 days is required. A turn-around time of 30 days or less is needed to ensure the USACE can stay on schedule regarding the planning of a possible project.

4.6. QUALITY CONTROL

Where applicable, field measurements and samples will be collected in accordance with SOPs developed by the USACE's Water Quality Unit. A split sample will be prepared from one collected sediment sample (i.e., RM842SSC). The split sediment sample will be analyzed and used to prepare an elutriate sample.

5. DATA MANAGEMENT AND REPORTING

All water quality measurements and analyses will be verified, validated, and compiled. A report will be prepared that documents sampled locations, methods, and findings. The report will be provided to Kelly Crane (CENWO-OD-TN).

6. ESTIMATED COSTS FOR FIELD COLLECTION AND LABORATORY ANALYSIS OF ELUTRIATE SAMPLES

Field Collection:

Field Mobilization and Collection of Samples: 100 man hours @ $100 = $10,000

Laboratory Analysis (Midwest Laboratories – Omaha, Nebraska):

Sample Type	Number of Samples	Analytical Cost per Sample	Total Cost
Sediment	21	$571	$11,991
Split Sediment	1	$571	$571
Standard Elutriate	21	$824	$17,304
Standard Elutriate (Split Sediment)	1	$824	$824
Pre-Elutriate	21	$266	$5,586
Pre-Elutriate (Split Sediment)	1	$266	$266
Receiving Water	7	$741	$5,187
Total Estimated Laboratory Analytical Costs			**$41,729**

Total Estimated Sampling Costs:

Sample Collection	$10,000
Sample Analyses	$41,729
Total Estimated Costs	$51,729

Table. 1. Field Parameters to be Measured.

Parameter	Method	Resolution Limit	Measurement Taken	
			Lat/Long	Receiving Water
Coring Location	GPS	25 feet	**X**	
Water Temperature (°C)	HydroLab	0.1		**X**
Dissolved Oxygen (mg/l and % sat.)	HydroLab	0.1		**X**
pH (S.U)	HydroLab	0.1		**X**
Conductivity (umhos/cm)	HydroLab	1		**X**
Oxidation-Reduction Potential	HydroLab	1		**X**
Turbidity (NTU)	HydroLab	0.1		**X**
Chlorophyll *a* (ug/l)	HydroLab	1		**X**

Table. 2. Parameters to be Analyzed in Collected Soil/Sediment Samples and Unit Costs.

Parameter	Method	Detection Limit	Analytical Cost
PHYSICAL AND AGGREGATE PROPERTIES			
Particle Size	Sieve (Minimum Sieve #200)	0.001 mm	$60
Alkalinity, Total	SM2320B	4 mg/l	14
Oxidation Reduction Potential	SM2580B	1 mV*	30
pH	EPA 150.1	0.1 S.U.*	7
NUTRIENTS			0
Ammonia, Total as N	EPA 350.1	0.02 mg/kg	18
Kjeldahl Nitrogen, Total as N	EPA 351.3	0.2 mg/kg	20
Nitrate/Nitrite, Total as N	EPA 353.2	0.02 mg/kg	12
Phosphorus, Total	SM4500PF	0.02 mg/kg	18
AGGREGATE ORGANIC CONSTITUENTS			0
Chemical Oxygen Demand	ASTM D1252	3 mg/kg	17
Total Organic Carbon	EPA 415.1	0.4 mg/kg	25
METALS			0
Metals Scan (Total)	EPA 6010B	See Table 6a	175
PESTICIDES AND PCBs			0
Organochlorine Pesticide and PCB Scan	EPA 8081 and EPA 8082	See Table 7a	175
Total Laboratory Cost for Analyzing a Soil/Sediment Sample			**$571**

* Resolution limit.

Table. 3. Parameters to be Analyzed in Standard Elutriate Water Samples and Unit Costs.

Parameter*	Method	Detection Limit	Analytical Cost
SAMPLE PREPARATION			
Elutriate Sample Preparation	1:4 Sediment:Receiving Water	-----	$160
PHYSICAL AND AGGREGATE PROPERTIES			0
Alkalinity	SM2320B	4 mg/l	14
Color	ASTM D-1209-05	1 S.U.	10
pH	EPA 150.1	0.1 S.U.**	7
Total Dissolved Solids	EPA 160.1	5 mg/l	10
NUTRIENTS			0
Ammonia, as N	EPA 350.1	0.02 mg/l	18
Kjeldahl Nitrogen, as N	EPA 351.3	0.2 mg/l	20
Nitrate/Nitrite, as N	EPA 353.2	0.02 mg/l	12
Phosphorus, Dissolved	SM4500PF	0.02 mg/l	18
Ortho-Phosphorus, Dissolved	EPA 365.1	0.02 mg/l	13
AGGREGATE ORGANIC CONSTITUENTS			0
Chemical Oxygen Demand	ASTM D1252	3 mg/l	17
Dissolved Organic Carbon	EPA 415.1	0.4 mg/l	25
Trihalomethane Formation Potential	SM5710	2.5 ug/l	150
METALS			0
Metals Scan	EPA 6010B	See Table 6b	175
PESTICIDES AND PCBs			0
Organochlorine Pesticide and PCB Scan	EPA 8081 and EPA 8082	See Table 7b	175
Total Laboratory Cost for Analyzing a Standard Elutriate Water Sample			**$824**

* Since the final step in preparing elutriate samples is filtration (0.45 micron filter), the results for all parameters will be reported as dissolved.
** Resolution limit.

Table. 4. Parameters to be Analyzed in Pre-Elutriate Water Samples and Unit Costs.

Parameter*	Method	Detection Limit	Analytical Cost
PHYSICAL AND AGGREGATE PROPERTIES			
Total Suspended Solids	EPA 160.1	5 mg/l	$10
Turbidity	EPA 180.1	1 NTU	13
NUTRIENTS			0
Ammonia, Total as N	EPA 350.1	0.02 mg/l	18
Kjeldahl Nitrogen, Total as N	EPA 351.3	0.2 mg/l	20
Nitrate/Nitrite, Total as N	EPA 353.2	0.02 mg/l	12
Phosphorus, Total	SM4500PF	0.02 mg/l	18
AGGREGATE ORGANIC CONSTITUENTS			0
Total Organic Carbon	EPA 415.1	0.4 mg/l	25
Trihalomethane Formation Potential	SM5710	2.5 ug/l	150
Total Laboratory Cost for Analyzing a Pre-Elutriate Water Sample			**$266**

Table. 5. Parameters to be Analyzed in Receiving Water Sample and Unit Costs.

Parameter	Method	Detection Limit	Analytical Cost
PHYSICAL AND AGGREGATE PROPERTIES			
Alkalinity, Total	SM2320B	4 mg/l	$14
Color	ASTM D-1209-05	1 S.U.	10
Total Dissolved Solids	EPA 160.1	5 mg/l	10
Total Suspended Solids	EPA 160.2	4 mg/l	10
NUTRIENTS			0
Ammonia, Total as N	EPA 350.1	0.02 mg/l	18
Kjeldahl Nitrogen, Total as N	EPA 351.3	0.2 mg/l	20
Nitrate/Nitrite, Total as N	EPA 353.2	0.02 mg/l	12
Phosphorus, Dissolved	SM4500PF	0.02 mg/l	18
Phosphorus, Total	SM4500PF	0.02 mg/l	18
Ortho-Phosphorus, Dissolved	EPA 365.1	0.02 mg/l	13
AGGREGATE ORGANIC CONSTITUENTS			0
Chemical Oxygen Demand	ASTM D1252	3 mg/l	17
Chlorophyll *a* (corrected)	SM10200H2	1 ug/l	31
Dissolved Organic Carbon	EPA 415.1	0.4 mg/l	25
Total Organic Carbon	EPA 415.1	0.4 mg/l	25
Trihalomethane Formation Potential	SM5710	2.5 ug/l	150
METALS			0
Metals Scan (Total)	EPA 6010B	See Table 6b	175
PESTICIDES AND PCBs			0
Organochlorine Pesticide and PCB Scan	EPA 8081 and EPA 8082	See Table 7b	175
Total Laboratory Cost for Analyzing the Receiving Water Sample			**$741**

Table 6a. Detection and Reporting Limits for individual metals included in the Metals Scan of sediment samples.

Metal	Detection Limit (mg/kg)	Reporting Limit (mg/kg)	Metal	Detection Limit (mg/kg)	Reporting Limit (mg/kg)
Aluminum	13	50	Lead	13	50
Antimony	10	30	Magnesium	3	10
Arsenic	10	30	Manganese	1	5
Beryllium	0.25	5	Mercury	0.1	0.5
Cadmium	0.2	1	Nickel	1	5
Calcium	14	50	Selenium	10	30
Chromium	1	3	Silver	1	3
Copper	1	5	Thallium	10	30
Cyanide	1	5	Zinc	2	10
Iron	11	50			

Table 6b. Detection and Reporting Limits for individual metals included in the Metals Scan of elutriate and receiving water samples.

Metal	Detection Limit (µg/l)	Reporting Limit (µg/l)	Metal	Detection Limit (µg/l)	Reporting Limit (µg/l)
Aluminum	25	75	Lead	0.5	2
Antimony	0.5	2	Magnesium	1,000	3,000
Arsenic	1	3	Manganese	2	10
Beryllium	2	5	Mercury	0.02	0.1
Cadmium	0.2	1	Nickel	10	30
Calcium	1,000	3,000	Selenium	1	3
Chromium	1	10	Silver	1	3
Copper	1	5	Thallium	0.5	2
Cyanide	8	20	Zinc	10	30
Iron	7	20			

Table 7a. Detection and Reporting Limits for individual parameters included in the Organochlorine Pesticide and PCB Scan of sediment samples.

Parameter	Detection Limit (µg/kg)	Reporting Limit (µg/kg)	Parameter	Detection Limit (µg/kg)	Reporting Limit (µg/kg)
DDE	0.8	9.9	Alpha-BHC (alpha-Lindane)	0.4	5.1
DDD	0.7	9.9	Beta-BHC (beta-Lindane)	1.0	5.1
DDT	1.0	9.9	Delta-BHC (delta-Lindane)	1.8	5.1
Methoxychlor	1.2	5.1	Gamma-BHC (gamma-Lindane)	0.6	5.1
Aldrin	0.7	5.1	Gamma-Chlordane	0.8	5.1
Dieldrin	0.7	9.9	PCB - Aroclor1016	10	50
Endosulfan 1	0.7	5.1	PCB - Aroclor1260	10	50
Endosulfan 2	0.8	9.9	PCB - Aroclor1221	10	50
Endosulfan Sulfate	1.0	9.9	PCB - Aroclor1248	10	50
Endrin	1.0	9.9	PCB - Aroclor1268	10	50
Endrin Aldehyde	1.0	9.9	PCB - Aroclor1232	10	50
Endrin Ketone	0.8	9.9	PCB - Aroclor1254	10	50
Heptachlor	0.6	5.1	PCB - Aroclor1242	10	50
Heptachlor Epoxide	0.8	5.1	PCB - Aroclor1262	10	50
Alpha-Chlordane	0.8	5.1			

Table 7b. Detection and Reporting Limits for individual parameters included in the Organochlorine Pesticide and PCB Scan of water samples.

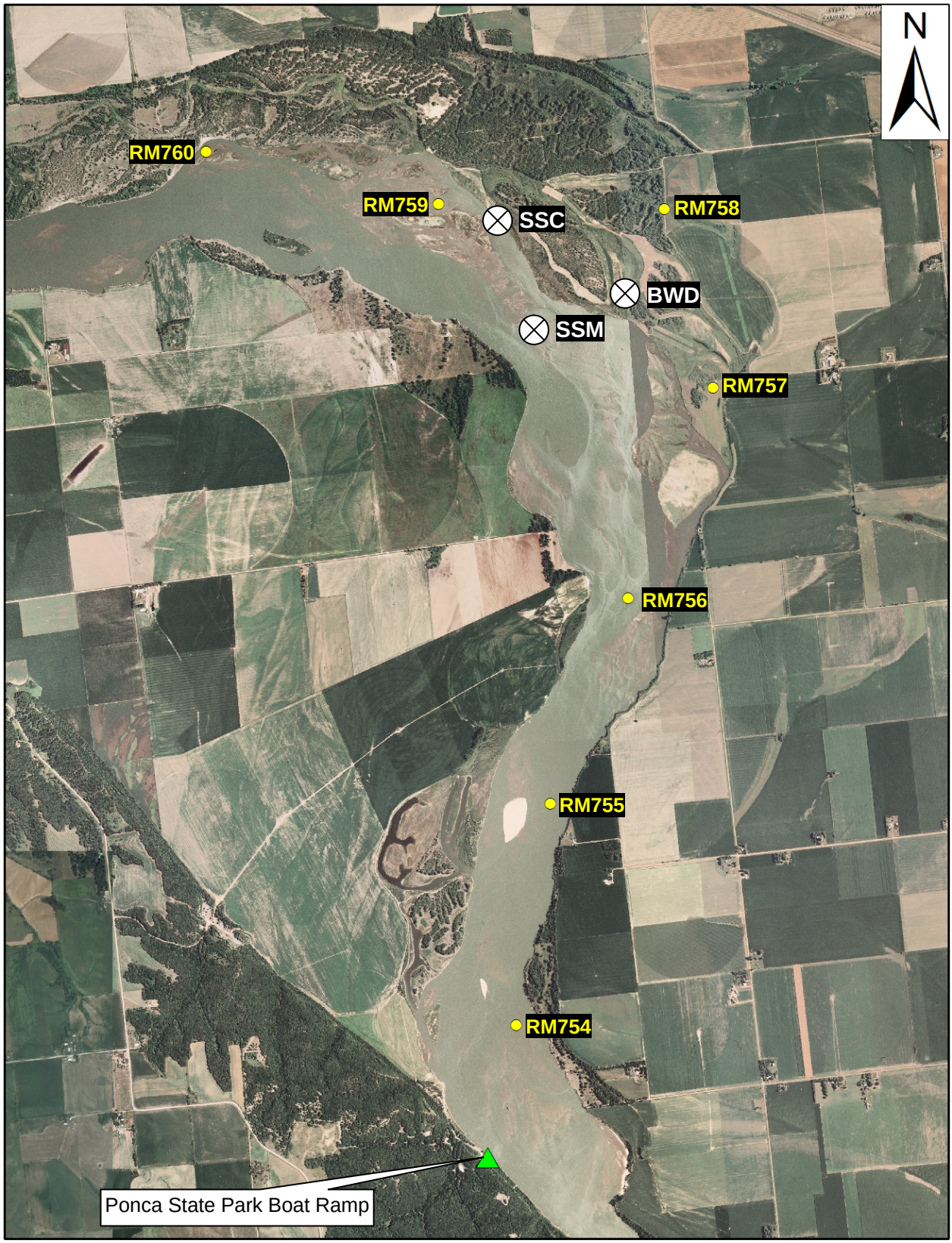
Parameter	Detection Limit (µg/l)	Reporting Limit (µg/l)	Parameter	Detection Limit (µg/l)	Reporting Limit (µg/l)
DDE	0.005	0.1	Alpha-BHC (alpha-Lindane)	0.009	0.05
DDD	0.005	0.1	Beta-BHC (beta-Lindane)	0.009	0.05
DDT	0.004	0.1	Delta-BHC (delta-Lindane)	0.014	0.05
Methoxychlor	0.005	0.5	Gamma-BHC (gamma-Lindane)	0.035	0.05
Aldrin	0.008	0.5	Gamma-Chlordane	0.006	0.05
Dieldrin	0.004	0.1	PCB - Aroclor1016	0.2	1.0
Endosulfan 1	0.006	0.05	PCB - Aroclor1260	0.2	1.0
Endosulfan 2	0.003	0.1	PCB - Aroclor1221	0.2	2.0
Endosulfan Sulfate	0.010	0.1	PCB - Aroclor1248	0.3	1.0
Endrin	0.003	0.1	PCB - Aroclor1268	0.3	1.0
Endrin Aldehyde	0.011	0.1	PCB - Aroclor1232	0.2	1.0
Endrin Ketone	0.006	0.1	PCB - Aroclor1254	0.2	1.0
Heptachlor	0.009	0.05	PCB - Aroclor1242	0.2	1.0
Heptachlor Epoxide	0.007	0.05	PCB - Aroclor1262	0.2	1.0
Alpha-Chlordane	0.011	0.05			

7. REFERENCES

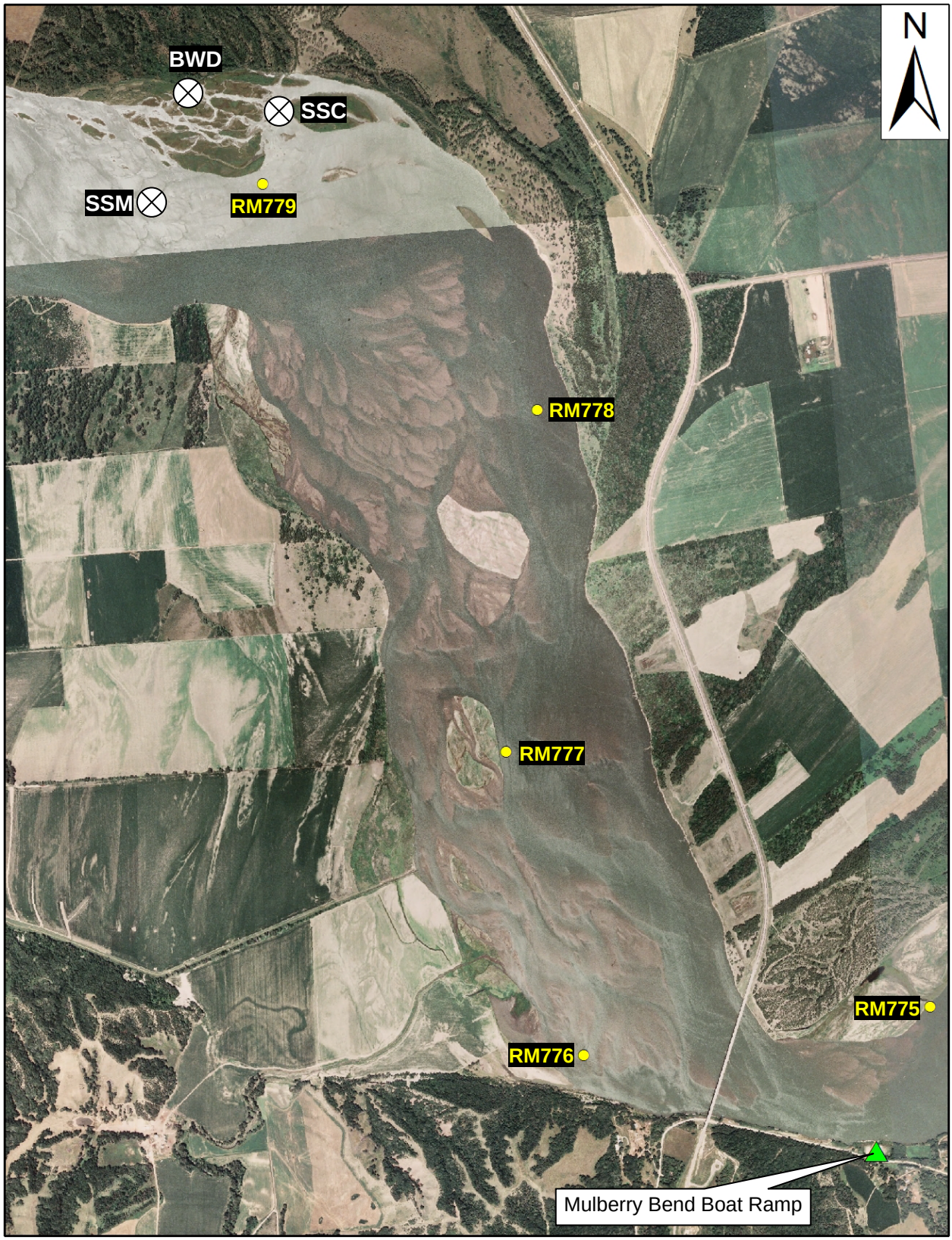
USEPA and USACE. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Test Manual: Inland Testing Manual. EPA-823-B-98-004, February 1998. U.S. Environmental Protection Agency, Office of Water. Department of Army, U.S. Army Corps of Engineers. Washington, D.C

USACE. 2008. Using a "Hydrolab DS4a and DS5" to directly Measure Water Quality. October 2008. Water Quality Unit, Water Control and Water Quality Section, Hydrologic Engineering Branch, Engineering Division, Omaha District, U.S. Army Corps of Engineers. Omaha, Nebraska.

ATTACHMENT 1. Potential sampling locations at RM757.



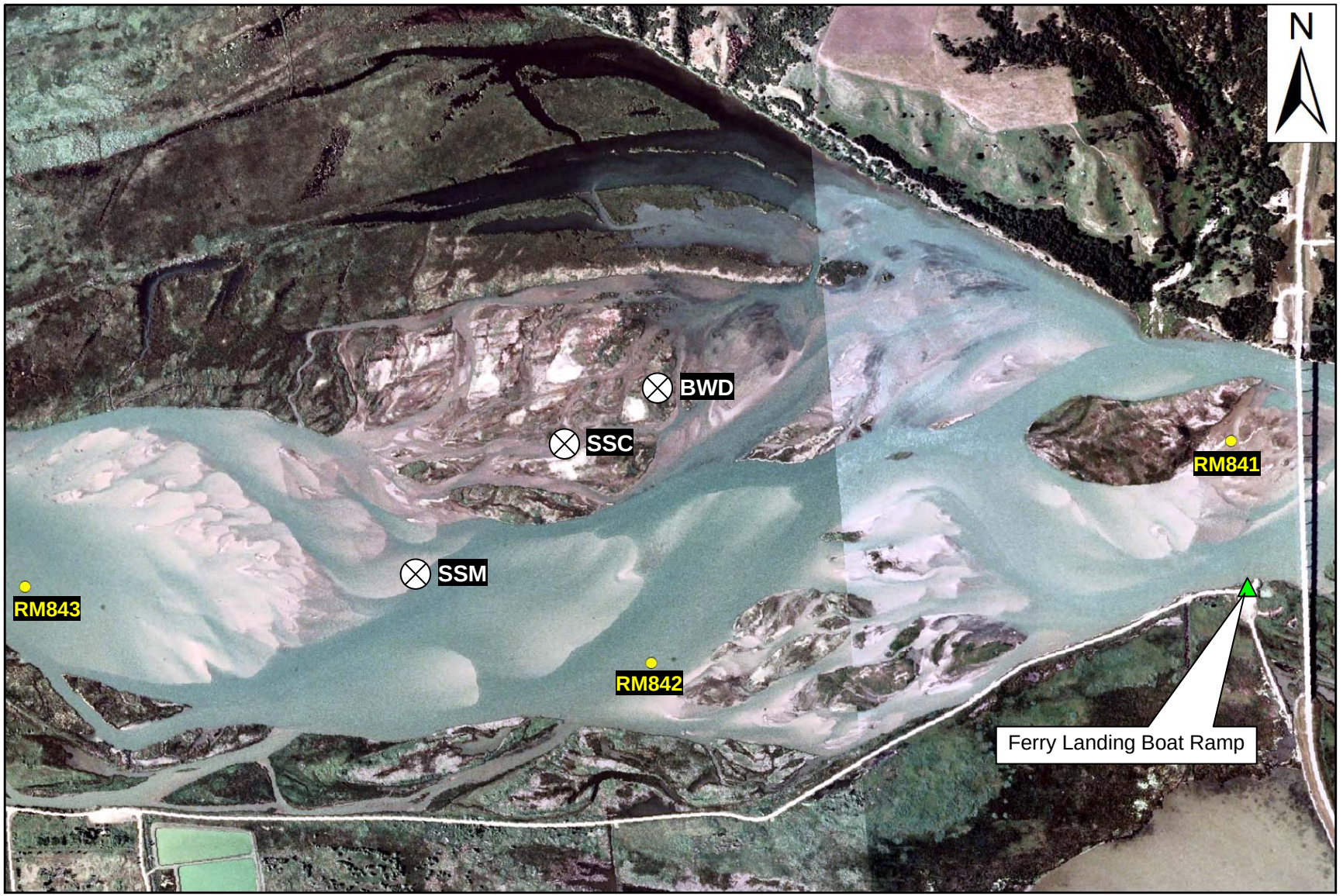
ATTACHMENT 2. Potential sampling locations at RM779.



ATTACHMENT 3. Potential sampling locations at RM801.

ATTACHMENT 4. Potential sampling locations at RM828.

ATTACHMENT 5. Potential sampling locations at RM842.



ATTACHMENT 6. Potential sampling locations at RM852.

ATTACHMENT 7. Potential sampling locations at RM867.

Attachment 8A. Field Sheet for Elutriate Sampling for ESH Creation.
(U.S. Army Corps of Engineers – Omaha District – Water Quality Unit)

FIELD DATA SHEET

Project Name: ESH Creation - Fort Randall Dam to Ponca, NE **Project Number:** SPS-ESHSED-001

Trip Number: _____ **Date:** _____

Site Location: Segment 10 of Missouri River

Site Numbers: RM757, RM779, and RM801

Collectors: _____

GPS MEASUREMENTS

GPS Device Used: _____

RM757 (SSM): Latitude: _____ Longitude: _____

RM757 (SSC): Latitude: _____ Longitude: _____

RM757 (BWD): Latitude: _____ Longitude: _____

RM779 (SSM): Latitude: _____ Longitude: _____

RM779 (SSC): Latitude: _____ Longitude: _____

RM779 (BWD): Latitude: _____ Longitude: _____

RM801 (SSM): Latitude: _____ Longitude: _____

RM801 (SSC): Latitude: _____ Longitude: _____

RM801 (BWD): Latitude: Longitude:

WATER MEASUREMENTS

Site	Temp. (°C)	D.O. (mg/l)	D.O. (% Sat)	pH (S.U.)	Cond. (umho/cm)	ORP (mV)	Turbidity (NTUs)	Chlorophyll (ug/l)
RM757								
RM779								
RM801								

SAMPLES COLLECTED

Sample Type	Sample ID	Sampled Depth	Collection Time	Sampling Method
Water	RM757	Surface		Grab
Sediment	RM757SSM			Composite Core
Sediment	RM757SSC			Composite Core
Sediment	RM757BWD			Composite Core
Water	RM779	Surface		Grab
Sediment	RM779SSM			Composite Core
Sediment	RM779SSC			Composite Core
Sediment	RM779BWD			Composite Core
Water	RM757	Surface		Grab
Sediment	RM801SSM			Composite Core
Sediment	RM801SSC			Composite Core
Sediment	RM801BWD			Composite Core

Attachment 8B. Field Sheet for Elutriate Sampling for ESH Creation.
(U.S. Army Corps of Engineers – Omaha District – Water Quality Unit)

FIELD DATA SHEET

Project Name: ESH Creation - Fort Randall Dam to Ponca, NE **Project Number:** SPS-ESHSED-001

Trip Number: _____ **Date:** _____

Site Location: Segment 9 of Missouri River

Site Numbers: RM828, RM842

Collectors: _____

GPS MEASUREMENTS

GPS Device Used: _____

RM828 (SSM): Latitude: _____ Longitude: _____

RM828 (SSC): Latitude: _____ Longitude: _____

RM828 (BWD): Latitude: _____ Longitude: _____

RM842 (SSM): Latitude: _____ Longitude: _____

RM842 (SSC): Latitude: _____ Longitude: _____

RM842 (BWD): Latitude: _____ Longitude: _____

WATER MEASUREMENTS

Site	Temp. (°C)	D.O. (mg/l)	D.O. (% Sat)	pH (S.U.)	Cond. (umho/cm)	ORP (mV)	Turbidity (NTUs)	Chlorophyll (ug/l)
RM828								
RM842								

SAMPLES COLLECTED

Sample Type	Sample ID	Sampled Depth	Collection Time	Sampling Method
Water	RM828	Surface		Grab
Sediment	RM828SSM			Composite Core
Sediment	RM828SSC			Composite Core
Sediment	RM828BWD			Composite Core
Water	RM842	Surface		Grab
Sediment	RM842SSM			Composite Core
Sediment	RM842SSC			Composite Core
Sediment	RM842BWD			Composite Core
Sediment	RM842SPLIT			Composite Core

Split Sample Site: RM842SSC

Attachment 8C. Field Sheet for Elutriate Sampling for ESH Creation.
(U.S. Army Corps of Engineers – Omaha District – Water Quality Unit)

FIELD DATA SHEET

Project Name: ESH Creation - Fort Randall Dam to Ponca, NE **Project Number:** SPS-ESHSED-001

Trip Number: _____ **Date:** _____

Site Location: Segment 8 of Missouri River

Site Numbers: RM852, RM867

Collectors: _____

GPS MEASUREMENTS

GPS Device Used: _____

RM852 (SSM): Latitude: _____ Longitude: _____

RM852 (SSC): Latitude: _____ Longitude: _____

RM852 (BWD): Latitude: _____ Longitude: _____

RM867 (SSM): Latitude: _____ Longitude: _____

RM867 (SSC): Latitude: _____ Longitude: _____

RM867 (BWD): Latitude: _____ Longitude: _____

WATER MEASUREMENTS

Site	Temp. (°C)	D.O. (mg/l)	D.O. (% Sat)	pH (S.U.)	Cond. (umho/cm)	ORP (mV)	Turbidity (NTUs)	Chlorophyll (ug/l)
RM852								
RM867								

SAMPLES COLLECTED

Sample Type	Sample ID	Sampled Depth	Collection Time	Sampling Method
Water	RM852	Surface		Grab
Sediment	RM852SSM			Composite Core
Sediment	RM852SSC			Composite Core
Sediment	RM852BWD			Composite Core
Water	RM867	Surface		Grab
Sediment	RM867SSM			Composite Core
Sediment	RM867SSC			Composite Core
Sediment	RM867BWD			Composite Core

Attachment 9A. Analytical Request Form for Elutriate Sampling for ESH Creation.
(U.S. Army Corps of Engineers – Omaha District – Water Quality Unit)

ANALYTICAL REQUEST FORM

Project Name: ESH Creation **Project Number:** SPS-ESHSED-001

Trip Number: _____

Samples to be Analyzed:

Site Number	Sample Description	Sample Identification Number	Collection Date	Collection Time	Number of Sample Containers
RM757	Missouri River Receiving Water	RM757NS			13*
RM757SSM	Sediment Sample	RM757SSM			1
RM757SSC	Sediment Sample	RM757SSC			1
RM757BWD	Sediment Sample	RM757BWD			1
RM779	Missouri River Receiving Water	RM779NS			13*
RM779SSM	Sediment Sample	RM779SSM			1
RM779SSC	Sediment Sample	RM779SSC			1
RN779BWD	Sediment Sample	RN779BWD			1
RM801	Missouri River Receiving Water	RM801NS			13*
RM801SSM	Sediment Sample	RM801SSM			1
RM801SSC	Sediment Sample	RM801SSC			1
RM801BWD	Sediment Sample	RM801BWD			1

* Assuming 1-gallon containers **Total Number of Sample Containers Delivered to Lab:** _____

Samples Collected By: _____

Samples Delivered By: _____

Samples Received By: _____ **Date/Time Received:** _____

REQUESTED LABORATORY ANALYSES				
Parameter (See SAP for detection and reporting limits)	**Sediment**	**Standard Elutriate Water**	**Pre-Elutriate Water**	**Receiving Water**
PHYSICAL AND AGGREGATE PROPERTIES				
Particle Size	X			
Alkalinity, Total	X	X		X
Color		X		X
Oxidation-Reduction Potential	X			
pH	X	X		
Total Dissolved Solids		X		X
Total Suspended Solids			X	X
Turbidity			X	
NUTRIENTS				
Ammonia, Total as N	X	X	X	X
Kjeldahl Nitrogen, Total as N	X	X	X	X
Nitrate/Nitrite, Total as N	X	X	X	X
Phosphorus, Dissolved		X		X
Phosphorus, Total	X		X	X
Ortho-Phosphorous, Dissolved		X		X
AGGREGATE ORGANIC CONSTITUENTS				
Chemical Oxygen Demand	X	X		X
Chlorophyll *a* (corrected)				X
Dissolved Organic Carbon		X		X
Total Organic Carbon	X		X	X
Trihalomethane Formational Potential		X	X	X
METALS				
Metals Scan	X	X		X
PESTICIDES AND PCBs				
Organochlorine Pesticide and PCB Scan	X	X		X

Attachment 9B. Analytical Request Form for Elutriate Sampling for ESH Creation.
(U.S. Army Corps of Engineers – Omaha District – Water Quality Unit)

ANALYTICAL REQUEST FORM

Project Name: ESH Creation **Project Number:** SPS-ESHSED-001

Trip Number: _____

Samples to be Analyzed:

Site Number	Sample Description	Sample Identification Number	Collection Date	Collection Time	Number of Sample Containers
RM828	Missouri River Receiving Water	RM828NS			13*
RM828SSM	Sediment Sample	RM828SSM			1
RM828SSC	Sediment Sample	RM828SSC			1
RM828BWD	Sediment Sample	RM828BWD			1
RM842	Missouri River Receiving Water	RM842NS			13*
RM842SSM	Sediment Sample	RM842SSM			1
RM842SSC	Sediment Sample	RM842SSC			1
RN842BWD	Sediment Sample	RN842BWD			1

* Assuming 1-gallon containers

Total Number of Sample Containers Delivered to Lab: _____

Samples Collected By: _____

Samples Delivered By: _____

Samples Received By: _____ **Date/Time Received:** _____

REQUESTED LABORATORY ANALYSES				
Parameter (See SAP for detection and reporting limits)	**Sediment**	**Standard Elutriate Water**	**Pre-Elutriate Water**	**Receiving Water**
PHYSICAL AND AGGREGATE PROPERTIES				
Particle Size	X			
Alkalinity, Total	X	X		X
Color		X		X
Oxidation-Reduction Potential	X			
pH	X	X		
Total Dissolved Solids		X		X
Total Suspended Solids			X	X
Turbidity			X	
NUTRIENTS				
Ammonia, Total as N	X	X	X	X
Kjeldahl Nitrogen, Total as N	X	X	X	X
Nitrate/Nitrite, Total as N	X	X	X	X
Phosphorus, Dissolved		X		X
Phosphorus, Total	X		X	X
Ortho-Phosphorous, Dissolved		X		X
AGGREGATE ORGANIC CONSTITUENTS				
Chemical Oxygen Demand	X	X		X
Chlorophyll *a* (corrected)				X
Dissolved Organic Carbon		X		X
Total Organic Carbon	X		X	X
Trihalomethane Formational Potential		X	X	X
METALS				
Metals Scan	X	X		X
PESTICIDES AND PCBs				
Organochlorine Pesticide and PCB Scan	X	X		X

Attachment 9C. Analytical Request Form for Elutriate Sampling for ESH Creation.
(U.S. Army Corps of Engineers – Omaha District – Water Quality Unit)

ANALYTICAL REQUEST FORM

Project Name: ESH Creation **Project Number:** SPS-ESHSED-001

Trip Number: _____

Samples to be Analyzed:

Site Number	Sample Description	Sample Identification Number	Collection Date	Collection Time	Number of Sample Containers
RM852	Missouri River Receiving Water	RM852NS			13*
RM852SSM	Sediment Sample	RM852SSM			1
RM852SSC	Sediment Sample	RM852SSC			1
RM852BWD	Sediment Sample	RM852BWD			1
RM867	Missouri River Receiving Water	RM867NS			13*
RM867SSM	Sediment Sample	RM867SSM			1
RM867SSC	Sediment Sample	RM867SSC			1
RN867BWD	Sediment Sample	RN867BWD			1

* Assuming 1-gallon containers

Total Number of Sample Containers Delivered to Lab: _____

Samples Collected By: _____

Samples Delivered By: _____

Samples Received By: _____ **Date/Time Received:** _____

REQUESTED LABORATORY ANALYSES				
Parameter (See SAP for detection and reporting limits)	**Sediment**	**Standard Elutriate Water**	**Pre-Elutriate Water**	**Receiving Water**
PHYSICAL AND AGGREGATE PROPERTIES				
Particle Size	X			
Alkalinity, Total	X	X		X
Color		X		X
Oxidation-Reduction Potential	X			
pH	X	X		
Total Dissolved Solids		X		X
Total Suspended Solids			X	X
Turbidity			X	
NUTRIENTS				
Ammonia, Total as N	X	X	X	X
Kjeldahl Nitrogen, Total as N	X	X	X	X
Nitrate/Nitrite, Total as N	X	X	X	X
Phosphorus, Dissolved		X		X
Phosphorus, Total	X		X	X
Ortho-Phosphorous, Dissolved		X		X
AGGREGATE ORGANIC CONSTITUENTS				
Chemical Oxygen Demand	X	X		X
Chlorophyll *a* (corrected)				X
Dissolved Organic Carbon		X		X
Total Organic Carbon	X		X	X
Trihalomethane Formational Potential		X	X	X
METALS				
Metals Scan	X	X		X
PESTICIDES AND PCBs				
Organochlorine Pesticide and PCB Scan	X	X		X