

Saratoga Survey and Sampling Report

Waukesha County, Wisconsin



Prepared for:

City of Waukesha

November 2019

Saratoga Survey and Sampling Report

Waukesha County, Wisconsin



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- Attachment 1 Sediment Sampling Plan
- Attachment 2 Conceptual Dredge Drawings
- Attachment 3 Cost Estimate
- Attachment 4 Sample Analytical Results

Introduction

In preparation to potentially dredge Saratoga Lake (Fox River), the City of Waukesha worked with Ayres Associates to sample deposited lake bed sediments, measure lake bed depths and estimate the volume of deposited sediment that could be removed. The information included in this report will assist the City of Waukesha with developing a dredging plan and will provide information to be included in a WDNR pre application permit submittal for lake dredging.



Methods

A sediment sampling plan was prepared and submitted to the Wisconsin Department of Natural Resources (WDNR) in September 2018. The WDNR reviewed the plan and it was approved on September 24, 2018. A copy of the approved plan is included in Attachment 1.

A bathymetric survey of the lake was completed on October 3, 2018. The soundings were obtained using a 235 Sonarmite BT kHz Echosounder and positioned with a submeter Trimble 6000 Series GeoXH GPS. The survey area was between the West Moreland Boulevard Bridge to the Saratoga Dam. The water surface elevation for Saratoga Lake was based on the National Geodetic Survey benchmark (OM0112) set vertically in the northeast corner of Waukesha Family Practice Center building, elevation 819.6 NAVD88. A level loop with was done to determine the water surface elevation of 811.47 NAVD88. The water surface was higher than normal due to recent large rain events. See Attachment 2 for the 2018 bathymetric contours and typical native lake bed cross sections.

Six sediment sample was collected with an AMS multistage sediment sampler with three samples located within the sediment expected to be dredged and three sample located in the native bed expected to be remain after dredging. The samples were visually classified and then sent to Pace Analytical Laboratories for physical and chemical testing. The results of the tested samples are summarized on Table 1 and the lab reports are included in Attachment 4.

The lake bed was probed until refusal along cross sections within the proposed dredge area. This was done to estimate the depth of the deposited sediment in each lake. Estimates of the volume of deposited sediment are shown on page 5 of the Conceptual Dredge Drawings in Attachment 2.

Results

Sediment Volume Results

Sediment depth probes were conducted along several cross sections within the lake. Survey poles were lowered to the top of the sediment and the depth was recorded. The survey poles were then pushed into the sediment until refusal and that measurement was recorded. Both measurements were measured from the water surface. The probe locations were geolocated within our hydrosurvey software, HYPACK. The sediment probes were done on several cross sections within the proposed dredge area, see page 4 of the Conceptual Dredge Drawings in Attachment 2.

The original river channel was at elevation approximately 801 at the north end of the project area, between elevation 802 and 803 on the middle and southern (downstream) end of proposed dredging project. At the north end of project sediment thickness is between four and eight feet, two to six feet in the middle section and less than two foot at downstream southern limits.

The dredge volumes were calculated using the drafting program AutoCAD Civil 3D. An existing bed surface was created for the proposed dredge area from the bathymetric survey data. An assumed native lake bed surface was also created from the sediment probe cross section data. A volume surface was created comparing the existing top of sediment surface to the assumed native lake bed surface. The dredge volumes were calculated from the comparison surface. Ayres estimates approximately 65,000 cubic yards are available to be dredged if dredging occurs to the assumed native lake bed.

Sample Testing Results

Six sediment samples were collected by Ayres Associates in 2018 and sent to Pace Laboratories in Minneapolis, Minnesota for testing. The below table shows only the detects that exceed NR 720 limits. See Attachment 4 for the complete lab testing results.

Table 1: Saratoga Lake Sediment Sampling							Non-Industrial Direct Contact RCL	Industrial Direct Contact RCL	Ground Water RCL	Back ground Threshold Value
October 3, 2018 Samples										
Detects Only										
Detects Only	Sample									
	1	2	3	4	5	6				
Arsenic	31.8	18.3	22.1	13.6	15.6	15.4	0.677	3	0.584	8
Cadmium	3.4	0.97 J	0.88 J	0.92 J			71.1	985	0.752	1
Lead	281	66.4	60.0	38.8			400	800	27.	52
Nickel	48.7	18.1	21.4	20.1	14.4	18.9	1,550.	22,500.	13.0612	31
Benzo(a)anthracene	2.80	20.1					1.14	20.8	NA	NA
Benzo(a)pyrene	2.81	19.5	0.522	1.02	0.134		0.115	2.11	0.47	NA
Benzo(b)fluoranthene	3.62	23.9	0.685	1.51			1.15	21.1	0.4781	NA
Chrysene	2.72	19.8	0.506	1.04			115	2110	0.1442	NA
Dibenz(a,h)anthracene	0.436	3.46		0.180			0.115	2.11	NA	NA
Indeno(1,2,3-cd)pyrene	1.63	10.7					1.15	21.1	NA	NA
Naphthalene		1.49					5.52	24.1	0.6582	NA
Cumulative										
Exceedance Count	6	6	1	4	2	1				
Hazard Index	1.19969	1.9617	0.1333	0.5684	0.5258	0.5075				
Cumulative Cancer Risk	8.50E-05	2.8E-04	8.3E-06	3.6E-05	2.7E-05	2.5E-05				
NR720 Groundwater RCL Exceedence										
NR 720 Non Industrial Exceedence										
NR 720 Industrial Exceedence										
All results in mg/kg, equivalent to PPM										

Proposed Dredging and Disposal Options

During the survey in October 2018 the water elevation was 811.47. Top of sediment elevations averaged 808, which results in about 3.5 feet of water column. Estimated historic river bed elevation, based on sediment probe refusal, is elevation 802 at north end of project and 805 at south end. We recognize that the river bed elevation at the downstream end of the project is higher than upstream. We theorize this is because sediment at the downstream end has compacted over time and elevation 805 is not the pre-dam river bed. Typically, the DNR limits dredging to the native lake/river bed. A case could be made to allow dredging deeper than elevation 805 at the southern end of project, however this material may also be difficult to remove with a hydraulic dredge. The proposed dredging limits shown in Attachment 2 dredge the Fox River to the elevation of firm sediment versus what was the pre-dam river channel. The proposed dredging limits will result in an increase in water column of approximately 9.5 feet at north upstream end of dredging limits and 6.5 feet at south end of project.

Dredging is typically completed by either mechanical or hydraulic dredging. Mechanical dredging is often done after a reservoir drawdown and completed in winter. Hydraulic dredging is typically completed in summer season. The stop logs in the Saratoga Dam spillway can be removed, which will partially dewater the reservoir, however with recent climactic events with above average precipitation

and the limited number of stoplog bays in the dam, much of the sediment to be dredged would not be dewatered to allow mechanical dredging. Therefore, dredging will likely have to be completed at normal pool, which is typically done hydraulically.

Hydraulic dredging uses a suction/cutting head to remove sediment from the water body. A slurry of approximately 50% water and 50% sediment is pumped by the dredge to a staging area where the material can be dewatered and then transported to final disposal site. If the disposal site is close enough to sediment source, it is possible to pump the slurry to the final disposal site, however for the Saratoga project, no nearby disposal sites are available.

It is possible to mechanically dredging without dewatering. This is typically done from barges and using barges to transport sediment to an off-loading area. Turbidity control is more difficult when mechanically dredging is done under full pool and this option may not be allowed by the WDNR. This option, if desired, would need to be evaluated during the pre-permit application process.

The proposed dredging limits are detailed in the Attachment 2 drawings. If the project would be hydraulically dredged, a staging area nearby the reservoir is needed. A proposed dewatering/staging area is shown in the drawings in Attachment 2. Within this area the sediment is typically pumped into dewatering bags (or other dewatering method) where the sediment can dewater enough to be trucked to the disposal site. The City of Waukesha has researched available disposal sites and at this time, the only available disposal locations are to dispose of the sediment in a landfill.

Cost Estimate

To dredge 65,000 cubic yards hydraulically, Ayres estimates the project to cost in the 6 million to 7-million-dollar range. Cost can range greatly for dredging projects, but Ayres estimates \$20 - \$25 per cubic yard for hydraulic dredging and \$10 - \$15 for mechanical dredging. These dollar amounts are based on recent hydraulic and mechanically dredge projects Ayres has been involved with the last few years. To dispose of dredge material at a landfill, Ayres reached out to Waste Management and Advanced Disposal for budgetary pricing of sediment disposal. Waste Management has a budgetary price of \$36.50 per ton. Advanced Disposal's budgetary price range of \$15 to \$40 per ton. Ayres is assuming 1 cubic yard of sediment will weigh approximately 1.3 tons (variable due to water content). See Attachment 3 for the detailed cost breakdown and pricing proposals from the landfill representatives.

Recommendations

Disposing of the sediment within a landfill is the costliest disposal option for this sediment. If a non-landfill site can be located, the estimated project costs would likely decrease, but without an alternative site available, a landfill may be the only option. The Ayres environmental team reviewed the results and recommended a suitable method of disposal of the contaminated material would be land spreading with a two-foot thick cap of clean fill material, but this method must be approved by the DNR. If the City of Waukesha can locate a non-landfill disposal site, estimated projects will likely decrease. After the dredging method and disposal method is determined, a pre dredging application can be submitted to the DNR to start the permitting process.

Attachment 1
Sediment Sampling Plan

September 20, 2018

Craig Helker
Water Resources Management Specialist
Wisconsin Department of Natural Resources
craig.helker@wisconsin.gov

Re: Saratoga Lake Sediment Sampling and Analysis Plan

Dear: Mr. Helker,

The purpose of this letter is to submit a sampling and analysis plan for sediment that is planned to be removed due to a proposed upcoming Saratoga Impoundment Dredging project. The sampling is planned to occur concurrently with a sediment profile survey. The sediment profile survey will provide a basis for estimating a potential volumetric range of sediment that will be removed during the dredging.

Please approve or advise modifications to the attached sediment sampling and analysis plan.

If the plan is approved, the completed sampling report and analytical results will be submitted to your office.

Sincerely,

Ayres Associates Inc

A handwritten signature in black ink, appearing to read "Rob Wayne".

Rob Wayne
Environmental Scientist
715.831.7506
WayneR@AyresAssociates.com

**Sediment Sampling and Analysis Plan
Saratoga Lake – Waukesha County, WI**

Preliminary Application Summary, per NR 347.05:

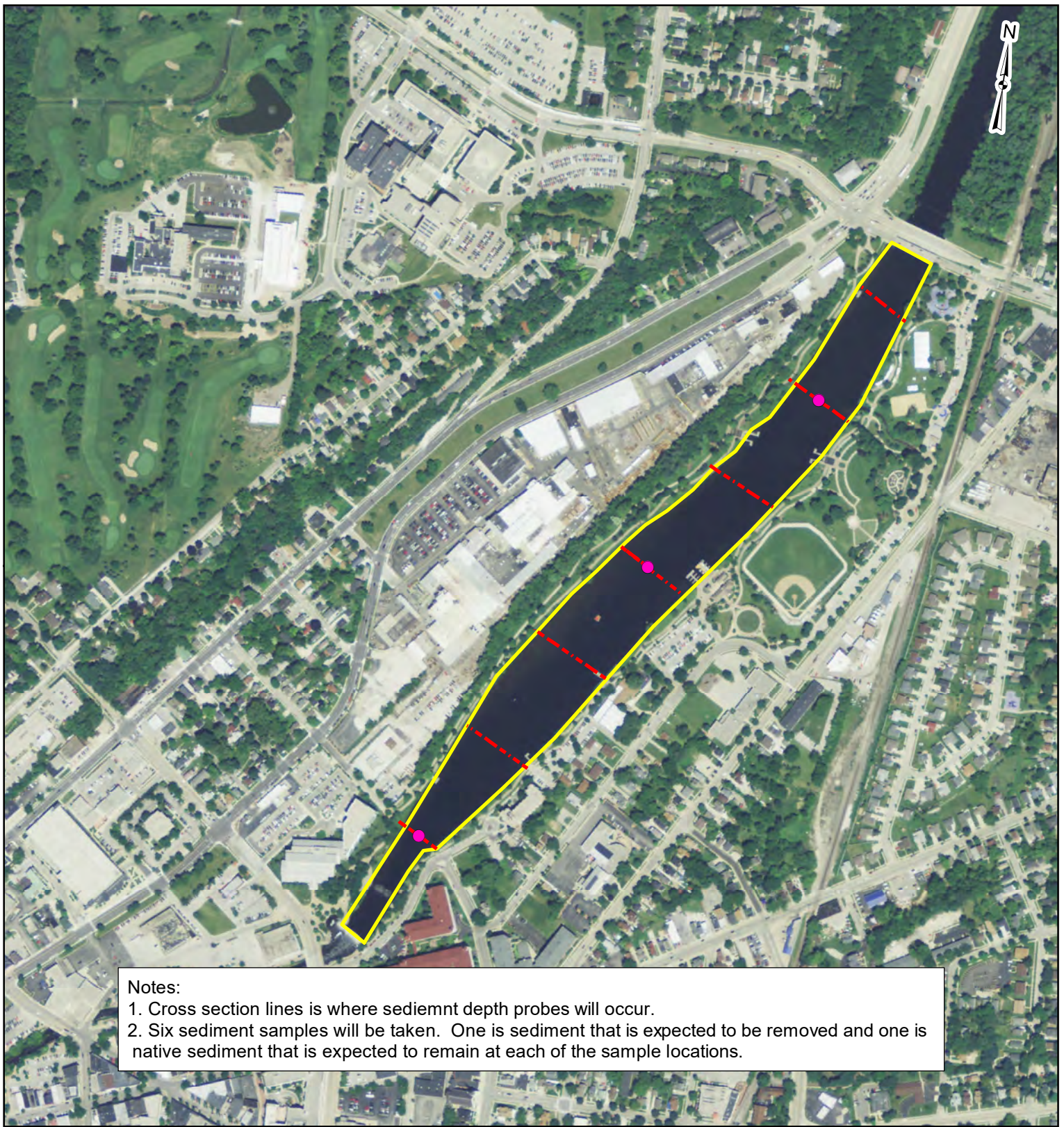
- Name of waterbody and project location:
 - Saratoga Lake/Fox River – Located in City of Waukesha, WI
- Volume of material to be dredged:
 - TBD, if any at all. Purpose of this study is to determine the volumetric build-up of sediment in Saratoga Lake for possible future dredging of Saratoga Lake.
- Dredging method and equipment:
 - TBD
- Disposal method:
 - TBD
- Brief description of known historical chemical use in the waterbody for vegetation / algae control, including year, chemical, and amount applied:
 - It is unknown if any chemicals were used.
 - Most land in the Saratoga Lake watershed is and historically has been residential and agricultural.
- Any previous sediment sampling:
 - 1993 Sediment Sampling
- Copy of a map showing area to be dredged, depth of cut, and proposed sediment sampling site, bathymetry of area to be dredged:
 - See attached map for proposed sediment sampling locations. Bathymetry of existing Saratoga Lake to be mapped based on concurrent sediment profile survey planned to be completed with the sediment sampling work.
- Anticipated starting and completion dates of the proposed project:
 - Preliminary Design by November 2018.

Sampling and Analysis Plan:

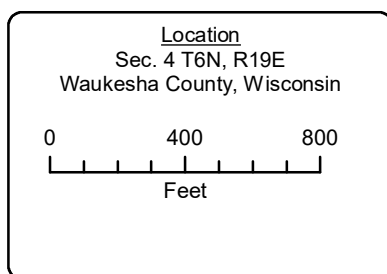
- Parameters to be analyzed for, including analytical methods and detection levels:
 - See highlighted rows in attached Table 1.
- Updated sampling location map:
 - See attached map. Proposed locations for sediment sampling and analysis as well as sediment survey profiling are outlined on the map. Exact locations may vary due to field conditions.
- Planned sectioning of cores at each sample location:
 - Two samples will be taken at the sample location point identified on attached map. One sample will be taken in the sediment that is expected to be dredged and one sample will be taken in the lake bed that is expected to remain after sediment removal.
 - At each cross-section line, a probe will be extended to the bottom of the impoundment to measure elevation of the bed. Then, the probe will be hand-pushed into the sediment until refusal to measure depth to 'hard bottom'.
- Sampling methods and sample handling procedures:
 - Sampling will be done from a boat in October 2018.
 - Sampling will be completed in accordance with section 6.2 of the attached document, *Guidance for Applying the Sediment Sampling and Analysis Requirements of Chapter NR 347, Wisconsin Administrative Code*.

Project: 26-1083.00 File: v:\wr-ec\waukesha\saratoga dam dredging\sediment sampling plan\saratoga dam sampling plan.docx

- Analytical laboratory certified under NR 149, Adm. Code to conduct parameter analysis.
 - Samples will be tested at a WI DNR approved lab.
 - Pace Analytical Services, LLC in Minneapolis, MN



Sediment Sample Plan Saratoga Dam



Legend

- Sediment Sample Location
- Survey Limits
- Probe Cross Sections

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Table 1. Sediment Sampling Parameters with Suggested Methods and Analyses

Parameter	Suggested Analytical Method (Suggested Detection Level) (mg/kg, dry weight unless noted)	Suggested Base Parameter Analyses ¹	
		Great Lakes or Urban/ Industrial	Inland Waters (Rural/ Forested)
Inorganics – Metals			
Arsenic	SW-846 3050B/6010B EPA 6010 or 7060 (5)	X	X
Barium	SW-846 3050B/6010B (0.2)		
Cadmium	SW-846 3050B/6010B EPA 7131 (0.6)	X	X
Chromium (total)	SW-846 3050B/6010B EPA 6010 or 7191 (0.6)	X	X
Copper	SW-846 3050B/6010B EPA 6010 or 7211 (0.5)	X	X
Cyanide	SW-846 9010B/9014 (0.4)		
Lead	SW-846 3050B/6010B EPA 6010 or 7421 (3)	X	X
Manganese	SW-846 3050B/6010B (0.1)		
Mercury	SW-846 7471A EPA 7471 (0.015)	X	X
Nickel	SW-846 3050B/6010B EPA 6010 (2)	X	X
Selenium	SW-846 3050B/6010B (8)	X	
Zinc	SW-846 3050B/6010B EPA 6010 or 7951 (2)	X	X
Inorganics – Nutrients			
Oil & Grease	SW-846 9070	X	
Total Phosphorus	EPA 365.2/365.3 or USGS I-6600-85 (9.9)	X	X
Nitrate + Nitrite	LACHAT 12-107-04-1-B (0.25)	X	X
Ammonia-Nitrogen	LACHAT 12-107-06-1-A (0.16)	X	X
Total Kjeldahl Nitrogen		X	X
Organics			
Aldrin	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		
Chlordane	SW-846 8081 EPA 8081, 354440B, 3541 (0.009)	X	
Dieldrin	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		
Endrin	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		
Heptachlor	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		
Lindane (Gamma BHC)	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)		

¹ Suggested base parameter list reflects additions to NR347 Table 1, based on scientific research and experience with dredging projects.

Parameter	Suggested Analytical Method (Suggested Detection Level) (mg/kg, dry weight unless noted)	Suggested Base Parameter Analyses ¹	
		Great Lakes or Urban/ Industrial	Inland Waters (Rural/ Forested)
DDT	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)	X	
DDD & DDE	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)	X	
Toxaphene	SW-846 8081 (0.01)		
PCBs (Total)	SW-846 8081 EPA 8081, 3540B, 3541 (0.04)	X	X
		Tied to Fish Advisories	
2,3,7,8-dioxin, 2,3,7,8-furan and 15 2,3,7,8-substituted dioxin and furan congeners	EPA 8290 (1 – 10 pg/g)		
Total Organic Carbon	SW 846 8081 SW846-EPA 9060 (0.2%)	X	X
Polycyclic Aromatic Hydrocarbons (PAHs)	EPA 8310	X	
Naphthalene	(0.019)		
Phenanthrene	(0.017)		
Pyrene	(0.012)		
Fluorene	(0.058)		
2-Methylnaphthelene			
Acenaphthene	(0.017)		
Acenaphthylene	(0.021)		
Anthracene	(0.0071)		
Benzo (a) anthracene	(0.019)		
Benzo (a) pyrene	(0.023)		
Benzo (e) pyrene			
Benzo (b) fluoranthene	(0.032)		
Benzo (g,h,i) perylene	(0.022)		
Benzo (k) fluoranthene	(0.021)		
Chrysene	(0.0074)		
Dibenzo(a,h)anthracene	(0.008)		
Fluoranthene	(0.029)		
Indeno (1,2,3-cd) pyrene	(0.034)		
Physical Tests			
Particle Size Analysis – Sieve and Hydrometer Analysis	ASTM D-422 (%)	X	X
Moisture Content	ASTM D-2216 (%)	X	X
Atterburg Limits (Liquid Limit and Plastic Limit)	ASTM D4318 (as moisture content)		
Specific Gravity	ASTM D-854 (Ratio, unitless)		

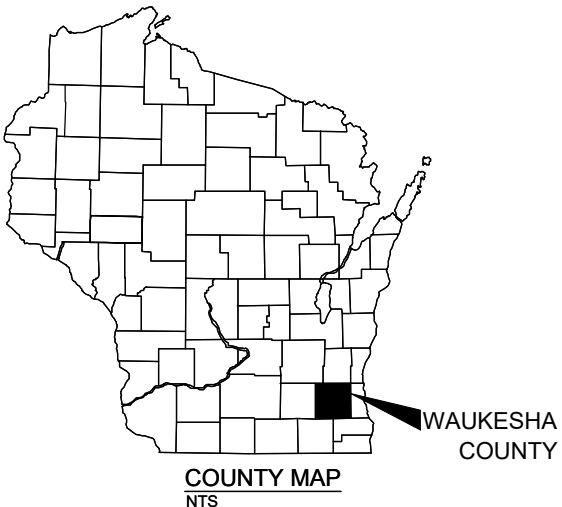
Attachment 2
Conceptual Dredge Drawings

SARATOGA CONCEPTUAL DREDGING PLANS

CITY OF WAUKESHA

WAUKESHA COUNTY, WISCONSIN

NOVEMBER 2019



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WAUKESHA COUNTY, WISCONSIN



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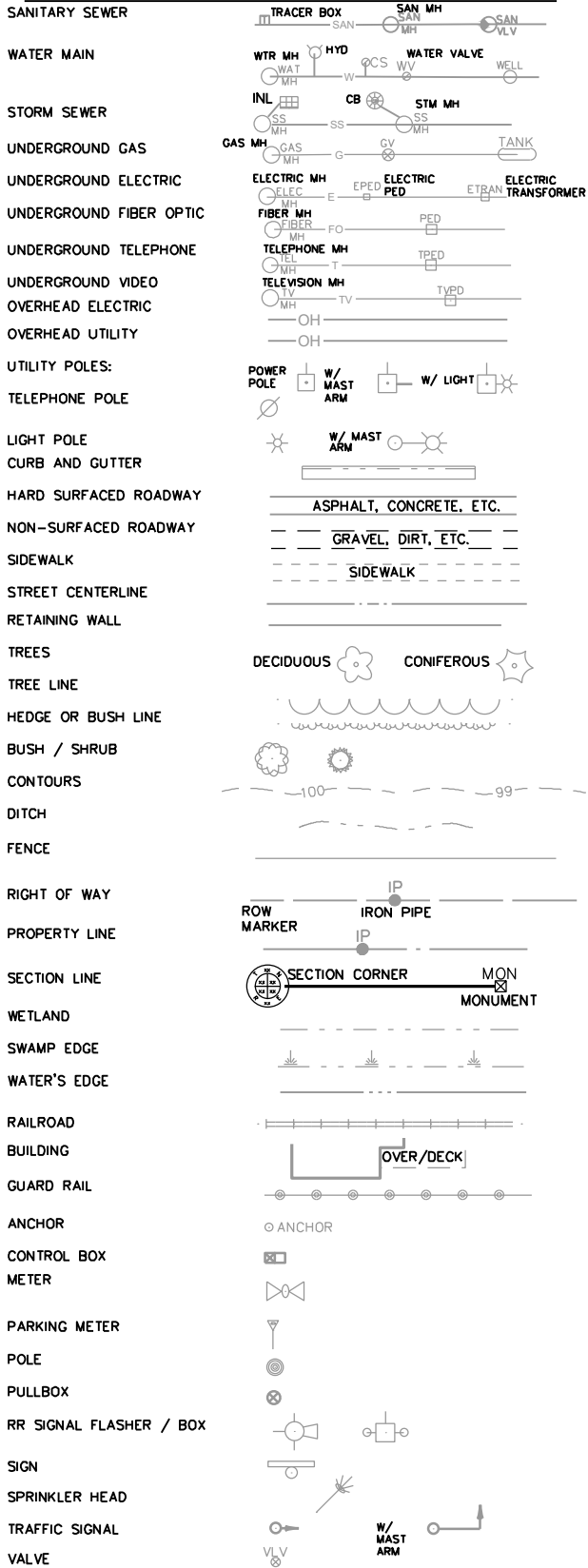
SARATOGA CONCEPTUAL DREDGING PLANS
CITY OF WAUKESHA
WAUKESHA COUNTY, WISCONSIN



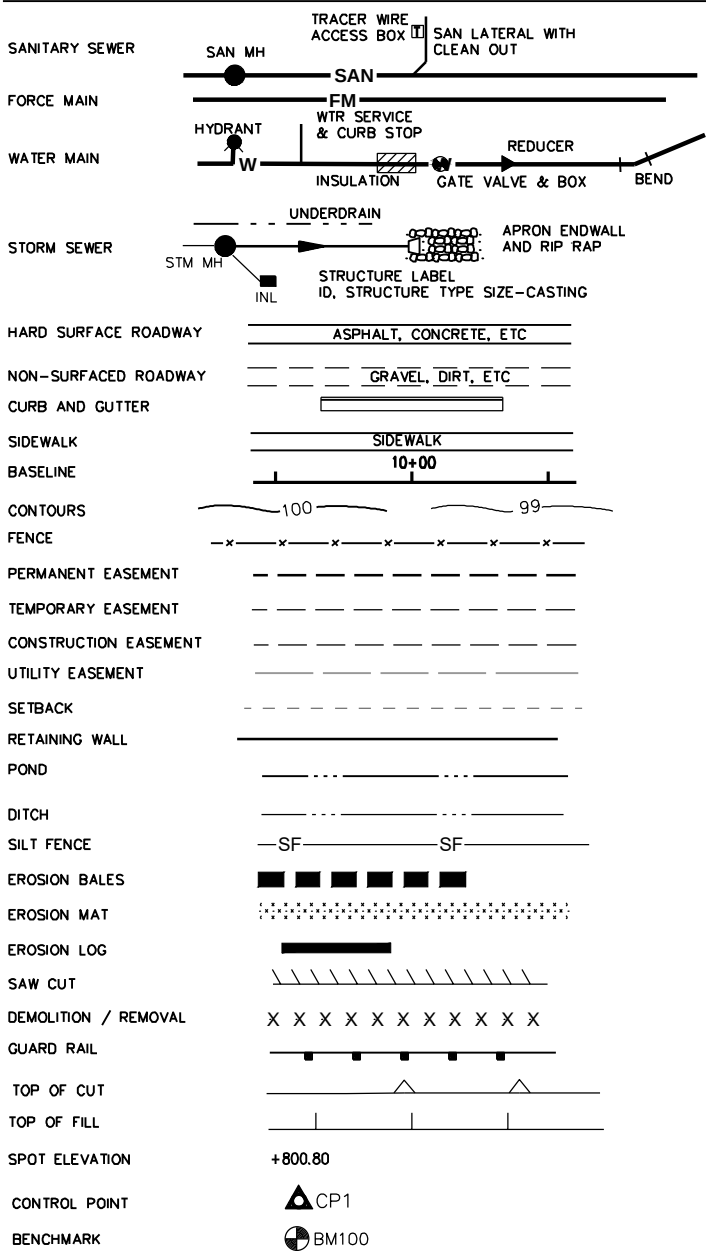
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EXISTING



NEW



ABBREVIATIONS:

AB	ANCHOR BOLT	DEFL	DEFLECTION	ID	INSIDE DIAMETER	PC	POINT OF CURVE	T&B	TOP & BOTTOM
ABV	ABOVE	DEG / °	DEGREE	IF	INSIDE FACE	PE	PRIVATE ENTRANCE	TC	TOP OF CURB
ADJ	ADJUST	DF	DRINKING FOUNTAIN	IN (")	INCHES	PED	PEDESTAL	TELE	TELEPHONE
AFF	ABOVE FINISHED FLOOR	DI	DUCTILE IRON	INCL	INCLUDE	PERF	PERFORATE	THK	THICKNESS
AL	ALUMINUM	DIA	DIAMETER	INF	INFLUENT	PI	POINT OF INTERSECTION	THRU	THROUGH
ALT	ALTERNATE WITH	DIM	DIMENSION	INL	INLET	PKG	PARKING	TP	TELEPHONE POLE
ALT/	ALTERNATE	DISCH	DISCHARGE	INSUL	INSULATION	P	PLATE	TYP	TYPICAL
APPROX	APPROXIMATE	DN	DOWN	INT	INTERIOR	PL	PLACE	T/	TOP OF
ASPH	ASPHALT	DP	DEPTH	INV	INVERT	PL R	PROPERTY LINE		
AUTO	AUTOMATIC	DR	DOOR	IP	IRON PIPE	PP	POWER POLE	UG	UNDERGROUND GAS
AVE	AVENUE	DTL	DETAIL	IPS	IRON PIPE SIZE	PSF	POUNDS PER SQUARE FOOT	UE	UNDERGROUND ELECTRICAL
@	AT	DW	DRIVEWAY			PSI	POUNDS PER SQUARE INCH	UNEXC	UNEXCAVATED
		DWG	DRAWING	JT	JOINT	PT	POINT OF TANGENCY	UNO	UNLESS NOTED OTHERWISE
B CRS	BASE COURSE			KGV	KNIFE GATE VALVE	PV	PLUG VALVE	USH	UNITED STATES HIGHWAY
BC	BACK OF CURB	E	EAST			PVC	POLYVINYL CHLORIDE	UT	UNDERGROUND TELEPHONE
BD	BOARD	EA	EACH	LAB	LABORATORY	PVMT	PAVEMENT	UV	UNDERGROUND VIDEO
BEL	BELOW	EF	EACH FACE	LAV	LAVATORY	PW	POTABLE WATER		
BETWN	BETWEEN	EFF	EFFLUENT	LC	LENGTH OF CURVE	%	PERCENT	V	VALVE
BF	BACK FACE	EJ	EXPANSION JOINT	LF	LINEAL FEET	QTY	QUANTITY	V&B	VALVE & BOX
BFV	BUTTERFLY VALVE	EL	ELEVATION	LG	LENGTH	RAD	RADIUS	VAR	VARIABLE
BIT	BITUMINOUS	ELB	ELBOW	LOC	LOCATION	RCP	REINFORCED CONCRETE PIPE	VER	VERTICAL
BLD	BLIND	ELEC	ELECTRICAL	LP	LIGHT POLE	RD	ROAD	VC	VERTICAL CURVE
BLDG	BUILDING	EQ	EQUAL	LR	LONG RADIUS	RDWY	ROADWAY	W	WEST
BLK	BLOCK	EQUIP	EQUIPMENT	LS	LUMP SUM	RED	REDUCER	W/	WITH
BLKG	BLOCKING	ER	END OF RADIUS	LT	LEFT	REF	REFERENCE	W/O	WITHOUT
BLVD	BOULEVARD	EST	ESTIMATE			REINF	REINFORCING	WD	WIDTH
BM	BENCHMARK	EW	EACH WAY	MAS	MASONRY	REM	REMOVE	WM	WATER MAIN
BO	BREAKOFF	EWC	ELECTRIC WATER COOLER	MAX	MAXIMUM	REPL	REPLACE	WS	WATER SURFACE
BRG	BEARING	EX	EXISTING	MECH	MECHANICAL	REQD	REQUIRED	WTP	WATER TREATMENT PLANT
BRK	BRICK	EXH	EXHAUST	MFG	MANUFACTURER	REV	REVISED	WTR	WATER
BS	BACK OF SIDEWALK	EXP	EXPANSION	MH	MANHOLE	RM	ROOM	WWF	WELDED WIRE FABRIC
BTM	BOTTOM	EXT	EXTERIOR	MIN	MINIMUM	RR	RAILROAD	WWM	WOVEN WIRE MESH
BV	BALL VALVE			MISC	MISCELLANEOUS	RT	RIGHT	WWTP	WASTEWATER TREATMENT PLANT
B/	BOTTOM OF	FD	FLOOR DRAIN	MJ	MECHANICAL JOINT	RW	RIGHT OF WAY		
		FDN	FOUNDATION	MP	MID POINT	S	SOUTH		
C&G	CURB AND GUTTER	FERT	FERTILIZER	MTL	MATERIAL	SAN	SANITARY		
CB	CATCH BASIN	F-F	FACE TO FACE	N	NORTH	SAMH	SANITARY MANHOLE		
CF	CUBIC FOOT	FGL	FIBERGLASS	NF	NEAR FACE	SCH	SCHEDULE		
CHKD P	CHECKERED PLATE	FIN	FINISHED	NIC	NOT IN CONTRACT	SEC	SECTION		
CI	CAST IRON	FL	FLOWLINE	NO	NUMBER	SF	SQUARE FOOT		
CJ	CAST IRON	FLG	FLANGED	NOM	NOMINAL	SHT	SHEET		
CL / C	CENTERLINE	FLR	FLOOR	NPW	NON-POTABLE WATER	SIM	SIMILAR		
CHL	CHLORINE	FM	FORCE MAIN	NTS	NOT TO SCALE	SL	SLOPE		
CLG	CEILING	FN	FENCE			SPA	SPACE		
CLR	CLEAR	FT (')	FOOT			SPEC	SPECIFICATION		
CMP	CORRUGATED METAL PIPE	FTG	FOOTING			SQ	SQUARE		
CMU	CONCRETE MASONRY UNIT	FUT	FUTURE			SS	STAINLESS STEEL		
CO	CLEANOUT	G	GAS			SSMH	STORM SEWER MANHOLE		
CONC	CONCRETE	GA	GAGE			ST	STREET		
CONN	CONNECTION	GAR	GARAGE			STD	STANDARD		
CONST	CONSTRUCTION	GEN	GENERAL			STH	STATE TRUNK HIGHWAY		
CONST JT	CONSTRUCTION JOINT	GRD	GRADE, GROUND			STL	STEEL		
CONT	CONTINUOUS	GV	GATE VALVE			STM	STORM		
CONTR	CONTRACTOR	GRAV	GRAVEL			STP	SEWAGE TREATMENT PLANT		
CONTR JT	CONTRACTOR JOINT	GW	GROUNDWATER			SURF	SURFACE		
COR	CORNER	HB	HOSE BIB			SW	SIDEWALK		
CP	CONTROL POINT	HM	HOLLOW METAL			SWR	SEWER		
CPLG	COUPLING	HORZ	HORIZONTAL			SY	SQUARE YARD		
CRS	COURSE	HSE	HOUSE			SYS	SYSTEM		
CSP	CORRUGATED STEEL PIPE	HT	HEIGHT						
CTG	CASTING	HW	HOT WATER						
CTH	COUNTY TRUNK HIGHWAY	HWR	HOT WATER RETURN						
CULV	CULVERT	HYD	HYDRANT						
CV	CHECK VALVE								
CW	COLD WATER								
CY	CUBIC YARD								



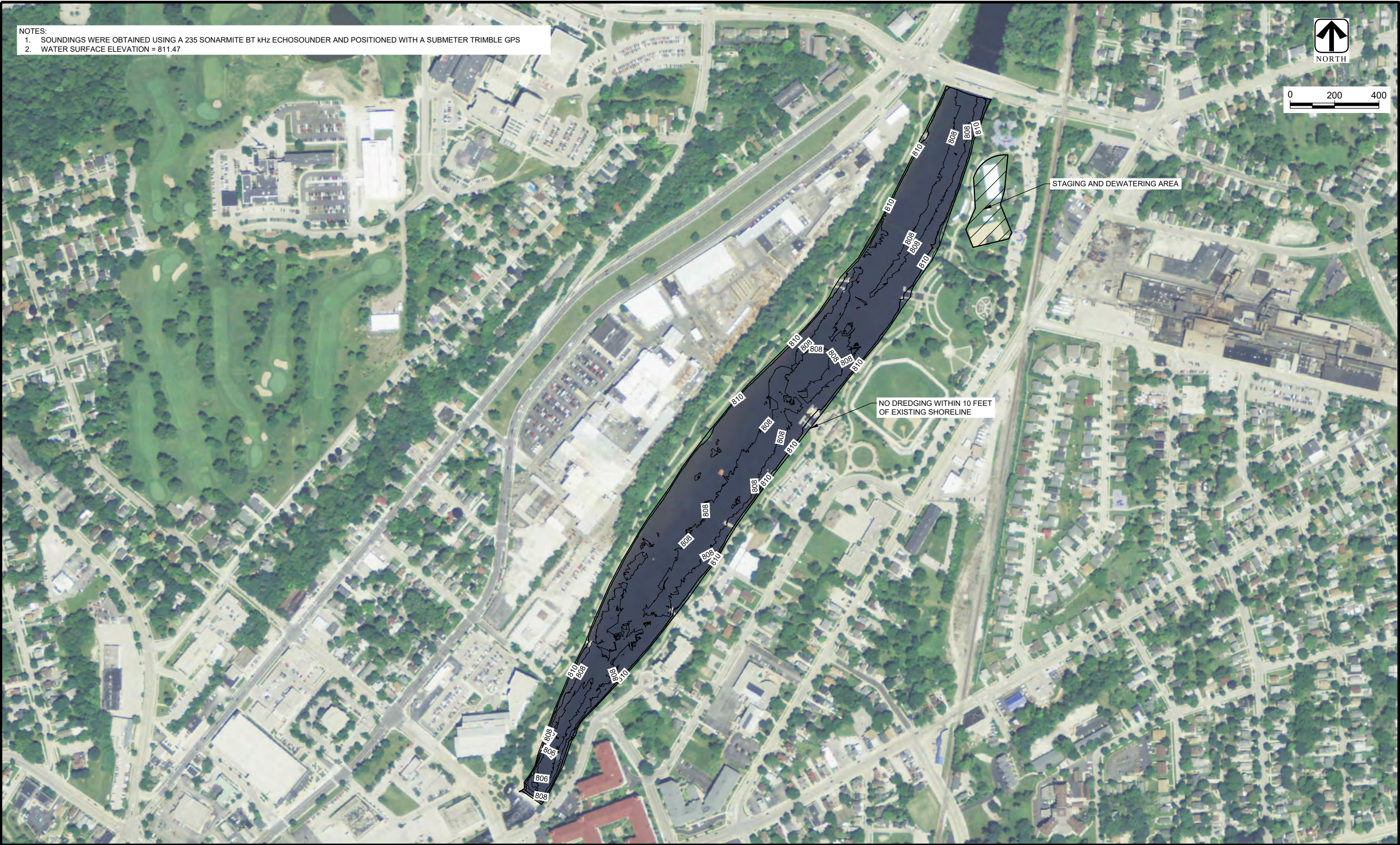
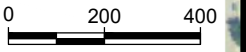
DES BY	CTG	PROJ NO	26-1083.00	NOT FOR CONSTRUCTION			
DR BY	RJW	DATE	NOVEMBER 2019	NO	DATE	NO	DATE
CHK BY	CTG	REVISION		NO	DATE	NO	DATE

SARATOGA CONCEPTUAL DREDGING PLANS
CITY OF WAUKESHA
WAUKESHA COUNTY, WISCONSIN



LEGEND

- NOTES:
1. SOUNDINGS WERE OBTAINED USING A 235 SONARMITE BT kHz ECHOSOUNDER AND POSITIONED WITH A SUBMETER TRIMBLE GPS
 2. WATER SURFACE ELEVATION = 811.47



DES BY	CTG		NOT FOR CONSTRUCTION						
DR BY	RJW	PROJ NO	26-1083.00						
CHK BY	CTG	DATE	NOVEMBER 2019	NO	DATE		REVISION	NO	DATE

SARATOGA CONCEPTUAL DREDGING PLANS
CITY OF WAUKESHA
WAUKESHA COUNTY, WISCONSIN

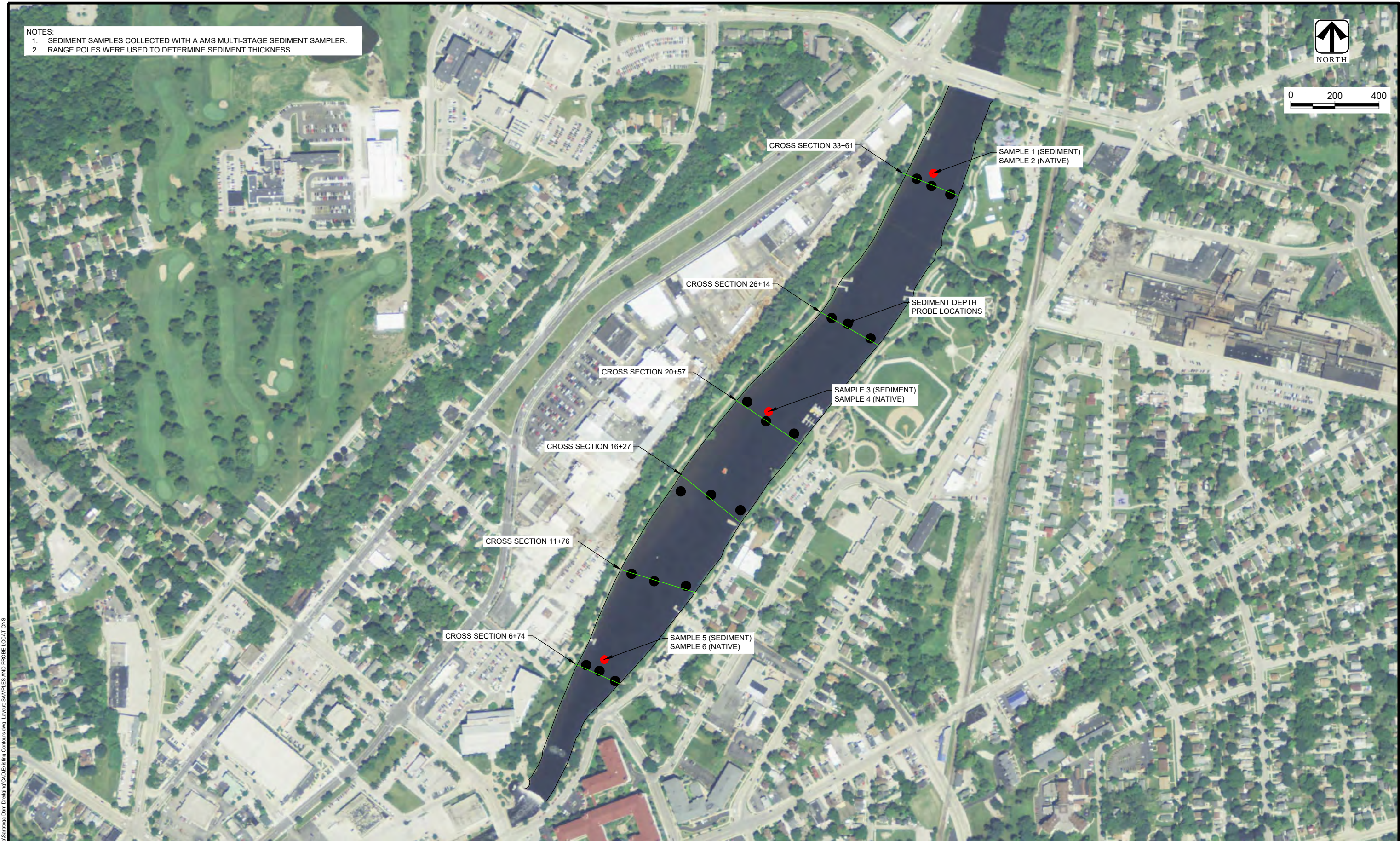
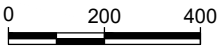


EXISTING CONTOURS

SHEET NO.
3

AA-Standard.snb
11/20/2019
V:\WR-EC\Waukesha\Saratoga Dam Dredging\CA\Existing Contours.dwg, Layout: EXISTING CONTOURS

- NOTES:
1. SEDIMENT SAMPLES COLLECTED WITH A AMS MULTI-STAGE SEDIMENT SAMPLER.
 2. RANGE POLES WERE USED TO DETERMINE SEDIMENT THICKNESS.



AA-Standard.snb
11/20/2019
V:\WR-EC\Waukesha\Saratoga Dam Dredging\CAD\Existing Contours.dwg, Layout: SAMPLES AND PROBE LOCATIONS

DES BY	CTG	PROJ NO							
DR BY	RJW	26-1083.00							
CHK BY	CTG	DATE	NOVEMBER 2019	NO	DATE		REVISION	NO	DATE

SARATOGA CONCEPTUAL DREDGING PLANS
CITY OF WAUKESHA
WAUKESHA COUNTY, WISCONSIN

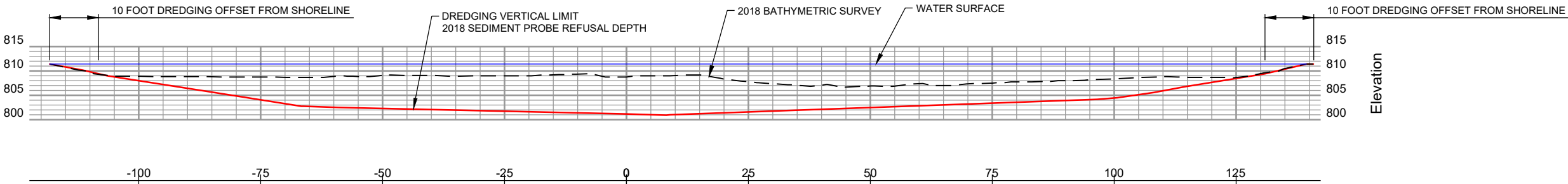


SAMPLES AND PROBE LOCATIONS

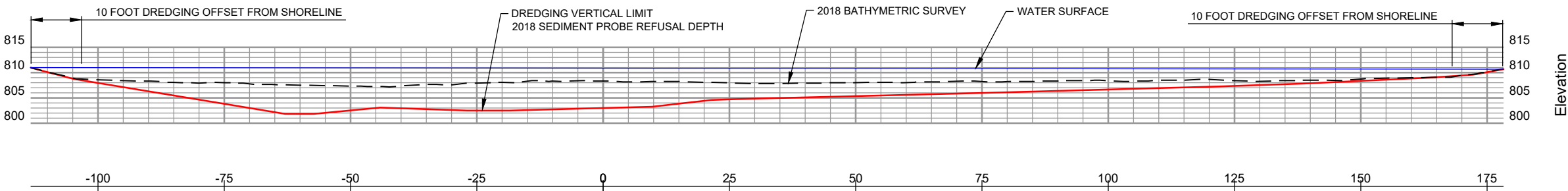
SHEET NO.
4

- NOTES:
- 1. SOUNDINGS WERE OBTAINED USING A 235 SONAR MITE BT kHz ECHOSOUNDER AND POSITIONED WITH A SUBMETER TRIMBLE GPS.
 - 2. WATER SURFACE ELEVATION = 811.47
 - 3. SEDIMENT SAMPLES COLLECTED WITH A AMS MULTI-STAGE SEDIMENT SAMPLER.
 - 4. RANGE POLES WERE USED TO DETERMINE SEDIMENT THICKNESS.
 - 5. APPROXIMATELY 65,000 CY OF SEDIMENT WITHIN SURVEY AREA.
 - 6. NO DREDGING WITHIN 10 FEET OF THE SHORELINE.

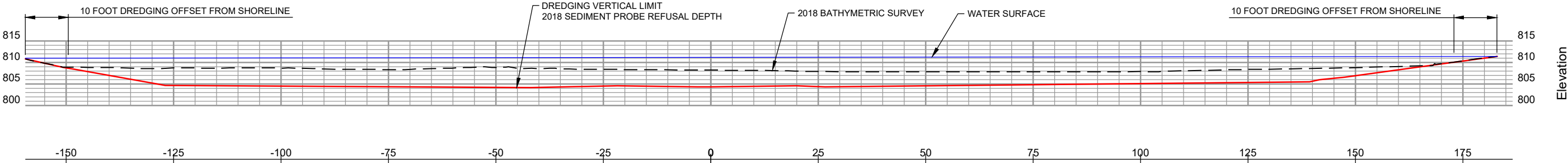
CROSS SECTION 33+61



CROSS SECTION 26+14



CROSS SECTION 20+57



AA-Standard.sib
11/20/2019
V:\WR-EC\Waukesha\Saratoga Dam Dredging\CAD\Existing Contours.dwg, Layout: CROSS SECTIONS

DES BY	CTG	PROJ NO	26-1083.00						
DR BY	RJW	DATE	NOVEMBER 2019	NO	DATE	REVISION	NO	DATE	REVISION
CHK BY	CTG								

SARATOGA CONCEPTUAL DREDGING PLANS
CITY OF WAUKESHA
WAUKESHA COUNTY, WISCONSIN

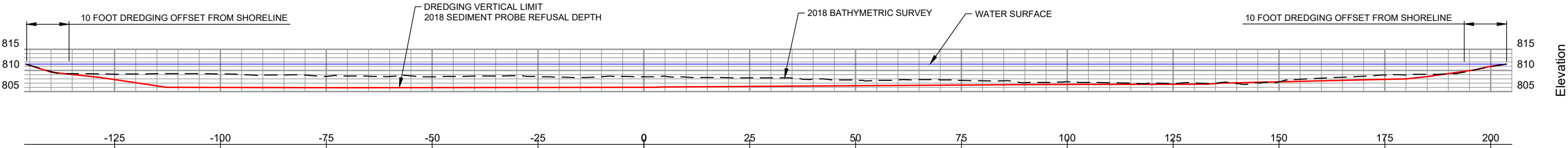


CROSS SECTIONS

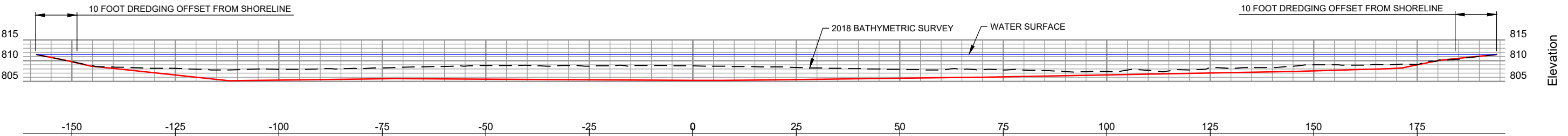
SHEET NO.
5

- NOTES:
- 1. SOUNDINGS WERE OBTAINED USING A 235 SONAR MITE BT kHz ECHOSOUNDER AND POSITIONED WITH A SUBMETER TRIMBLE GPS.
 - 2. WATER SURFACE ELEVATION = 811.47
 - 3. SEDIMENT SAMPLES COLLECTED WITH A AMS MULTI-STAGE SEDIMENT SAMPLER.
 - 4. RANGE POLES WERE USED TO DETERMINE SEDIMENT THICKNESS.
 - 5. APPROXIMATELY 65,000 CY OF SEDIMENT WITHIN SURVEY AREA.
 - 6. NO DREDGING WITHIN 10 FEET OF THE SHORELINE.

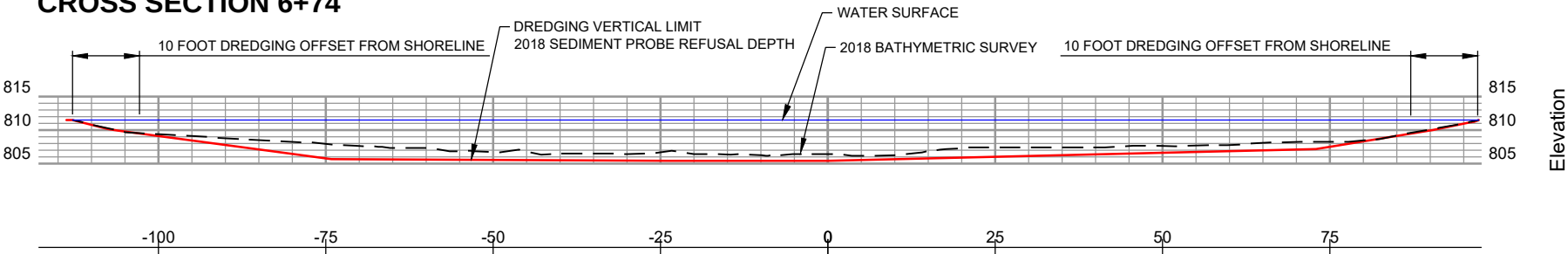
CROSS SECTION 16+27



CROSS SECTION 11+76



CROSS SECTION 6+74



AA-Standard.snb
11/20/2019
I:\26\Waukesha\Saratoga Dam Dredging\CAD\Existing Contours.dwg, Layout: CROSS SECTIONS (2)

DES BY	CTG	PROJ NO	26-1083.00						
DR BY	RJW	DATE	NOVEMBER 2019	NO	DATE	REVISION	NO	DATE	REVISION
CHK BY	CTG								

SARATOGA CONCEPTUAL DREDGING PLANS
CITY OF WAUKESHA
WAUKESHA COUNTY, WISCONSIN



CROSS SECTIONS

Attachment 3
Cost Estimate



Opinion of Probable Cost

Nov-19

Project: Saratoga Dredging
Client: City of Waukesha
Location: Waukesha, WI
Project No.: 26-1083.00

References: 1.) *Heavy Construction Cost Data* . RSMeans. 32th Annual Edition. 2018.

RS Means Item Number and Description	Unit	Quantity	2018 Bare Costs			Total Incl O&P	Total Item Cost Incl O&P	Notes:
			Material	Labor	Equipment	Total		
35 24 13.13 Cutter Suction Dredging								
1500 Hydraulic method, pumped	C.Y.	65000		9.15	7.50	16.65	22.00 \$	1,430,000.00
35 24 23.13 Mobilization								
100 Dredging	Total	1		29,600	28800.00	58,400	76,500 \$	76,500.00
31 23 23.20 Hauling								
1468 12 C.Y. Truck, 35 MPH avg, Cycle 20 miles	C.Y.	65000		3.83	5.65	9.48	11.95 \$	776,750.00
Misc								
Dewatering of Dredged Sediment	C.Y.	65000					10 \$	650,000.00 Previous bids
Landfill Disposal	Ton	84500					36.5 \$	3,084,250.00 Price from Waste Management
Erosion Control (Silt Fence/Turbidity Barriers)	L.S.	1					\$	15,000.00 Previous bids
Site Restoration	L.S.	1					\$	20,000.00 Previous bids
Subtotal for Division 31 - Earthwork =							\$ 6,052,500.00	

Subtotal for All Divisions = \$ 6,052,500.00

Contingency (15%) = \$ 907,875.00

Total Construction Cost = \$ 6,960,375.00



October 3, 2019

Mr Rob Wayne
Ayres & Associates
Eau Claire, WI

Project: City of Waukesha-Fox River Dredge Project, 2020-2021

Dear Rob,

Waste Management of Wisconsin is pleased to provide you with pricing for disposal per your request. Based upon the information provided, the following summarizes our quotation.

DISPOSAL FACILITY:

Orchard Ridge Landfill	Metro Security Landfill
W124 N9355 Boundary Road	10712 S. 124 th Street
Menomonee Falls, WI 53051	Franklin, WI 53132

WASTE STREAMS

Waste Description	Contaminated Dredge Sediment
Estimated Volume	65,000 cubic yards
Disposal Method	Direct Landfill

Estimated Disposal Pricing

Base	\$21.00/ton
WI Generator Tax	\$13.00/ton
Landfill Environmental Fee	\$ 1.50/ton
Disposal Fuel Surcharge	\$ 1.00/ton
ALL IN	\$36.50 per ton
Profile Approval Fee	\$100 (one time) per profile submitted.

Credit Charges (after 45 days)	1.5% of outstanding invoice balance.
--------------------------------	--------------------------------------

SPECIAL CONDITIONS:

Waste must meet acceptability criteria at the site and comply with local, state and federal regulations, as well as the sites permit requirements.



Strength and moisture requirements are:

1. No free liquid—Pass Paint Filter test.
2. Able to
 - a. Support its own weight;
 - b. Support the weight of material placed over it;
 - c. Be capable of being worked and managed by the Disposal Site's low ground pressure bulldozers.

The dredge material must be dewatered as necessary to pass the paint filter test prior to disposal. The dredge material must be transported in leak proof and covered trucks to prevent leakage and air borne transport of sediments.

The dredge material must be stabilized and received in a soil like consistency that allows Orchard Ridge Landfill, or Metro Security landfill to follow the regulatory requirements of placing the material in a manner such that it supports its own weight, supports the weight of other materials placed over it without slumping, and maintains the integrity and stability of the landfill slopes.

ANALYTICAL TESTING REQUIREMENTS:

Complete and submit profile with analytical testing attached – submit online www.wmsolutions.com

***Pricing is contingent upon review and approval of profile submittal along with full lab testing results.**

Customers must have a current Waste Management Industrial Service Agreement.

Pricing is open for consideration for a period of 30 days. Upon acceptance, pricing remains in effect up to and including 60 days from the date of the quote. Pricing based solely on the information available at this time. Additional information may be required prior to approval.

Please do not hesitate to contact me at the phone number below with any questions you may have or if you require any further assistance.

Sincerely,
Brian

Brian Smith
Industrial Account Manager
Manufacturing & Industrial
Bsmith45@WM.com
414-793-0232

From: [Scott Kleinhans](#)
To: [Wayne, Robert](#)
Subject: RE: Dredging Disposal Quote
Date: Tuesday, August 27, 2019 2:37:35 PM
Attachments: [image001.png](#)

Wayne,

There are several issues that will affect the potential pricing. Moisture content, material strength and daily volume intake are three of the biggest. With that said, I can give you a range for budgetary purposes.

The stronger and dryer the material is the lower the cost. If we have to do any type of special handling, monofiling or drainage, the pricing will go up.

For budget purposes, you can use \$15-\$40/T for disposal. Again, this is very preliminary and will depend greatly on what the material ends up looking like coming to the landfill.

Please feel free to reach out with any other questions.

Thanks,

Scott Kleinhans | Landfill Sales



Advanced Disposal Emerald Park Landfill, LLC
W124 S10629 S. 124th St. | Muskego | WI 53150
T: 414-529-1360 | F: 414-529-1478 | M: 414-807-7101 | E: scott.kleinhans@advanceddisposal.com

Advanced Disposal Mallard Ridge Landfill, Inc.
W8470 State RD 11 | Delavan | WI 53115
T: 262-724-3257 | F: 262-724-5479

Connect with us: AdvancedDisposal.com [Facebook](#) [YouTube](#)



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From: Wayne, Robert [mailto:WayneR@AyresAssociates.com]
Sent: Tuesday, August 27, 2019 2:11 PM
To: Scott Kleinhans <scott.kleinhans@advanceddisposal.com>
Subject: RE: Dredging Disposal Quote

We are still in the conceptual phase but it is anticipated to start in 2020 or 2021 and the duration would be approximately 3 months.

Robert J Wayne

Environmental Scientist

Office: 715.834.3161 • Direct: 715.831.7506

WayneR@AyresAssociates.com

www.AyresAssociates.com

From: Scott Kleinhans <scott.kleinhans@advanceddisposal.com>

Sent: Tuesday, August 27, 2019 10:05 AM

To: Wayne, Robert <WayneR@AyresAssociates.com>

Cc: Goodwin, Chris <Goodwinc@AyresAssociates.com>

Subject: RE: Dredging Disposal Quote

Wayne,

I do have a couple questions that revolve around project timing. Any idea on a start date? Thoughts on project duration. If I can get an idea on when things will happen, that will help.

Thanks,

Scott Kleinhans | Landfill Sales



Advanced Disposal Emerald Park Landfill, LLC

W124 S10629 S. 124th St. | Muskego | WI 53150

T: 414-529-1360 | F: 414-529-1478 | M: 414-807-7101 | E: scott.kleinhans@advanceddisposal.com

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From: Wayne, Robert [<mailto:WayneR@AyresAssociates.com>]

Sent: Tuesday, August 27, 2019 9:26 AM

To: Scott Kleinhans <scott.kleinhans@advanceddisposal.com>

Cc: Goodwin, Chris <Goodwinc@AyresAssociates.com>

Subject: Dredging Disposal Quote

Hi Scott,

We are working with the City of Waukesha on a dredging project in the Fox River and we are looking

into disposal site options for 65,000 CY of contaminated soil.

Can you provide me with a quote for disposing of the sediment?

Attached are the soil testing results.

The conceptual plan for dredging would be to dewater the sediment in geotextile tubes until the acceptable moisture content. What moisture content is acceptable for disposal?

Let me know if you need any additional information.

Thank you,

Rob



Robert J Wayne

Environmental Scientist

Ayres Associates

3433 Oakwood Hills Parkway • Eau Claire, WI 54701-7698

Office: 715.834.3161 • Direct: 715.831.7506

WayneR@AyresAssociates.com

www.AyresAssociates.com

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Attachment 4
Sample Analytical Results

Saratoga Lake Sediment Sampling
October 3, 2018 Samples
Complete Sampling Results

Parameter	Sample					
	1	2	3	4	5	6
Arsenic	31.8	18.3	22.1	13.6	15.6	15.4
Cadmium	3.4	0.97 J	0.88 J	0.92 J	0.35 J	0.31 J
Chromium	104	27.6	30.0	30.0	18.1	22.4
Copper	69.5	69.8	38.4	66.1	25.1	30.1
Lead	281	66.4	60.0	38.8	20.8	23.3
Nickel	48.7	18.1	21.4	20.1	14.4	18.9
Zinc	444	187	157	186	79.3	94.0
Mercury	0.17 J	0.17 J	0.17 J	0.13 J	0.073 J	0.078 J
PCB, Total	<0.0653	<0.0584	<0.0560	<0.0615	<0.0497	<0.0443
PCB-1016 (Aroclor 1016)	<0.0761	<0.0680	<0.0653	<0.0716	<0.0579	<0.0516
PCB-1221 (Aroclor 1221)	<0.0960	<0.0858	<0.0824	<0.0904	<0.0731	<0.0652
PCB-1232 (Aroclor 1232)	<0.109	<0.0976	<0.0937	<0.103	<0.0832	<0.0742
PCB-1242 (Aroclor 1242)	<0.0927	<0.0828	<0.0795	<0.0873	<0.0706	<0.0629
PCB-1248 (Aroclor 1248)	<0.0820	<0.0732	<0.0703	<0.0771	<0.0624	<0.0556
PCB-1254 (Aroclor 1254)	<0.0804	<0.0718	<0.0689	<0.0757	<0.0612	<0.0546
PCB-1260 (Aroclor 1260)	<0.0653	<0.0584	<0.0560	<0.0615	<0.0497	<0.0443
PCB-1262 (Aroclor 1262)	<0.0944	<0.0843	<0.0809	<0.0888	<0.0718	<0.0641
PCB-1268 (Aroclor 1268)	<0.0886	<0.0791	<0.0760	<0.0834	<0.0674	<0.0601
2-Methylnaphthalene	<0.0209	0.420	0.0226	<0.0197	<0.0032	<0.0029
Acenaphthene	0.293	3.55	0.0320	<0.0159	<0.0026	<0.0023
Acenaphthylene	0.405	1.73	0.0319	<0.0193	0.0317	<0.0028
Anthracene	0.799	10.1	0.0891	0.143	0.0244	<0.0026
Benzo(a)anthracene	2.80	20.1	0.440	0.744	0.119	0.0300
Benzo(a)pyrene	2.81	19.5	0.522	1.02	0.134	0.0340
Benzo(b)fluoranthene	3.62	23.9	0.685	1.51	0.175	0.0490
Benzo(e)pyrene	2.07	13.2	0.405	0.819	0.0962	0.0258
Benzo(g,h,i)perylene	1.79	11.9	0.381	0.770	0.0904	0.0245
Benzo(k)fluoranthene	1.57	9.59	0.242	0.599	0.0575	0.0174
Chrysene	2.72	19.8	0.506	1.04	0.131	0.0351
Dibenz(a,h)anthracene	0.436	3.46	0.0792	0.180	<0.0029	<0.0026
Fluoranthene	7.34	51.5	1.11	2.11	0.214	0.0726
Fluorene	0.562	4.35	0.0449	<0.0122	<0.0020	<0.0018
Indeno(1,2,3-cd)pyrene	1.63	10.7	0.310	0.712	0.0741	0.0205
Naphthalene	<0.0319	1.49	<0.0055	<0.0301	<0.0049	<0.0044
Phenanthrene	3.68	35.6	0.418	0.715	0.0539	0.0221
Pyrene	5.76	39.0	0.881	1.56	0.206	0.0651
Cumulative						
Exceedance Count	6	6	1	4	2	1
Hazard Index	1.19969	1.9617	0.1333	0.5684	0.5258	0.5075
Cumulative Cancer Risk	8.50E-05	2.8E-04	8.3E-06	3.6E-05	2.7E-05	2.5E-05

Non-Industrial Direct Contact RCL	Industrial Direct Contact RCL	Ground Water RCL	Back ground Threshold Value
0.677	3	0.584	8
71.1	985	0.752	1
100000	100000	360,000.	44
3,130.	46,700.	91.6	69.5
400	800	27.	52
1,550.	22,500.	13.0612	31
23,500.	100,000.	NA	150
3.13	3.13	0.208	NA
0.234	0.967	0.0094	NA
4.11	28	NA	NA
0.213	0.883	NA	NA
0.19	0.792	NA	NA
0.235	0.972	NA	NA
0.236	0.975	NA	NA
0.239	0.988	NA	NA
0.243	1	NA	NA
NA	NA	NA	NA
NA	NA	NA	NA
239	3010	NA	NA
3590	45200	NA	NA
NA	NA	NA	NA
17900	100000	196.9492	NA
1.14	20.8	NA	NA
0.115	2.11	0.47	NA
1.15	21.1	0.4781	NA
NA	NA	NA	NA
NA	NA	NA	NA
11.5	211	NA	NA
115	2110	0.1442	NA
0.115	2.11	NA	NA
2390	30100	88.8778	NA
2390	30100	14.8299	NA
1.15	21.1	NA	NA
5.52	24.1	0.6582	NA
NA	NA	NA	NA
1790	22600	54.5455	NA

NR720 Groundwater RCL Exceedence

NR 720 Non Industrial Exceedence

NR 720 Industrial Exceedence

All results in mg/kg, equivalent to PPM

Saratoga Lake Sediment Sampling

October 3, 2018 Samples
Detects Only

Non-Industrial Direct Contact RCL	Industrial Direct Contact RCL	Ground Water RCL	Back ground Threshold Value
-----------------------------------	-------------------------------	------------------	-----------------------------

Detects Only	Sample					
	1	2	3	4	5	6
Arsenic	<u>31.8</u>	<u>18.3</u>	<u>22.1</u>	<u>13.6</u>	<u>15.6</u>	<u>15.4</u>
Cadmium	3.4	0.97 J	0.88 J	0.92 J		
Lead	281	66.4	60.0	38.8		
Nickel	48.7	18.1	21.4	20.1	14.4	18.9
Benzo(a)anthracene	<u>2.80</u>	<u>20.1</u>				
Benzo(a)pyrene	<u>2.81</u>	<u>19.5</u>	<u>0.522</u>	<u>1.02</u>	<u>0.134</u>	
Benzo(b)fluoranthene	<u>3.62</u>	<u>23.9</u>	<u>0.685</u>	<u>1.51</u>		
Chrysene	2.72	19.8	0.506	1.04		
Dibenz(a,h)anthracene	<u>0.436</u>	<u>3.46</u>		<u>0.180</u>		
Indeno(1,2,3-cd)pyrene	<u>1.63</u>	<u>10.7</u>				
Naphthalene		1.49				

0.677	3	0.584	8
71.1	985	0.752	1
400	800	27.	52
1,550.	22,500.	13.0612	31
1.14	20.8	NA	NA
0.115	2.11	0.47	NA
1.15	21.1	0.4781	NA
115	2110	0.1442	NA
0.115	2.11	NA	NA
1.15	21.1	NA	NA
5.52	24.1	0.6582	NA

Cumulative

Exceedance Count	6	6	1	4	2	1
Hazard Index	1.19969	1.9617	0.1333	0.5684	0.5258	0.5075
Cumulative Cancer Risk	8.50E-05	2.8E-04	8.3E-06	3.6E-05	2.7E-05	2.5E-05

NR720 Groundwater RCL Exceedence

NR 720 Non Industrial Exceedence

NR 720 Industrial Exceedence

All results in mg/kg, equivalent to PPM

October 30, 2018

Peter Haug
Ayres Associates
3433 Oakwood Hills Parkway
Eau Claire, WI 54701

RE: Project: Saratoga Dam
Pace Project No.: 10450829

Dear Peter Haug:

Enclosed are the analytical results for sample(s) received by the laboratory on October 09, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Bob Michels
bob.michels@pacelabs.com
(612)709-5046
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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CERTIFICATIONS

Project: Saratoga Dam

Pace Project No.: 10450829

Minnesota Certification IDs

1700 Elm Street SE, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #: MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909

Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Certification #: via MN 027-053-137
Minnesota Petrofund Certification #: 1240
Mississippi Certification #: MN00064
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon NwTPH Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #: 74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DW Certification #: 9952 C
West Virginia DEP Certification #: 382
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01

Virginia Minnesota Certification ID's

315 Chestnut Street, Virginia, MN 55792
Montana Certificate #CERT0103
Alaska Certification UST-107
Minnesota Dept of Health Certification #: 027-137-445

North Dakota Certification: # R-203
Wisconsin DNR Certification #: 998027470
WA Department of Ecology Lab ID# C1007

Green Bay Certification IDs

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150

Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Saratoga Dam

Pace Project No.: 10450829

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10450829001	1	Solid	10/03/18 12:30	10/09/18 09:20
10450829002	2	Solid	10/03/18 12:35	10/09/18 09:20
10450829003	3	Solid	10/03/18 12:40	10/09/18 09:20
10450829004	4	Solid	10/03/18 12:45	10/09/18 09:20
10450829005	5	Solid	10/03/18 12:50	10/09/18 09:20
10450829006	6	Solid	10/03/18 12:55	10/09/18 09:20

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Saratoga Dam

Pace Project No.: 10450829

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10450829001	1	EPA 8082A	RAG	12	PASI-M
		EPA 6010	TXW	7	PASI-G
		EPA 7471	AJT	1	PASI-G
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	STB	20	PASI-M
		EPA 350.1	DMB	1	PASI-V
		EPA 351.2	DMB	1	PASI-V
		EPA 353.2	DMB	1	PASI-V
		EPA 365.1	DMB	1	PASI-V
		EPA 9060A	CSD	4	PASI-V
		EPA 8082A	RAG	12	PASI-M
10450829002	2	EPA 6010	TXW	7	PASI-G
		EPA 7471	AJT	1	PASI-G
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	STB	20	PASI-M
		EPA 350.1	DMB	1	PASI-V
		EPA 351.2	DMB	1	PASI-V
		EPA 353.2	DMB	1	PASI-V
		EPA 365.1	DMB	1	PASI-V
		EPA 9060A	CSD	4	PASI-V
		EPA 8082A	RAG	12	PASI-M
		EPA 6010	TXW	7	PASI-G
10450829003	3	EPA 7471	AJT	1	PASI-G
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	STB	20	PASI-M
		EPA 350.1	DMB	1	PASI-V
		EPA 351.2	DMB	1	PASI-V
		EPA 353.2	DMB	1	PASI-V
		EPA 365.1	DMB	1	PASI-V
		EPA 9060A	CSD	4	PASI-V
		EPA 8082A	RAG	12	PASI-M
		EPA 6010	TXW	7	PASI-G
		EPA 7471	AJT	1	PASI-G
10450829004	4	ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	STB	20	PASI-M
		EPA 350.1	DMB	1	PASI-V
		EPA 351.2	DMB	1	PASI-V
		EPA 8082A	RAG	12	PASI-M
		EPA 6010	TXW	7	PASI-G
		EPA 7471	AJT	1	PASI-G
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	STB	20	PASI-M
		EPA 350.1	DMB	1	PASI-V
		EPA 351.2	DMB	1	PASI-V

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Saratoga Dam

Pace Project No.: 10450829

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10450829005	5	EPA 353.2	DMB	1	PASI-V
		EPA 365.1	DMB	1	PASI-V
		EPA 9060A	CSD	4	PASI-V
		EPA 8082A	RAG	12	PASI-M
		EPA 6010	TXW	7	PASI-G
		EPA 7471	AJT	1	PASI-G
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	STB	20	PASI-M
		EPA 350.1	DMB	1	PASI-V
		EPA 351.2	DMB	1	PASI-V
		EPA 353.2	DMB	1	PASI-V
		EPA 365.1	DMB	1	PASI-V
		EPA 9060A	CSD	4	PASI-V
		EPA 8082A	RAG	12	PASI-M
10450829006	6	EPA 6010	TXW	7	PASI-G
		EPA 7471	AJT	1	PASI-G
		ASTM D2974	JDL	1	PASI-M
		EPA 8270D by SIM	STB	20	PASI-M
		EPA 350.1	DMB	1	PASI-V
		EPA 351.2	DMB	1	PASI-V
		EPA 353.2	DMB	1	PASI-V
		EPA 365.1	DMB	1	PASI-V
		EPA 9060A	CSD	4	PASI-V

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 1 **Lab ID: 10450829001** Collected: 10/03/18 12:30 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8082A GCS PCB Analytical Method: EPA 8082A Preparation Method: EPA 3550									
PCB-1016 (Aroclor 1016)	ND	ug/kg	76.1	22.8	1	10/12/18 07:51	10/12/18 21:04	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	96.0	28.8	1	10/12/18 07:51	10/12/18 21:04	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	109	32.8	1	10/12/18 07:51	10/12/18 21:04	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	ug/kg	92.7	27.8	1	10/12/18 07:51	10/12/18 21:04	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	82.0	24.6	1	10/12/18 07:51	10/12/18 21:04	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	ug/kg	80.4	24.1	1	10/12/18 07:51	10/12/18 21:04	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	ug/kg	65.3	19.6	1	10/12/18 07:51	10/12/18 21:04	11096-82-5	
PCB-1262 (Aroclor 1262)	ND	ug/kg	94.4	28.3	1	10/12/18 07:51	10/12/18 21:04	37324-23-5	
PCB-1268 (Aroclor 1268)	ND	ug/kg	88.6	26.6	1	10/12/18 07:51	10/12/18 21:04	11100-14-4	
PCB, Total	ND	ug/kg	65.3	19.6	1	10/12/18 07:51	10/12/18 21:04	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	75	%	48-125		1	10/12/18 07:51	10/12/18 21:04	877-09-8	
Decachlorobiphenyl (S)	73	%	30-134		1	10/12/18 07:51	10/12/18 21:04	2051-24-3	
6010 MET ICP Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	31.8	mg/kg	11.5	2.4	1	10/18/18 09:13	10/27/18 10:11	7440-38-2	
Cadmium	3.4	mg/kg	1.1	0.30	1	10/18/18 09:13	10/27/18 10:11	7440-43-9	
Chromium	104	mg/kg	2.3	0.64	1	10/18/18 09:13	10/27/18 10:11	7440-47-3	
Copper	69.5	mg/kg	3.4	1.0	1	10/18/18 09:13	10/27/18 10:11	7440-50-8	
Lead	281	mg/kg	4.6	1.4	1	10/18/18 09:13	10/27/18 10:11	7439-92-1	
Nickel	48.7	mg/kg	2.3	0.53	1	10/18/18 09:13	10/27/18 10:11	7440-02-0	
Zinc	444	mg/kg	9.2	2.3	1	10/18/18 09:13	10/27/18 10:11	7440-66-6	
7471 Mercury Analytical Method: EPA 7471 Preparation Method: EPA 7471									
Mercury	0.17J	mg/kg	0.29	0.086	1	10/17/18 13:25	10/18/18 09:32	7439-97-6	
Dry Weight / %M by ASTM D2974 Analytical Method: ASTM D2974									
Percent Moisture	59.9	%	0.10	0.10	1		10/18/18 13:14		
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Acenaphthene	293	ug/kg	16.9	5.1	5	10/17/18 17:48	10/19/18 03:10	83-32-9	
Acenaphthylene	405	ug/kg	20.5	6.2	5	10/17/18 17:48	10/19/18 03:10	208-96-8	
Anthracene	799	ug/kg	19.4	5.8	5	10/17/18 17:48	10/19/18 03:10	120-12-7	
Benzo(a)anthracene	2800	ug/kg	44.7	13.4	5	10/17/18 17:48	10/19/18 03:10	56-55-3	
Benzo(a)pyrene	2810	ug/kg	28.4	8.5	5	10/17/18 17:48	10/19/18 03:10	50-32-8	
Benzo(b)fluoranthene	3620	ug/kg	15.4	4.6	5	10/17/18 17:48	10/19/18 03:10	205-99-2	
Benzo(e)pyrene	2070	ug/kg	29.8	8.9	5	10/17/18 17:48	10/19/18 03:10	192-97-2	N2
Benzo(g,h,i)perylene	1790	ug/kg	26.2	7.9	5	10/17/18 17:48	10/19/18 03:10	191-24-2	
Benzo(k)fluoranthene	1570	ug/kg	35.0	10.5	5	10/17/18 17:48	10/19/18 03:10	207-08-9	
Chrysene	2720	ug/kg	56.3	16.9	5	10/17/18 17:48	10/19/18 03:10	218-01-9	
Dibenz(a,h)anthracene	436	ug/kg	19.1	5.7	5	10/17/18 17:48	10/19/18 03:10	53-70-3	
Fluoranthene	7340	ug/kg	88.6	26.6	25	10/17/18 17:48	10/19/18 13:10	206-44-0	
Fluorene	562	ug/kg	13.0	3.9	5	10/17/18 17:48	10/19/18 03:10	86-73-7	
Indeno(1,2,3-cd)pyrene	1630	ug/kg	27.7	8.3	5	10/17/18 17:48	10/19/18 03:10	193-39-5	
2-Methylnaphthalene	ND	ug/kg	20.9	6.3	5	10/17/18 17:48	10/19/18 03:10	91-57-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 1 **Lab ID: 10450829001** Collected: 10/03/18 12:30 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Naphthalene	ND	ug/kg	31.9	9.6	5	10/17/18 17:48	10/19/18 03:10	91-20-3	
Phenanthrene	3680	ug/kg	79.5	23.9	5	10/17/18 17:48	10/19/18 03:10	85-01-8	
Pyrene	5760	ug/kg	317	95.1	25	10/17/18 17:48	10/19/18 13:10	129-00-0	
Surrogates									
2-Fluorobiphenyl (S)	90	%	42-125		5	10/17/18 17:48	10/19/18 03:10	321-60-8	D3
p-Terphenyl-d14 (S)	89	%	57-125		5	10/17/18 17:48	10/19/18 03:10	1718-51-0	
350.1 Ammonia Analytical Method: EPA 350.1 Preparation Method: EPA 350.1									
Nitrogen, Ammonia	821	mg/kg	42.7	20.6	2	10/11/18 14:36	10/12/18 07:20	7664-41-7	
351.2 Total Kjeldahl Nitrogen Analytical Method: EPA 351.2 Preparation Method: EPA 351.2									
Nitrogen, Kjeldahl, Total	6980	mg/kg	1190	520	5	10/15/18 10:16	10/16/18 16:00	7727-37-9	
353.2 Nitrogen, NO2/NO3 Analytical Method: EPA 353.2 Preparation Method: EPA 353.2									
Nitrogen, NO2 plus NO3	ND	mg/kg	1.2	0.29	1	10/12/18 07:44	10/12/18 15:51		N3
365.1 Phosphorus, Total Analytical Method: EPA 365.1 Preparation Method: SM 4500P B									
Phosphorus	743	mg/kg	144	68.3	10	10/10/18 14:00	10/11/18 09:05	7723-14-0	
Total Organic Carbon Analytical Method: EPA 9060A									
RPD%	5.7	%			1		10/25/18 10:45		
Total Organic Carbon	87800	mg/kg	2710	561	1		10/25/18 10:36	7440-44-0	
Total Organic Carbon	92900	mg/kg	2970	615	1		10/25/18 10:45	7440-44-0	
Mean Total Organic Carbon	90300	mg/kg	2840	588	1		10/25/18 10:45	7440-44-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 2 **Lab ID: 10450829002** Collected: 10/03/18 12:35 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8082A GCS PCB Analytical Method: EPA 8082A Preparation Method: EPA 3550									
PCB-1016 (Aroclor 1016)	ND	ug/kg	68.0	20.4	1	10/12/18 07:51	10/12/18 21:20	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	85.8	25.8	1	10/12/18 07:51	10/12/18 21:20	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	97.6	29.3	1	10/12/18 07:51	10/12/18 21:20	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	ug/kg	82.8	24.9	1	10/12/18 07:51	10/12/18 21:20	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	73.2	22.0	1	10/12/18 07:51	10/12/18 21:20	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	ug/kg	71.8	21.6	1	10/12/18 07:51	10/12/18 21:20	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	ug/kg	58.4	17.5	1	10/12/18 07:51	10/12/18 21:20	11096-82-5	
PCB-1262 (Aroclor 1262)	ND	ug/kg	84.3	25.3	1	10/12/18 07:51	10/12/18 21:20	37324-23-5	
PCB-1268 (Aroclor 1268)	ND	ug/kg	79.1	23.8	1	10/12/18 07:51	10/12/18 21:20	11100-14-4	
PCB, Total	ND	ug/kg	58.4	17.5	1	10/12/18 07:51	10/12/18 21:20	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	76	%	48-125		1	10/12/18 07:51	10/12/18 21:20	877-09-8	
Decachlorobiphenyl (S)	74	%	30-134		1	10/12/18 07:51	10/12/18 21:20	2051-24-3	
6010 MET ICP Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	18.3	mg/kg	10.6	2.2	1	10/18/18 09:13	10/27/18 10:13	7440-38-2	
Cadmium	0.97J	mg/kg	1.1	0.28	1	10/18/18 09:13	10/27/18 10:13	7440-43-9	
Chromium	27.6	mg/kg	2.1	0.59	1	10/18/18 09:13	10/27/18 10:13	7440-47-3	
Copper	69.8	mg/kg	3.1	0.94	1	10/18/18 09:13	10/27/18 10:13	7440-50-8	
Lead	66.4	mg/kg	4.2	1.3	1	10/18/18 09:13	10/27/18 10:13	7439-92-1	
Nickel	18.1	mg/kg	2.1	0.49	1	10/18/18 09:13	10/27/18 10:13	7440-02-0	
Zinc	187	mg/kg	8.5	2.2	1	10/18/18 09:13	10/27/18 10:13	7440-66-6	
7471 Mercury Analytical Method: EPA 7471 Preparation Method: EPA 7471									
Mercury	0.17J	mg/kg	0.24	0.073	1	10/17/18 13:25	10/18/18 09:35	7439-97-6	
Dry Weight / %M by ASTM D2974 Analytical Method: ASTM D2974									
Percent Moisture	55.2	%	0.10	0.10	1		10/18/18 13:14		
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Acenaphthene	3550	ug/kg	15.2	4.5	5	10/17/18 17:48	10/19/18 03:31	83-32-9	
Acenaphthylene	1730	ug/kg	18.3	5.5	5	10/17/18 17:48	10/19/18 03:31	208-96-8	
Anthracene	10100	ug/kg	347	104	100	10/17/18 17:48	10/19/18 14:34	120-12-7	
Benzo(a)anthracene	20100	ug/kg	800	240	100	10/17/18 17:48	10/19/18 14:34	56-55-3	
Benzo(a)pyrene	19500	ug/kg	509	153	100	10/17/18 17:48	10/19/18 14:34	50-32-8	
Benzo(b)fluoranthene	23900	ug/kg	276	83.0	100	10/17/18 17:48	10/19/18 14:34	205-99-2	
Benzo(e)pyrene	13200	ug/kg	533	160	100	10/17/18 17:48	10/19/18 14:34	192-97-2	N2
Benzo(g,h,i)perylene	11900	ug/kg	469	141	100	10/17/18 17:48	10/19/18 14:34	191-24-2	
Benzo(k)fluoranthene	9590	ug/kg	626	188	100	10/17/18 17:48	10/19/18 14:34	207-08-9	
Chrysene	19800	ug/kg	1010	303	100	10/17/18 17:48	10/19/18 14:34	218-01-9	
Dibenz(a,h)anthracene	3460	ug/kg	17.1	5.1	5	10/17/18 17:48	10/19/18 03:31	53-70-3	
Fluoranthene	51500	ug/kg	317	95.2	100	10/17/18 17:48	10/19/18 14:34	206-44-0	
Fluorene	4350	ug/kg	232	69.6	100	10/17/18 17:48	10/19/18 14:34	86-73-7	
Indeno(1,2,3-cd)pyrene	10700	ug/kg	496	149	100	10/17/18 17:48	10/19/18 14:34	193-39-5	
2-Methylnaphthalene	420	ug/kg	18.7	5.6	5	10/17/18 17:48	10/19/18 03:31	91-57-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 2 **Lab ID: 10450829002** Collected: 10/03/18 12:35 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Naphthalene	1490	ug/kg	28.6	8.6	5	10/17/18 17:48	10/19/18 03:31	91-20-3	
Phenanthrene	35600	ug/kg	1420	427	100	10/17/18 17:48	10/19/18 14:34	85-01-8	
Pyrene	39000	ug/kg	1130	340	100	10/17/18 17:48	10/19/18 14:34	129-00-0	
Surrogates									
2-Fluorobiphenyl (S)	84	%.	42-125		5	10/17/18 17:48	10/19/18 03:31	321-60-8	D3
p-Terphenyl-d14 (S)	98	%.	57-125		5	10/17/18 17:48	10/19/18 03:31	1718-51-0	
350.1 Ammonia Analytical Method: EPA 350.1 Preparation Method: EPA 350.1									
Nitrogen, Ammonia	595	mg/kg	21.2	10.2	1	10/11/18 14:36	10/12/18 07:01	7664-41-7	
351.2 Total Kjeldahl Nitrogen Analytical Method: EPA 351.2 Preparation Method: EPA 351.2									
Nitrogen, Kjeldahl, Total	3550	mg/kg	223	97.8	1	10/15/18 10:16	10/16/18 15:48	7727-37-9	
353.2 Nitrogen, NO2/NO3 Analytical Method: EPA 353.2 Preparation Method: EPA 353.2									
Nitrogen, NO2 plus NO3	ND	mg/kg	1.1	0.26	1	10/12/18 07:44	10/12/18 15:53		N3
365.1 Phosphorus, Total Analytical Method: EPA 365.1 Preparation Method: SM 4500P B									
Phosphorus	2000	mg/kg	140	66.3	10	10/10/18 14:00	10/11/18 09:06	7723-14-0	
Total Organic Carbon Analytical Method: EPA 9060A									
RPD%	0.20	%			1		10/25/18 11:29		
Total Organic Carbon	59800	mg/kg	5910	1220	1		10/25/18 11:22	7440-44-0	
Total Organic Carbon	59900	mg/kg	5880	1220	1		10/25/18 11:29	7440-44-0	
Mean Total Organic Carbon	59900	mg/kg	5910	1220	1		10/25/18 11:29	7440-44-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 3 **Lab ID: 10450829003** Collected: 10/03/18 12:40 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8082A GCS PCB Analytical Method: EPA 8082A Preparation Method: EPA 3550									
PCB-1016 (Aroclor 1016)	ND	ug/kg	65.3	19.6	1	10/12/18 07:51	10/12/18 22:08	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	82.4	24.7	1	10/12/18 07:51	10/12/18 22:08	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	93.7	28.1	1	10/12/18 07:51	10/12/18 22:08	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	ug/kg	79.5	23.9	1	10/12/18 07:51	10/12/18 22:08	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	70.3	21.1	1	10/12/18 07:51	10/12/18 22:08	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	ug/kg	68.9	20.7	1	10/12/18 07:51	10/12/18 22:08	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	ug/kg	56.0	16.8	1	10/12/18 07:51	10/12/18 22:08	11096-82-5	
PCB-1262 (Aroclor 1262)	ND	ug/kg	80.9	24.3	1	10/12/18 07:51	10/12/18 22:08	37324-23-5	
PCB-1268 (Aroclor 1268)	ND	ug/kg	76.0	22.8	1	10/12/18 07:51	10/12/18 22:08	11100-14-4	
PCB, Total	ND	ug/kg	56.0	16.8	1	10/12/18 07:51	10/12/18 22:08	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	71	%	48-125		1	10/12/18 07:51	10/12/18 22:08	877-09-8	
Decachlorobiphenyl (S)	70	%	30-134		1	10/12/18 07:51	10/12/18 22:08	2051-24-3	
6010 MET ICP Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	22.1	mg/kg	10.3	2.2	1	10/18/18 09:13	10/27/18 10:20	7440-38-2	
Cadmium	0.88J	mg/kg	1.0	0.27	1	10/18/18 09:13	10/27/18 10:20	7440-43-9	
Chromium	30.0	mg/kg	2.1	0.57	1	10/18/18 09:13	10/27/18 10:20	7440-47-3	
Copper	38.4	mg/kg	3.0	0.91	1	10/18/18 09:13	10/27/18 10:20	7440-50-8	
Lead	60.0	mg/kg	4.1	1.2	1	10/18/18 09:13	10/27/18 10:20	7439-92-1	
Nickel	21.4	mg/kg	2.1	0.48	1	10/18/18 09:13	10/27/18 10:20	7440-02-0	
Zinc	157	mg/kg	8.2	2.1	1	10/18/18 09:13	10/27/18 10:20	7440-66-6	
7471 Mercury Analytical Method: EPA 7471 Preparation Method: EPA 7471									
Mercury	0.17J	mg/kg	0.24	0.072	1	10/17/18 13:25	10/18/18 09:37	7439-97-6	
Dry Weight / %M by ASTM D2974 Analytical Method: ASTM D2974									
Percent Moisture	53.2	%	0.10	0.10	1		10/18/18 13:14		
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Acenaphthene	32.0	ug/kg	2.9	0.87	1	10/17/18 17:48	10/18/18 22:38	83-32-9	
Acenaphthylene	31.9	ug/kg	3.5	1.1	1	10/17/18 17:48	10/18/18 22:38	208-96-8	
Anthracene	89.1	ug/kg	3.3	1.0	1	10/17/18 17:48	10/18/18 22:38	120-12-7	
Benzo(a)anthracene	440	ug/kg	7.7	2.3	1	10/17/18 17:48	10/18/18 22:38	56-55-3	
Benzo(a)pyrene	522	ug/kg	4.9	1.5	1	10/17/18 17:48	10/18/18 22:38	50-32-8	
Benzo(b)fluoranthene	685	ug/kg	2.6	0.79	1	10/17/18 17:48	10/18/18 22:38	205-99-2	
Benzo(e)pyrene	405	ug/kg	5.1	1.5	1	10/17/18 17:48	10/18/18 22:38	192-97-2	N2
Benzo(g,h,i)perylene	381	ug/kg	4.5	1.3	1	10/17/18 17:48	10/18/18 22:38	191-24-2	
Benzo(k)fluoranthene	242	ug/kg	6.0	1.8	1	10/17/18 17:48	10/18/18 22:38	207-08-9	
Chrysene	506	ug/kg	9.7	2.9	1	10/17/18 17:48	10/18/18 22:38	218-01-9	
Dibenz(a,h)anthracene	79.2	ug/kg	3.3	0.98	1	10/17/18 17:48	10/18/18 22:38	53-70-3	
Fluoranthene	1110	ug/kg	15.2	4.6	5	10/17/18 17:48	10/19/18 11:26	206-44-0	
Fluorene	44.9	ug/kg	2.2	0.67	1	10/17/18 17:48	10/18/18 22:38	86-73-7	
Indeno(1,2,3-cd)pyrene	310	ug/kg	4.8	1.4	1	10/17/18 17:48	10/18/18 22:38	193-39-5	
2-Methylnaphthalene	22.6	ug/kg	3.6	1.1	1	10/17/18 17:48	10/18/18 22:38	91-57-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 3 **Lab ID: 10450829003** Collected: 10/03/18 12:40 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Naphthalene	ND	ug/kg	5.5	1.6	1	10/17/18 17:48	10/18/18 22:38	91-20-3	
Phenanthrene	418	ug/kg	13.6	4.1	1	10/17/18 17:48	10/18/18 22:38	85-01-8	
Pyrene	881	ug/kg	54.3	16.3	5	10/17/18 17:48	10/19/18 11:26	129-00-0	
Surrogates									
2-Fluorobiphenyl (S)	83	%	42-125		1	10/17/18 17:48	10/18/18 22:38	321-60-8	
p-Terphenyl-d14 (S)	81	%	57-125		1	10/17/18 17:48	10/18/18 22:38	1718-51-0	
350.1 Ammonia Analytical Method: EPA 350.1 Preparation Method: EPA 350.1									
Nitrogen, Ammonia	424	mg/kg	20.2	9.8	1	10/11/18 14:36	10/12/18 07:03	7664-41-7	
351.2 Total Kjeldahl Nitrogen Analytical Method: EPA 351.2 Preparation Method: EPA 351.2									
Nitrogen, Kjeldahl, Total	3220	mg/kg	214	93.5	1	10/15/18 10:16	10/16/18 15:49	7727-37-9	
353.2 Nitrogen, NO2/NO3 Analytical Method: EPA 353.2 Preparation Method: EPA 353.2									
Nitrogen, NO2 plus NO3	ND	mg/kg	1.1	0.25	1	10/12/18 07:44	10/12/18 15:54		N3
365.1 Phosphorus, Total Analytical Method: EPA 365.1 Preparation Method: SM 4500P B									
Phosphorus	1460	mg/kg	118	55.8	10	10/10/18 14:00	10/11/18 09:07	7723-14-0	
Total Organic Carbon Analytical Method: EPA 9060A									
RPD%	5.1	%			1		10/25/18 11:44		
Total Organic Carbon	59700	mg/kg	3940	816	1		10/25/18 11:36	7440-44-0	
Total Organic Carbon	62800	mg/kg	4290	888	1		10/25/18 11:44	7440-44-0	
Mean Total Organic Carbon	61300	mg/kg	4120	852	1		10/25/18 11:44	7440-44-0	

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 4 **Lab ID: 10450829004** Collected: 10/03/18 12:45 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8082A GCS PCB Analytical Method: EPA 8082A Preparation Method: EPA 3550									
PCB-1016 (Aroclor 1016)	ND	ug/kg	71.6	21.5	1	10/12/18 07:51	10/12/18 22:24	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	90.4	27.1	1	10/12/18 07:51	10/12/18 22:24	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	103	30.9	1	10/12/18 07:51	10/12/18 22:24	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	ug/kg	87.3	26.2	1	10/12/18 07:51	10/12/18 22:24	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	77.1	23.2	1	10/12/18 07:51	10/12/18 22:24	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	ug/kg	75.7	22.7	1	10/12/18 07:51	10/12/18 22:24	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	ug/kg	61.5	18.5	1	10/12/18 07:51	10/12/18 22:24	11096-82-5	
PCB-1262 (Aroclor 1262)	ND	ug/kg	88.8	26.7	1	10/12/18 07:51	10/12/18 22:24	37324-23-5	
PCB-1268 (Aroclor 1268)	ND	ug/kg	83.4	25.0	1	10/12/18 07:51	10/12/18 22:24	11100-14-4	
PCB, Total	ND	ug/kg	61.5	18.5	1	10/12/18 07:51	10/12/18 22:24	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	78	%	48-125		1	10/12/18 07:51	10/12/18 22:24	877-09-8	
Decachlorobiphenyl (S)	77	%	30-134		1	10/12/18 07:51	10/12/18 22:24	2051-24-3	
6010 MET ICP Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	13.6	mg/kg	11.1	2.3	1	10/18/18 09:13	10/27/18 10:22	7440-38-2	
Cadmium	0.92J	mg/kg	1.1	0.29	1	10/18/18 09:13	10/27/18 10:22	7440-43-9	
Chromium	30.0	mg/kg	2.2	0.62	1	10/18/18 09:13	10/27/18 10:22	7440-47-3	
Copper	66.1	mg/kg	3.3	0.98	1	10/18/18 09:13	10/27/18 10:22	7440-50-8	
Lead	38.8	mg/kg	4.4	1.3	1	10/18/18 09:13	10/27/18 10:22	7439-92-1	
Nickel	20.1	mg/kg	2.2	0.51	1	10/18/18 09:13	10/27/18 10:22	7440-02-0	
Zinc	186	mg/kg	8.9	2.3	1	10/18/18 09:13	10/27/18 10:22	7440-66-6	
7471 Mercury Analytical Method: EPA 7471 Preparation Method: EPA 7471									
Mercury	0.13J	mg/kg	0.25	0.074	1	10/17/18 13:25	10/18/18 09:39	7439-97-6	
Dry Weight / %M by ASTM D2974 Analytical Method: ASTM D2974									
Percent Moisture	57.4	%	0.10	0.10	1		10/18/18 13:14		
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Acenaphthene	ND	ug/kg	15.9	4.8	5	10/17/18 17:48	10/19/18 03:52	83-32-9	
Acenaphthylene	ND	ug/kg	19.3	5.8	5	10/17/18 17:48	10/19/18 03:52	208-96-8	
Anthracene	143	ug/kg	18.3	5.5	5	10/17/18 17:48	10/19/18 03:52	120-12-7	
Benzo(a)anthracene	744	ug/kg	42.1	12.6	5	10/17/18 17:48	10/19/18 03:52	56-55-3	
Benzo(a)pyrene	1020	ug/kg	26.8	8.0	5	10/17/18 17:48	10/19/18 03:52	50-32-8	
Benzo(b)fluoranthene	1510	ug/kg	14.5	4.4	5	10/17/18 17:48	10/19/18 03:52	205-99-2	
Benzo(e)pyrene	819	ug/kg	28.0	8.4	5	10/17/18 17:48	10/19/18 03:52	192-97-2	N2
Benzo(g,h,i)perylene	770	ug/kg	24.7	7.4	5	10/17/18 17:48	10/19/18 03:52	191-24-2	
Benzo(k)fluoranthene	599	ug/kg	33.0	9.9	5	10/17/18 17:48	10/19/18 03:52	207-08-9	
Chrysene	1040	ug/kg	53.0	15.9	5	10/17/18 17:48	10/19/18 03:52	218-01-9	
Dibenz(a,h)anthracene	180	ug/kg	18.0	5.4	5	10/17/18 17:48	10/19/18 03:52	53-70-3	
Fluoranthene	2110	ug/kg	16.7	5.0	5	10/17/18 17:48	10/19/18 03:52	206-44-0	
Fluorene	ND	ug/kg	12.2	3.7	5	10/17/18 17:48	10/19/18 03:52	86-73-7	
Indeno(1,2,3-cd)pyrene	712	ug/kg	26.1	7.8	5	10/17/18 17:48	10/19/18 03:52	193-39-5	
2-Methylnaphthalene	ND	ug/kg	19.7	5.9	5	10/17/18 17:48	10/19/18 03:52	91-57-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 4 **Lab ID: 10450829004** Collected: 10/03/18 12:45 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Naphthalene	ND	ug/kg	30.1	9.0	5	10/17/18 17:48	10/19/18 03:52	91-20-3	
Phenanthrene	715	ug/kg	74.9	22.5	5	10/17/18 17:48	10/19/18 03:52	85-01-8	
Pyrene	1560	ug/kg	59.7	17.9	5	10/17/18 17:48	10/19/18 03:52	129-00-0	
Surrogates									
2-Fluorobiphenyl (S)	81	%	42-125		5	10/17/18 17:48	10/19/18 03:52	321-60-8	D3
p-Terphenyl-d14 (S)	86	%	57-125		5	10/17/18 17:48	10/19/18 03:52	1718-51-0	
350.1 Ammonia Analytical Method: EPA 350.1 Preparation Method: EPA 350.1									
Nitrogen, Ammonia	121	mg/kg	20.1	9.7	1	10/11/18 14:36	10/12/18 07:04	7664-41-7	
351.2 Total Kjeldahl Nitrogen Analytical Method: EPA 351.2 Preparation Method: EPA 351.2									
Nitrogen, Kjeldahl, Total	690	mg/kg	223	97.8	1	10/15/18 10:16	10/16/18 15:50	7727-37-9	
353.2 Nitrogen, NO2/NO3 Analytical Method: EPA 353.2 Preparation Method: EPA 353.2									
Nitrogen, NO2 plus NO3	ND	mg/kg	1.1	0.27	1	10/12/18 07:44	10/12/18 15:56		N3
365.1 Phosphorus, Total Analytical Method: EPA 365.1 Preparation Method: SM 4500P B									
Phosphorus	201	mg/kg	14.2	6.8	1	10/10/18 14:00	10/11/18 09:11	7723-14-0	
Total Organic Carbon Analytical Method: EPA 9060A									
RPD%	1.8	%			1		10/25/18 11:59		
Total Organic Carbon	18300	mg/kg	2320	480	1		10/25/18 11:51	7440-44-0	
Total Organic Carbon	18000	mg/kg	2260	468	1		10/25/18 11:59	7440-44-0	
Mean Total Organic Carbon	18200	mg/kg	2290	474	1		10/25/18 11:59	7440-44-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 5 **Lab ID: 10450829005** Collected: 10/03/18 12:50 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8082A GCS PCB Analytical Method: EPA 8082A Preparation Method: EPA 3550									
PCB-1016 (Aroclor 1016)	ND	ug/kg	57.9	17.4	1	10/12/18 07:51	10/12/18 22:40	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	73.1	21.9	1	10/12/18 07:51	10/12/18 22:40	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	83.2	25.0	1	10/12/18 07:51	10/12/18 22:40	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	ug/kg	70.6	21.2	1	10/12/18 07:51	10/12/18 22:40	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	62.4	18.7	1	10/12/18 07:51	10/12/18 22:40	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	ug/kg	61.2	18.4	1	10/12/18 07:51	10/12/18 22:40	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	ug/kg	49.7	14.9	1	10/12/18 07:51	10/12/18 22:40	11096-82-5	
PCB-1262 (Aroclor 1262)	ND	ug/kg	71.8	21.6	1	10/12/18 07:51	10/12/18 22:40	37324-23-5	
PCB-1268 (Aroclor 1268)	ND	ug/kg	67.4	20.2	1	10/12/18 07:51	10/12/18 22:40	11100-14-4	
PCB, Total	ND	ug/kg	49.7	14.9	1	10/12/18 07:51	10/12/18 22:40	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	77	%	48-125		1	10/12/18 07:51	10/12/18 22:40	877-09-8	
Decachlorobiphenyl (S)	74	%	30-134		1	10/12/18 07:51	10/12/18 22:40	2051-24-3	
6010 MET ICP Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	15.6	mg/kg	9.0	1.9	1	10/18/18 09:13	10/27/18 10:25	7440-38-2	
Cadmium	0.35J	mg/kg	0.90	0.24	1	10/18/18 09:13	10/27/18 10:25	7440-43-9	
Chromium	18.1	mg/kg	1.8	0.50	1	10/18/18 09:13	10/27/18 10:25	7440-47-3	
Copper	25.1	mg/kg	2.7	0.80	1	10/18/18 09:13	10/27/18 10:25	7440-50-8	
Lead	20.8	mg/kg	3.6	1.1	1	10/18/18 09:13	10/27/18 10:25	7439-92-1	
Nickel	14.4	mg/kg	1.8	0.41	1	10/18/18 09:13	10/27/18 10:25	7440-02-0	
Zinc	79.3	mg/kg	7.2	1.8	1	10/18/18 09:13	10/27/18 10:25	7440-66-6	
7471 Mercury Analytical Method: EPA 7471 Preparation Method: EPA 7471									
Mercury	0.073J	mg/kg	0.21	0.064	1	10/17/18 13:25	10/18/18 09:41	7439-97-6	
Dry Weight / %M by ASTM D2974 Analytical Method: ASTM D2974									
Percent Moisture	47.5	%	0.10	0.10	1		10/18/18 13:15		
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Acenaphthene	ND	ug/kg	2.6	0.78	1	10/17/18 17:48	10/18/18 22:59	83-32-9	
Acenaphthylene	31.7	ug/kg	3.1	0.94	1	10/17/18 17:48	10/18/18 22:59	208-96-8	
Anthracene	24.4	ug/kg	3.0	0.89	1	10/17/18 17:48	10/18/18 22:59	120-12-7	
Benzo(a)anthracene	119	ug/kg	6.8	2.1	1	10/17/18 17:48	10/18/18 22:59	56-55-3	
Benzo(a)pyrene	134	ug/kg	4.4	1.3	1	10/17/18 17:48	10/18/18 22:59	50-32-8	
Benzo(b)fluoranthene	175	ug/kg	2.4	0.71	1	10/17/18 17:48	10/18/18 22:59	205-99-2	
Benzo(e)pyrene	96.2	ug/kg	4.6	1.4	1	10/17/18 17:48	10/18/18 22:59	192-97-2	N2
Benzo(g,h,i)perylene	90.4	ug/kg	4.0	1.2	1	10/17/18 17:48	10/18/18 22:59	191-24-2	
Benzo(k)fluoranthene	57.5	ug/kg	5.4	1.6	1	10/17/18 17:48	10/18/18 22:59	207-08-9	
Chrysene	131	ug/kg	8.6	2.6	1	10/17/18 17:48	10/18/18 22:59	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	2.9	0.88	1	10/17/18 17:48	10/18/18 22:59	53-70-3	
Fluoranthene	214	ug/kg	2.7	0.81	1	10/17/18 17:48	10/18/18 22:59	206-44-0	
Fluorene	ND	ug/kg	2.0	0.60	1	10/17/18 17:48	10/18/18 22:59	86-73-7	
Indeno(1,2,3-cd)pyrene	74.1	ug/kg	4.2	1.3	1	10/17/18 17:48	10/18/18 22:59	193-39-5	
2-Methylnaphthalene	ND	ug/kg	3.2	0.96	1	10/17/18 17:48	10/18/18 22:59	91-57-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 5 **Lab ID: 10450829005** Collected: 10/03/18 12:50 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Naphthalene	ND	ug/kg	4.9	1.5	1	10/17/18 17:48	10/18/18 22:59	91-20-3	
Phenanthrene	53.9	ug/kg	12.2	3.7	1	10/17/18 17:48	10/18/18 22:59	85-01-8	
Pyrene	206	ug/kg	9.7	2.9	1	10/17/18 17:48	10/18/18 22:59	129-00-0	
Surrogates									
2-Fluorobiphenyl (S)	79	%	42-125		1	10/17/18 17:48	10/18/18 22:59	321-60-8	
p-Terphenyl-d14 (S)	77	%	57-125		1	10/17/18 17:48	10/18/18 22:59	1718-51-0	
350.1 Ammonia Analytical Method: EPA 350.1 Preparation Method: EPA 350.1									
Nitrogen, Ammonia	85.4	mg/kg	16.3	7.9	1	10/11/18 14:36	10/12/18 07:11	7664-41-7	
351.2 Total Kjeldahl Nitrogen Analytical Method: EPA 351.2 Preparation Method: EPA 351.2									
Nitrogen, Kjeldahl, Total	1750	mg/kg	173	75.8	1	10/19/18 15:15	10/23/18 12:30	7727-37-9	
353.2 Nitrogen, NO2/NO3 Analytical Method: EPA 353.2 Preparation Method: EPA 353.2									
Nitrogen, NO2 plus NO3	ND	mg/kg	0.94	0.22	1	10/12/18 07:44	10/12/18 15:57		N3
365.1 Phosphorus, Total Analytical Method: EPA 365.1 Preparation Method: SM 4500P B									
Phosphorus	410	mg/kg	113	53.7	10	10/10/18 14:00	10/11/18 09:12	7723-14-0	M6
Total Organic Carbon Analytical Method: EPA 9060A									
RPD%	9.9	%			1		10/25/18 12:18		
Total Organic Carbon	41500	mg/kg	4180	866	1		10/25/18 12:06	7440-44-0	
Total Organic Carbon	45800	mg/kg	4200	869	1		10/25/18 12:18	7440-44-0	
Mean Total Organic Carbon	43600	mg/kg	4190	867	1		10/25/18 12:18	7440-44-0	

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 6 **Lab ID: 10450829006** Collected: 10/03/18 12:55 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8082A GCS PCB Analytical Method: EPA 8082A Preparation Method: EPA 3550									
PCB-1016 (Aroclor 1016)	ND	ug/kg	51.6	15.5	1	10/12/18 07:51	10/12/18 22:56	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	65.2	19.6	1	10/12/18 07:51	10/12/18 22:56	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	74.2	22.3	1	10/12/18 07:51	10/12/18 22:56	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	ug/kg	62.9	18.9	1	10/12/18 07:51	10/12/18 22:56	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	55.6	16.7	1	10/12/18 07:51	10/12/18 22:56	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	ug/kg	54.6	16.4	1	10/12/18 07:51	10/12/18 22:56	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	ug/kg	44.3	13.3	1	10/12/18 07:51	10/12/18 22:56	11096-82-5	
PCB-1262 (Aroclor 1262)	ND	ug/kg	64.1	19.2	1	10/12/18 07:51	10/12/18 22:56	37324-23-5	
PCB-1268 (Aroclor 1268)	ND	ug/kg	60.1	18.1	1	10/12/18 07:51	10/12/18 22:56	11100-14-4	
PCB, Total	ND	ug/kg	44.3	13.3	1	10/12/18 07:51	10/12/18 22:56	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	70	%	48-125		1	10/12/18 07:51	10/12/18 22:56	877-09-8	
Decachlorobiphenyl (S)	69	%	30-134		1	10/12/18 07:51	10/12/18 22:56	2051-24-3	
6010 MET ICP Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	15.4	mg/kg	8.3	1.8	1	10/18/18 09:13	10/27/18 10:27	7440-38-2	
Cadmium	0.31J	mg/kg	0.83	0.22	1	10/18/18 09:13	10/27/18 10:27	7440-43-9	
Chromium	22.4	mg/kg	1.7	0.46	1	10/18/18 09:13	10/27/18 10:27	7440-47-3	
Copper	30.1	mg/kg	2.5	0.74	1	10/18/18 09:13	10/27/18 10:27	7440-50-8	
Lead	23.3	mg/kg	3.3	1.0	1	10/18/18 09:13	10/27/18 10:27	7439-92-1	
Nickel	18.9	mg/kg	1.7	0.39	1	10/18/18 09:13	10/27/18 10:27	7440-02-0	
Zinc	94.0	mg/kg	6.7	1.7	1	10/18/18 09:13	10/27/18 10:27	7440-66-6	
7471 Mercury Analytical Method: EPA 7471 Preparation Method: EPA 7471									
Mercury	0.078J	mg/kg	0.18	0.055	1	10/17/18 13:25	10/18/18 09:44	7439-97-6	
Dry Weight / %M by ASTM D2974 Analytical Method: ASTM D2974									
Percent Moisture	41.1	%	0.10	0.10	1		10/18/18 13:15		
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Acenaphthene	ND	ug/kg	2.3	0.69	1	10/17/18 17:48	10/18/18 23:20	83-32-9	
Acenaphthylene	ND	ug/kg	2.8	0.84	1	10/17/18 17:48	10/18/18 23:20	208-96-8	
Anthracene	ND	ug/kg	2.6	0.79	1	10/17/18 17:48	10/18/18 23:20	120-12-7	
Benzo(a)anthracene	30.0	ug/kg	6.1	1.8	1	10/17/18 17:48	10/18/18 23:20	56-55-3	
Benzo(a)pyrene	34.0	ug/kg	3.9	1.2	1	10/17/18 17:48	10/18/18 23:20	50-32-8	
Benzo(b)fluoranthene	49.0	ug/kg	2.1	0.63	1	10/17/18 17:48	10/18/18 23:20	205-99-2	
Benzo(e)pyrene	25.8	ug/kg	4.1	1.2	1	10/17/18 17:48	10/18/18 23:20	192-97-2	N2
Benzo(g,h,i)perylene	24.5	ug/kg	3.6	1.1	1	10/17/18 17:48	10/18/18 23:20	191-24-2	
Benzo(k)fluoranthene	17.4	ug/kg	4.8	1.4	1	10/17/18 17:48	10/18/18 23:20	207-08-9	
Chrysene	35.1	ug/kg	7.7	2.3	1	10/17/18 17:48	10/18/18 23:20	218-01-9	
Dibenz(a,h)anthracene	ND	ug/kg	2.6	0.78	1	10/17/18 17:48	10/18/18 23:20	53-70-3	
Fluoranthene	72.6	ug/kg	2.4	0.73	1	10/17/18 17:48	10/18/18 23:20	206-44-0	
Fluorene	ND	ug/kg	1.8	0.53	1	10/17/18 17:48	10/18/18 23:20	86-73-7	
Indeno(1,2,3-cd)pyrene	20.5	ug/kg	3.8	1.1	1	10/17/18 17:48	10/18/18 23:20	193-39-5	
2-Methylnaphthalene	ND	ug/kg	2.9	0.86	1	10/17/18 17:48	10/18/18 23:20	91-57-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Saratoga Dam
Pace Project No.: 10450829

Sample: 6 **Lab ID: 10450829006** Collected: 10/03/18 12:55 Received: 10/09/18 09:20 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV PAH by SIM Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3550									
Naphthalene	ND	ug/kg	4.4	1.3	1	10/17/18 17:48	10/18/18 23:20	91-20-3	
Phenanthrene	22.1	ug/kg	10.8	3.3	1	10/17/18 17:48	10/18/18 23:20	85-01-8	
Pyrene	65.1	ug/kg	8.6	2.6	1	10/17/18 17:48	10/18/18 23:20	129-00-0	
Surrogates									
2-Fluorobiphenyl (S)	69	%.	42-125		1	10/17/18 17:48	10/18/18 23:20	321-60-8	
p-Terphenyl-d14 (S)	76	%.	57-125		1	10/17/18 17:48	10/18/18 23:20	1718-51-0	
350.1 Ammonia Analytical Method: EPA 350.1 Preparation Method: EPA 350.1									
Nitrogen, Ammonia	55.6	mg/kg	13.9	6.7	1	10/11/18 14:36	10/12/18 07:12	7664-41-7	
351.2 Total Kjeldahl Nitrogen Analytical Method: EPA 351.2 Preparation Method: EPA 351.2									
Nitrogen, Kjeldahl, Total	743	mg/kg	154	67.6	1	10/19/18 15:15	10/23/18 12:34	7727-37-9	
353.2 Nitrogen, NO2/NO3 Analytical Method: EPA 353.2 Preparation Method: EPA 353.2									
Nitrogen, NO2 plus NO3	ND	mg/kg	0.84	0.20	1	10/12/18 07:44	10/12/18 15:59		N3
365.1 Phosphorus, Total Analytical Method: EPA 365.1 Preparation Method: SM 4500P B									
Phosphorus	403	mg/kg	106	50.4	10	10/10/18 14:00	10/11/18 09:15	7723-14-0	
Total Organic Carbon Analytical Method: EPA 9060A									
RPD%	19.2	%			1		10/25/18 12:40		
Total Organic Carbon	46100	mg/kg	4410	913	1		10/25/18 12:31	7440-44-0	
Total Organic Carbon	55800	mg/kg	4230	876	1		10/25/18 12:40	7440-44-0	
Mean Total Organic Carbon	50900	mg/kg	4320	895	1		10/25/18 12:40	7440-44-0	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Saratoga Dam

Pace Project No.: 10450829

QC Batch: 303477 Analysis Method: EPA 7471
QC Batch Method: EPA 7471 Analysis Description: 7471 Mercury
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

METHOD BLANK: 1772526 Matrix: Solid
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	<0.035	0.12	10/18/18 08:58	

LABORATORY CONTROL SAMPLE: 1772527

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	.83	0.94	113	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1772528 1772529

Parameter	Units	40177448001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	7.9	.969	.957	11.1	8.6	335	72	85-115	26	20	P6,R1

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QUALITY CONTROL DATA

Project: Saratoga Dam
Pace Project No.: 10450829

QC Batch: 303599 Analysis Method: EPA 6010
QC Batch Method: EPA 3050 Analysis Description: 6010 MET
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

METHOD BLANK: 1773393 Matrix: Solid
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	<1.0	5.0	10/27/18 09:40	
Cadmium	mg/kg	<0.13	0.50	10/27/18 09:40	
Chromium	mg/kg	<0.28	1.0	10/27/18 09:40	
Copper	mg/kg	<0.44	1.5	10/27/18 09:40	
Lead	mg/kg	<0.60	2.0	10/27/18 09:40	
Nickel	mg/kg	<0.23	1.0	10/27/18 09:40	
Zinc	mg/kg	<1.0	4.0	10/27/18 09:40	

LABORATORY CONTROL SAMPLE: 1773394

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	50	49.5	99	80-120	
Cadmium	mg/kg	50	49.5	99	80-120	
Chromium	mg/kg	50	49.8	100	80-120	
Copper	mg/kg	50	49.8	100	80-120	
Lead	mg/kg	50	48.7	97	80-120	
Nickel	mg/kg	50	49.5	99	80-120	
Zinc	mg/kg	50	50.4	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1773395 1773396

Parameter	Units	40177448001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	15.5	58.3	58.1	69.4	69.9	92	94	75-125	1	20	
Cadmium	mg/kg	3.0	58.3	58.1	60.0	58.5	98	95	75-125	3	20	
Chromium	mg/kg	18.4	58.3	58.1	74.5	72.9	96	94	75-125	2	20	
Copper	mg/kg	193	58.3	58.1	215	223	39	53	75-125	4	20	M0
Lead	mg/kg	609	58.3	58.1	712	842	176	400	75-125	17	20	P6
Nickel	mg/kg	20.8	58.3	58.1	76.1	74.3	95	92	75-125	2	20	
Zinc	mg/kg	656	58.3	58.1	783	766	218	189	75-125	2	20	P6

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QUALITY CONTROL DATA

Project: Saratoga Dam

Pace Project No.: 10450829

QC Batch: 570083 Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 Analysis Description: Dry Weight / %M by ASTM D2974
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

SAMPLE DUPLICATE: 3093222

Parameter	Units	10451745002 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	4.2	4.3	3	30	

SAMPLE DUPLICATE: 3093223

Parameter	Units	10450935007 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	20.8	19.8	5	30	

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QUALITY CONTROL DATA

Project: Saratoga Dam
Pace Project No.: 10450829

QC Batch: 568823 Analysis Method: EPA 8082A
QC Batch Method: EPA 3550 Analysis Description: 8082A GCS PCB
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

METHOD BLANK: 3086792 Matrix: Solid
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	ND	30.6	10/12/18 18:09	
PCB-1221 (Aroclor 1221)	ug/kg	ND	38.6	10/12/18 18:09	
PCB-1232 (Aroclor 1232)	ug/kg	ND	44.0	10/12/18 18:09	
PCB-1242 (Aroclor 1242)	ug/kg	ND	37.3	10/12/18 18:09	
PCB-1248 (Aroclor 1248)	ug/kg	ND	33.0	10/12/18 18:09	
PCB-1254 (Aroclor 1254)	ug/kg	ND	32.3	10/12/18 18:09	
PCB-1260 (Aroclor 1260)	ug/kg	ND	26.3	10/12/18 18:09	
PCB-1262 (Aroclor 1262)	ug/kg	ND	38.0	10/12/18 18:09	
PCB-1268 (Aroclor 1268)	ug/kg	ND	35.6	10/12/18 18:09	
Decachlorobiphenyl (S)	%.	81	30-134	10/12/18 18:09	
Tetrachloro-m-xylene (S)	%.	83	48-125	10/12/18 18:09	

LABORATORY CONTROL SAMPLE: 3086793

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	667	600	90	66-125	
PCB-1260 (Aroclor 1260)	ug/kg	667	584	88	62-125	
Decachlorobiphenyl (S)	%.			81	30-134	
Tetrachloro-m-xylene (S)	%.			83	48-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3086794 3086795

Parameter	Units	10450829002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
PCB-1016 (Aroclor 1016)	ug/kg	ND	1490	1480	1090	1160	73	78	30-150	6	30	
PCB-1260 (Aroclor 1260)	ug/kg	ND	1490	1480	1050	1110	71	75	30-138	6	30	
Decachlorobiphenyl (S)	%.						67	68	30-134			
Tetrachloro-m-xylene (S)	%.						68	70	48-125			

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QUALITY CONTROL DATA

Project: Saratoga Dam
Pace Project No.: 10450829

QC Batch: 569962 Analysis Method: EPA 8270D by SIM
QC Batch Method: EPA 3550 Analysis Description: 8270D Solid PAH by SIM MSSV
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

METHOD BLANK: 3092638 Matrix: Solid
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2-Methylnaphthalene	ug/kg	ND	1.7	10/18/18 20:12	
Acenaphthene	ug/kg	ND	1.4	10/18/18 20:12	
Acenaphthylene	ug/kg	ND	1.6	10/18/18 20:12	
Anthracene	ug/kg	ND	1.6	10/18/18 20:12	
Benzo(a)anthracene	ug/kg	ND	3.6	10/18/18 20:12	
Benzo(a)pyrene	ug/kg	ND	2.3	10/18/18 20:12	
Benzo(b)fluoranthene	ug/kg	ND	1.2	10/18/18 20:12	
Benzo(e)pyrene	ug/kg	ND	2.4	10/18/18 20:12	N2
Benzo(g,h,i)perylene	ug/kg	ND	2.1	10/18/18 20:12	
Benzo(k)fluoranthene	ug/kg	ND	2.8	10/18/18 20:12	
Chrysene	ug/kg	ND	4.5	10/18/18 20:12	
Dibenz(a,h)anthracene	ug/kg	ND	1.5	10/18/18 20:12	
Fluoranthene	ug/kg	ND	1.4	10/18/18 20:12	
Fluorene	ug/kg	ND	1.0	10/18/18 20:12	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	2.2	10/18/18 20:12	
Naphthalene	ug/kg	ND	2.6	10/18/18 20:12	
Phenanthrene	ug/kg	ND	6.4	10/18/18 20:12	
Pyrene	ug/kg	ND	5.1	10/18/18 20:12	
2-Fluorobiphenyl (S)	%	93	42-125	10/18/18 20:12	
p-Terphenyl-d14 (S)	%	90	57-125	10/18/18 20:12	

LABORATORY CONTROL SAMPLE: 3092639

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2-Methylnaphthalene	ug/kg	33.3	29.3	88	40-125	
Acenaphthene	ug/kg	33.3	27.1	81	52-125	
Acenaphthylene	ug/kg	33.3	27.8	83	50-125	
Anthracene	ug/kg	33.3	31.8	95	65-125	
Benzo(a)anthracene	ug/kg	33.3	28.6	86	60-125	
Benzo(a)pyrene	ug/kg	33.3	30.9	93	69-125	
Benzo(b)fluoranthene	ug/kg	33.3	31.1	93	61-125	
Benzo(e)pyrene	ug/kg	33.3	32.5	98	71-125	N2
Benzo(g,h,i)perylene	ug/kg	33.3	32.5	97	60-125	
Benzo(k)fluoranthene	ug/kg	33.3	30.3	91	67-125	
Chrysene	ug/kg	33.3	28.7	86	67-125	
Dibenz(a,h)anthracene	ug/kg	33.3	31.1	93	63-125	
Fluoranthene	ug/kg	33.3	30.5	92	75-125	
Fluorene	ug/kg	33.3	27.7	83	54-125	
Indeno(1,2,3-cd)pyrene	ug/kg	33.3	32.7	98	63-125	
Naphthalene	ug/kg	33.3	26.9	81	49-125	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Saratoga Dam

Pace Project No.: 10450829

LABORATORY CONTROL SAMPLE: 3092639

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phenanthrene	ug/kg	33.3	28.8	86	65-125	
Pyrene	ug/kg	33.3	29.7	89	64-125	
2-Fluorobiphenyl (S)	%			91	42-125	
p-Terphenyl-d14 (S)	%			87	57-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3092640 3092641

Parameter	Units	10451164003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
2-Methylnaphthalene	ug/kg	ND	34.8	34.9	29.9	25.3	86	72	30-125	17	30	
Acenaphthene	ug/kg	ND	34.8	34.9	30.5	25.9	87	74	30-125	16	30	
Acenaphthylene	ug/kg	ND	34.8	34.9	30.3	23.6	87	68	30-133	25	30	
Anthracene	ug/kg	ND	34.8	34.9	32.6	34.3	94	98	30-150	5	30	
Benzo(a)anthracene	ug/kg	ND	34.8	34.9	30.5	29.1	88	84	30-150	5	30	
Benzo(a)pyrene	ug/kg	ND	34.8	34.9	32.1	32.1	92	92	30-150	0	30	
Benzo(b)fluoranthene	ug/kg	ND	34.8	34.9	32.0	30.7	92	88	30-150	4	30	
Benzo(e)pyrene	ug/kg	ND	34.8	34.9	33.3	32.4	96	93	30-150	3	30	N2
Benzo(g,h,i)perylene	ug/kg	ND	34.8	34.9	34.3	33.1	98	95	30-150	4	30	
Benzo(k)fluoranthene	ug/kg	ND	34.8	34.9	29.2	28.4	84	81	30-150	3	30	
Chrysene	ug/kg	ND	34.8	34.9	29.3	28.3	84	81	30-150	3	30	
Dibenz(a,h)anthracene	ug/kg	ND	34.8	34.9	33.1	31.8	95	91	30-131	4	30	
Fluoranthene	ug/kg	ND	34.8	34.9	31.1	31.5	89	90	30-150	1	30	
Fluorene	ug/kg	ND	34.8	34.9	30.8	28.7	89	82	30-147	7	30	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	34.8	34.9	33.9	32.7	97	94	30-150	3	30	
Naphthalene	ug/kg	ND	34.8	34.9	29.3	24.3	84	70	30-131	19	30	
Phenanthrene	ug/kg	ND	34.8	34.9	31.5	30.7	90	88	30-150	2	30	
Pyrene	ug/kg	ND	34.8	34.9	32.8	31.4	94	90	30-150	4	30	
2-Fluorobiphenyl (S)	%						93	76	42-125			
p-Terphenyl-d14 (S)	%						90	87	57-125			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Saratoga Dam

Pace Project No.: 10450829

QC Batch:	154188	Analysis Method:	EPA 350.1
QC Batch Method:	EPA 350.1	Analysis Description:	350.1 Ammonia
Associated Lab Samples:	10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006		

METHOD BLANK:	610188	Matrix:	Solid
Associated Lab Samples:	10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/kg	ND	9.0	10/12/18 06:54	

LABORATORY CONTROL SAMPLE:	610187
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Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/kg	136	137	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:	610189	610190
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Parameter	Units	10450853001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Ammonia	mg/kg	104	175	175	247	257	81	87	90-110	4	10	M1

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:	610191	610192
--	--------	--------

Parameter	Units	12117117001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Ammonia	mg/kg	29600	20700	20700	46800	46800	83	83	90-110	0	10	E,M1

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QUALITY CONTROL DATA

Project: Saratoga Dam

Pace Project No.: 10450829

QC Batch: 154346 Analysis Method: EPA 351.2
QC Batch Method: EPA 351.2 Analysis Description: 351.2 TKN
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004

METHOD BLANK: 610827 Matrix: Solid
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	ND	100	10/16/18 15:30	

LABORATORY CONTROL SAMPLE: 610826

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	1050	1030	98	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 610828 610829

Parameter	Units	10450400001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Kjeldahl, Total	mg/kg	ND	1100	1100	1180	1170	101	100	90-110	1	15	

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QUALITY CONTROL DATA

Project: Saratoga Dam

Pace Project No.: 10450829

QC Batch: 154860 Analysis Method: EPA 351.2
QC Batch Method: EPA 351.2 Analysis Description: 351.2 TKN
Associated Lab Samples: 10450829005, 10450829006

METHOD BLANK: 613052 Matrix: Solid

Associated Lab Samples: 10450829005, 10450829006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	ND	111	10/23/18 12:29	

LABORATORY CONTROL SAMPLE: 613051

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	1110	1040	94	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 613053 613054

Parameter	Units	10450829005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Kjeldahl, Total	mg/kg	1750	1810	1810	3730	3700	110	108	90-110	1	15	E

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 613055 613056

Parameter	Units	12117319006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Kjeldahl, Total	mg/kg	2620	1210	1210	3320	3320	58	58	90-110	0	15	1M, M1

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QUALITY CONTROL DATA

Project: Saratoga Dam
Pace Project No.: 10450829

QC Batch: 154227 Analysis Method: EPA 353.2
QC Batch Method: EPA 353.2 Analysis Description: 353.2 Nitrate + Nitrite
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

METHOD BLANK: 610293 Matrix: Solid
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, NO2 plus NO3	mg/kg	ND	0.50	10/12/18 15:35	N3

LABORATORY CONTROL SAMPLE: 610292

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, NO2 plus NO3	mg/kg	9.9	9.5	96	90-110	N3

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 610294 610295

Parameter	Units	10450400001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, NO2 plus NO3	mg/kg	ND	12	12	11.5	11.6	95	96	90-110	0	10	N3

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 610296 610297

Parameter	Units	10450853001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, NO2 plus NO3	mg/kg	0.71	11.4	11.4	11.6	11.5	96	95	90-110	1	10	N3

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QUALITY CONTROL DATA

Project: Saratoga Dam
Pace Project No.: 10450829

QC Batch: 154045 Analysis Method: EPA 365.1
QC Batch Method: SM 4500P B Analysis Description: 365.1 Phosphorus, Total
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

METHOD BLANK: 609580 Matrix: Solid
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/kg	ND	6.0	10/11/18 08:54	

LABORATORY CONTROL SAMPLE: 609579

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	26.3	27.1	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 609581 609582

Parameter	Units	10450403001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	6600	884	920	5650	5970	-108	-69	90-110	6	10	M6

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 609650 609651

Parameter	Units	10450829005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/kg	410	43.6	44.5	485	494	171	188	90-110	2	10	M6

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QUALITY CONTROL DATA

Project: Saratoga Dam

Pace Project No.: 10450829

QC Batch: 155245 Analysis Method: EPA 9060A
QC Batch Method: EPA 9060A Analysis Description: 9060 TOC Average
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

METHOD BLANK: 614698 Matrix: Solid
Associated Lab Samples: 10450829001, 10450829002, 10450829003, 10450829004, 10450829005, 10450829006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	ND	302	10/25/18 10:14	

LABORATORY CONTROL SAMPLE: 614699

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	4270	3640	85	49-151	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 614700 614701

Parameter	Units	10450829001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	90300	93300	105000	170000	185000	86	90	70-130	8	25	

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QUALIFIERS

Project: Saratoga Dam
Pace Project No.: 10450829

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
ND - Not Detected at or above LOD.
J - Estimated concentration at or above the LOD and below the LOQ.
LOD - Limit of Detection adjusted for dilution factor and percent moisture.
LOQ - Limit of Quantitation adjusted for dilution factor and percent moisture.
S - Surrogate
1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
LCS(D) - Laboratory Control Sample (Duplicate)
MS(D) - Matrix Spike (Duplicate)
DUP - Sample Duplicate
RPD - Relative Percent Difference
NC - Not Calculable.
SG - Silica Gel - Clean-Up
U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.
N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
TNI - The NELAC Institute.

LABORATORIES

PASI-G Pace Analytical Services - Green Bay
PASI-M Pace Analytical Services - Minneapolis
PASI-V Pace Analytical Services - Virginia

ANALYTE QUALIFIERS

1M The samples were kept frozen; thawed and extracted within the 6 month holding time as indicated by Minnesota Department of Agriculture Guidance Document 11 for extractions and analysis.
D3 Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
E Analyte concentration exceeded the calibration range. The reported result is estimated.
M0 Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.
N2 The lab does not hold NELAC/TNI accreditation for this parameter.
N3 Accreditation is not offered by the relevant laboratory accrediting body for this parameter.
P6 Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.
R1 RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Saratoga Dam

Pace Project No.: 10450829

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10450829001	1	EPA 3550	568823	EPA 8082A	568957
10450829002	2	EPA 3550	568823	EPA 8082A	568957
10450829003	3	EPA 3550	568823	EPA 8082A	568957
10450829004	4	EPA 3550	568823	EPA 8082A	568957
10450829005	5	EPA 3550	568823	EPA 8082A	568957
10450829006	6	EPA 3550	568823	EPA 8082A	568957
10450829001	1	EPA 3050	303599	EPA 6010	303910
10450829002	2	EPA 3050	303599	EPA 6010	303910
10450829003	3	EPA 3050	303599	EPA 6010	303910
10450829004	4	EPA 3050	303599	EPA 6010	303910
10450829005	5	EPA 3050	303599	EPA 6010	303910
10450829006	6	EPA 3050	303599	EPA 6010	303910
10450829001	1	EPA 7471	303477	EPA 7471	303535
10450829002	2	EPA 7471	303477	EPA 7471	303535
10450829003	3	EPA 7471	303477	EPA 7471	303535
10450829004	4	EPA 7471	303477	EPA 7471	303535
10450829005	5	EPA 7471	303477	EPA 7471	303535
10450829006	6	EPA 7471	303477	EPA 7471	303535
10450829001	1	ASTM D2974	570083		
10450829002	2	ASTM D2974	570083		
10450829003	3	ASTM D2974	570083		
10450829004	4	ASTM D2974	570083		
10450829005	5	ASTM D2974	570083		
10450829006	6	ASTM D2974	570083		
10450829001	1	EPA 3550	569962	EPA 8270D by SIM	570265
10450829002	2	EPA 3550	569962	EPA 8270D by SIM	570265
10450829003	3	EPA 3550	569962	EPA 8270D by SIM	570265
10450829004	4	EPA 3550	569962	EPA 8270D by SIM	570265
10450829005	5	EPA 3550	569962	EPA 8270D by SIM	570265
10450829006	6	EPA 3550	569962	EPA 8270D by SIM	570265
10450829001	1	EPA 350.1	154188	EPA 350.1	154225
10450829002	2	EPA 350.1	154188	EPA 350.1	154225
10450829003	3	EPA 350.1	154188	EPA 350.1	154225
10450829004	4	EPA 350.1	154188	EPA 350.1	154225
10450829005	5	EPA 350.1	154188	EPA 350.1	154225
10450829006	6	EPA 350.1	154188	EPA 350.1	154225
10450829001	1	EPA 351.2	154346	EPA 351.2	154372
10450829002	2	EPA 351.2	154346	EPA 351.2	154372
10450829003	3	EPA 351.2	154346	EPA 351.2	154372
10450829004	4	EPA 351.2	154346	EPA 351.2	154372
10450829005	5	EPA 351.2	154860	EPA 351.2	154913
10450829006	6	EPA 351.2	154860	EPA 351.2	154913
10450829001	1	EPA 353.2	154227	EPA 353.2	154239
10450829002	2	EPA 353.2	154227	EPA 353.2	154239
10450829003	3	EPA 353.2	154227	EPA 353.2	154239

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

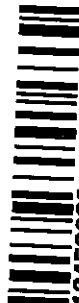
Project: Saratoga Dam

Pace Project No.: 10450829

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10450829004	4	EPA 353.2	154227	EPA 353.2	154239
10450829005	5	EPA 353.2	154227	EPA 353.2	154239
10450829006	6	EPA 353.2	154227	EPA 353.2	154239
10450829001	1	SM 4500P B	154045	EPA 365.1	154123
10450829002	2	SM 4500P B	154045	EPA 365.1	154123
10450829003	3	SM 4500P B	154045	EPA 365.1	154123
10450829004	4	SM 4500P B	154045	EPA 365.1	154123
10450829005	5	SM 4500P B	154045	EPA 365.1	154123
10450829006	6	SM 4500P B	154045	EPA 365.1	154123
10450829001	1	EPA 9060A	155245		
10450829001	1	EPA 9060A	155246		
10450829002	2	EPA 9060A	155245		
10450829002	2	EPA 9060A	155246		
10450829003	3	EPA 9060A	155245		
10450829003	3	EPA 9060A	155246		
10450829004	4	EPA 9060A	155245		
10450829004	4	EPA 9060A	155246		
10450829005	5	EPA 9060A	155245		
10450829005	5	EPA 9060A	155246		
10450829006	6	EPA 9060A	155245		
10450829006	6	EPA 9060A	155246		

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10450829

Section A

Required Client Information:

Section B

Section B Required Project Information:

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Section C

Company: <i>Apex America Inc</i>	Report To:	Attention:	2276298
Address: <i>7439 Oakwood Hills Drive</i>	Copy To:	Company Name:	
<i>Eastview Lp</i>		Address:	
Email To: <i>Bob Warner</i>	Purchase Order No.:	NPDES ☐ GROUND WATER ☐ DRINKING WATER UST ☐ RCRA ☐ OTHER ☐	
Phone: <i>713-851-7506</i>	Project Name:	Site Location STATE:	
Fax:			
Requested Due Date/TAT: <i>Nov</i>	Project Number:	Pace Quote References: Pace Project Manager: Pace Profile #:	<i>39173</i>

[illegible][illegible]

2	SAMPLER NAME AND SIGNATURE		Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	PRINT Name of SAMPLER: Rob Wayne					
	SIGNATURE of SAMPLER: <i>Rob Wayne</i>					
	DATE Signed (MM/DD/YY): 10/8/18					

Pace Container Order #405675

Addresses

Order By :

Company Ayres & Associates
 Contact Wayne, Rob
 Email wayner@ayresassociates.com
 Address 3433 Oakwood Hills Parkway
 Address 2 _____
 City Eau Claire
 State WI Zip 54701
 Phone (715) 831-7506

Ship To :

Company Ayres & Associates
 Contact Wayne, Rob
 Email wayner@ayresassociates.com
 Address 3433 Oakwood Hills Parkway
 Address 2 _____
 City Eau Claire
 State WI Zip 54701
 Phone (715) 831-7506

Return To:

Company Pace Analytical Minnesota
 Contact Michels, Bob
 Email bob.michels@pacelabs.com
 Address 1700 Elm Street
 Address 2 Suite 200
 City Minneapolis
 State MN Zip 55414
 Phone (612)709-5046

Info

Project Name Saratoga Dam Due Date 10/02/2018 Profile 38173 Quote _____
 Project Manager Michels, Bob Return _____ Carrier Most Economical Location _____

Trip Blanks

☐ Include Trip Blanks

Bottle Labels

☐ Blank
☒ Pre-Printed No Sample IDs
☐ Pre-Printed With Sample IDs

Bottles

☐ Boxed Cases
☒ Individually Wrapped
☐ Grouped By Sample

Return Shipping Labels

☒ No Shipper Number
☐ With Shipper Number

COC Options

☒ Number of Blanks 2
☐ Pre-Printed _____

Misc

☐ Sampling Instructions
☒ Custody Seal
☒ Temp. Blanks
☒ Coolers _____
☐ Syringes _____
☐ Extra Bubble Wrap
☐ Short Hold/Rush Stickers
☐ DI Water Liter(s)
☐ USDA Regulated Soils

# of Samples	Matrix	Test	Container	Total	# of QC	Lot #	Notes
6	SL	Moisture	Dry Weight Container	6	0	050718-5	
6	SL	Metals	4oz. jar unpres	6	0	081318-1KM	As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
6	SL	TOC	4oz. Jar unpres	6	0	081318-1KM	
6	SL	Phos, N+N, Ammonia, TKN	8oz. jar unpres	6	0	072318-1LH	
6	SL	PCBs, PAHs	8oz. jar unpres	6	0	072318-1LH	
6	SL	Particle Size Analysis/Sieve/Hydrometer	2-1 gallon ZipLocks, one inside the other	12	0		

RETURN W/ SAMPLES

Hazard Shipping Placard In Place : NO

*Sample receiving hours are Mon-Fri 7:30am-7:00pm and Sat 9:00am-1:00pm unless special arrangements are made with your project manager.

*Pace Analytical reserves the right to return hazardous, toxic, or radioactive samples to you.

*Pace Analytical reserves the right to charge for unused bottles, as well as cost associated with sample storage and disposal.

*Payment term are net 30 days.

*Please include the proposal number on the chain of custody to insure proper billing.

Sample Notes

Ship Date : 09/28/2018

Prepared By: HWF

Verified By: _____

	Document Name:	Document Revised: 02May2018
	Sample Condition Upon Receipt Form	Page 1 of 2
	Document No.: F-MN-L-213-rev.23	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt Courier: ☐ Fed Ex ☒ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ SpeedDee ☐ Other: _____ Tracking Number: <u>1Z 583 184 03 7460 5739</u>	Client Name: <u>Ayres Associates</u> Project #: WO#: 10450829 PM: BM2 Due Date: 10/16/18 CLIENT: AYRES ASSOC.
--	---

Custody Seal on Cooler/Box Present? ☒ Yes ☐ No Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other: _____ Thermometer Used: ☒ G87A9170600254 ☐ G87A9155100842 Cooler Temp Read (°C): <u>4.4</u> Cooler Temp Corrected (°C): <u>4.6</u> Temp should be above freezing to 6°C Correction Factor: <u>+0.2</u> USDA Regulated Soil (☐ N/A, water sample) Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☒ No Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No	Seals Intact? ☒ Yes ☐ No Temp Blank? ☒ Yes ☐ No Type of Ice: ☒ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted Biological Tissue Frozen? ☐ Yes ☐ No ☒ N/A Date and Initials of Person Examining Contents: <u>FE 10/9/18</u> Optional: Proj. Due Date: _____ Proj. Name: _____ If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.
---	---

		COMMENTS:
Chain of Custody Present?	☒ Yes ☐ No	1.
Chain of Custody Filled Out?	☒ Yes ☐ No	2. <u>No Analysis Performed</u>
Chain of Custody Relinquished?	☐ Yes ☒ No	3.
Sampler Name and/or Signature on COC?	☒ Yes ☐ No ☐ N/A	4.
Samples Arrived within Hold Time?	☒ Yes ☐ No	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes ☒ No	6.
Rush Turn Around Time Requested?	☐ Yes ☒ No	7.
Sufficient Volume?	☒ Yes ☐ No	8.
Correct Containers Used?	☒ Yes ☐ No	9.
-Pace Containers Used?	☒ Yes ☐ No	
Containers Intact?	☒ Yes ☐ No	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes ☐ No ☒ N/A	11. Note if sediment is visible in the dissolved container
Is sufficient information available to reconcile the samples to the COC? Matrix: <u>SL</u>	☒ Yes ☐ No	12.
All containers needing acid/base preservation have been checked?	☐ Yes ☐ No ☒ N/A	13. ☐ HNO ₃ ☐ H ₂ SO ₄ ☐ NaOH Positive for Res. Chlorine? Y N
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , <2pH, NaOH >9 Sulfide, NaOH >12 Cyanide)	☐ Yes ☐ No ☒ N/A	Sample #
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	☐ Yes ☐ No ☒ N/A	Initial when completed: _____ Lot # of added preservative: _____
Headspace in VOA Vials (>6mm)?	☐ Yes ☐ No ☒ N/A	14.
Trip Blank Present?	☐ Yes ☐ No ☒ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes ☐ No ☒ N/A	
Pace Trip Blank Lot # (if purchased): <u>N/A</u>		

CLIENT NOTIFICATION/RESOLUTION Person Contacted: _____ Comments/Resolution: _____	Field Data Required? ☐ Yes ☐ No Date/Time: _____
--	---

Project Manager Review: BA VC Date: 10/9/18
 Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Chain of Custody

☐ Samples were sent directly to the Subcontracting Laboratory.

State Of Origin: WI
 Cert. Needed: ☒ Yes

Workorder: 10450829 Workorder Name: 1

Owner Received Date: 10/9/2018 Results Requested By: TUI/ZJ/ZU10

Report To	Subcontract To
-----------	----------------

Bob Michels
Pace Analytical Minnesota
1700 Elm Street
Suite 200

Minneapolis, MN 55414
Phone (612)709-5046

Pace Analytical Virginia MN
315 Chestnut Street
Virginia, MN 55792
Phone (218)742-1042

Requested Analysis

[illegible]

Transfers	Released By	Date/Time	Received By	Date/Time
1	<i>[Signature]</i>	10/9/18 1700	DJCL	10.9.18
2	DJCL	10.9.18	B Mathews	10/10/18
3				

Cooler Temperature on Receipt 0.4 °C	Custody Seal Y or N	Received on Ice Y or N	Samples Intact Y or N
	Y	Y	Y

*****In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document.
This chain of custody is considered complete as is since this information is available in the owner laboratory.

	Document Name: Sample Condition Upon Receipt Form	Document Revised: 15Mar2016 Page 1 of 1
	Document No.: F-VM-C-001-Rev.10	Issuing Authority: Pace Virginia, Minnesota Quality Office

**Sample Condition
Upon Receipt**

Client Name:

Project #:

WO#: 12117109

PM: CLJ

Due Date: 10/23/18

CLIENT: PACE MPLS

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client
☐ Commercial ☒ Pace ☐ Other: _____

Tracking Number: _____

Custody Seal on Cooler/Box Present? ☒ Yes ☐ No Seals Intact? ☒ Yes ☐ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other: _____ Temp Blank? ☒ Yes ☐ No

Thermometer Used: ☒ 140792808 Type of Ice: ☐ Wet ☐ Blue ☐ None ☒ Samples on ice, cooling process has begun

Cooler Temp Read °C: 0.1 Cooler Temp Corrected °C: 0.4 Biological Tissue Frozen? ☐ Yes ☐ No ☒ N/A
 Temp should be above freezing to 6°C Correction Factor: 0.3 Date and Initials of Person Examining Contents: 10/9/18 DC

Comments: Bm 10/10/18

Chain of Custody Present?	☒ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out?	☒ Yes ☐ No ☐ N/A	2.
Chain of Custody Relinquished?	☒ Yes ☒ No ☐ N/A	3.
Sampler Name and Signature on COC?	☒ Yes ☒ No ☐ N/A	4.
Samples Arrived within Hold Time?	☒ Yes ☐ No ☐ N/A	5. If Fecal: ☐ <8 hours ☐ >8, <24 hours ☐ >24 hours
Short Hold Time Analysis (<72 hr)?	☐ Yes ☒ No ☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes ☒ No ☐ N/A	7.
Sufficient Volume?	☒ Yes ☐ No ☐ N/A	8.
Correct Containers Used?	☒ Yes ☐ No ☐ N/A	9.
-Pace Containers Used?	☒ Yes ☐ No ☐ N/A	
Containers Intact?	☒ Yes ☐ No ☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes ☐ No ☒ N/A	11. Note if sediment is visible in the dissolved containers.
Sample Labels Match COC?	☒ Yes ☐ No ☐ N/A	12.
-Includes Date/Time/ID/Analysis Matrix: <u>SL</u>		
All containers needing acid/base preservation will be checked and documented in the pH logbook.	☐ Yes ☐ No ☒ N/A	See pH log for results and additional preservation documentation
Headspace in Methyl Mercury Container	☐ Yes ☐ No ☒ N/A	13.
Headspace in VOA Vials (>6mm)?	☐ Yes ☐ No ☒ N/A	14.
Trip Blank Present?	☐ Yes ☐ No ☒ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes ☐ No ☒ N/A	
Pace Trip Blank Lot # (if purchased):		

CLIENT NOTIFICATION/RESOLUTION

Field Data Required? ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

FECAL WAIVER ON FILE Y N

TEMPERATURE WAIVER ON FILE Y N

Project Manager Review:

Date: 10/10/18

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

401773419

State Of Origin: WI
 Cert. Needed: ☒ Yes
 Owner Received Date:

Owner Received Date: 10/9/2018 Results Requested By: 10/23/2018

Subcontract To

Pace Analytical Green Bay
1241 Bellevue Street
Suite 9
Green Bay, WI 54302
Phone (920)469-2436

Requested Analysis

009/2018	Results Requested By:	10/23/2018
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****metals: As, Cd, Cr, Cu, Pb, Hg, Ni, Zn**

This chain of custody is considered complete as is since this information is available in the owner laboratory

Sample Preservation Receipt Form

Client Name: PAC-MN

Project # 40177349

All containers needing preservation have been checked and noted below: Yes ☒ No ☐ NA

Lab Lot# of pH paper: 10255761

Lab Lot# of pH paper: 10255761

Initial when completed: JM

Date/Time: JM

Pace Lab #	Glass			Plastic			Vials			Jars		General		VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)							
	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S								DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU
001																											2.5 / 5 / 10
002																											2.5 / 5 / 10
003																											2.5 / 5 / 10
004																											2.5 / 5 / 10
005																											2.5 / 5 / 10
006																											2.5 / 5 / 10
007																											2.5 / 5 / 10
008																											2.5 / 5 / 10
009																											2.5 / 5 / 10
010																											2.5 / 5 / 10
011																											2.5 / 5 / 10
012																											2.5 / 5 / 10
013																											2.5 / 5 / 10
014																											2.5 / 5 / 10
015																											2.5 / 5 / 10
016																											2.5 / 5 / 10
017																											2.5 / 5 / 10
018																											2.5 / 5 / 10
019																											2.5 / 5 / 10
020																											2.5 / 5 / 10

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other: _____ Headspace in VOA Vials (>6mm): ☐ Yes ☒ No NA *If yes look in headspace column

AG1U	1 liter amber glass	BP1U	1 liter plastic unpres	DG9A	40 ml amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 ml amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3C	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH		
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI		
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4				

SP5T	120 mL plastic Na Thiosulfate
ZPLC	ziploc bag
GN:	402 Hg jar unpres

 1241 Bellevue Street, Green Bay, WI 54302	Document Name: Sample Condition Upon Receipt (SCUR)	Document Revised: 25Apr2018
	Document No.: F-GB-C-031-Rev.07	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

Client Name: PACE-MN

Courier: ☐ CS Logistics ☐ Fed Ex ☐ Speedee ☐ UPS ☒ Walco
☐ Client ☐ Pace Other: _____

Tracking #: 1859297-1

Custody Seal on Cooler/Box Present: ☒ Yes ☐ No Seals intact: ☒ Yes ☐ No

Custody Seal on Samples Present: ☐ Yes ☒ No Seals intact: ☐ Yes ☐ No

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____

Thermometer Used SR-77

Type of Ice: ☒ Wet ☐ Blue ☐ Dry ☐ None

☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2.0 ICorr: 2.0

Temp Blank Present: ☒ Yes ☐ No

Biological Tissue is Frozen: ☐ Yes ☐ No

Person examining contents:

Date: 10/10/18

Initials: SM

Temp should be above freezing to 6°C.

Biota Samples may be received at ≤ 0°C.

Chain of Custody Present:	☒ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out:	☒ Yes ☐ No ☐ N/A	2.
Chain of Custody Relinquished:	☒ Yes ☐ No ☐ N/A	3.
Sampler Name & Signature on COC:	☐ Yes ☐ No ☒ N/A	4. <u>IRWD</u> <u>SM 10/10/18</u>
Samples Arrived within Hold Time:	☒ Yes ☐ No	5.
- VOA Samples frozen upon receipt	☐ Yes ☐ No	Date/Time:
Short Hold Time Analysis (<72hr):	☐ Yes ☒ No	6.
Rush Turn Around Time Requested:	☐ Yes ☒ No	7.
Sufficient Volume:		8.
For Analysis: ☒ Yes ☐ No MS/MSD: ☐ Yes ☒ No ☐ N/A		
Correct Containers Used:	☒ Yes ☐ No	9.
-Pace Containers Used:	☐ Yes ☐ No ☒ N/A	
-Pace IR Containers Used:	☒ Yes ☐ No ☐ N/A	
Containers Intact:	☒ Yes ☐ No	10.
Filtered volume received for Dissolved tests	☐ Yes ☐ No ☒ N/A	11.
Sample Labels match COC:	☒ Yes ☐ No ☐ N/A	12.
-Includes date/time/ID/Analysis Matrix: <u>S</u>		
Trip Blank Present:	☐ Yes ☐ No ☒ N/A	13.
Trip Blank Custody Seals Present	☐ Yes ☐ No ☒ N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution:

If checked, see attached form for additional comments ☐

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: CS

Date: 10/10/18

Intra-Regional Chain of Custody



Workorder: 10450829 Workorder Name: Saratoga Dam Owner Received Date: 10/9/2018 Due Date: 10/23/2018

Received at: Pace Analytical Minnesota
1700 Elm Street
Suite 200
Minneapolis, MN 55414
Phone (612)709-5046

Send To Lab: Pace Analytical Billings MT
150 N Ninth Street
Billings, MT 59101
Phone (406)254-7226

Report To: Bob Michels

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers						LAB USE ONLY
						ZPLK						
1		PS	10/3/2018 12:30	10450829001	Solid	1						
2		PS	10/3/2018 12:35	10450829002	Solid	1						
3		PS	10/3/2018 12:40	10450829003	Solid	1						
4		PS	10/3/2018 12:45	10450829004	Solid	1						
5		PS	10/3/2018 12:50	10450829005	Solid	1						
6		PS	10/3/2018 12:55	10450829006	Solid	1						

Transfers				Received By			
Released By	Date/Time	Received By	Date/Time	Received on Ice	Y or N	Samples Intact	Y or N
<i>gjc / Pace</i>	10/19/18 15:00	<i>Muattew Rose</i>	10/18/18 09:20	☒		☒	
<i>Lead Ex</i>							

Cooler Temperature on Receipt 2.2 °C Custody Seal ☒ Received on Ice ☒ Samples Intact ☒ Y or N

***In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document.
This chain of custody is considered complete as is since this information is available in the owner laboratory.

	Document Name:	Document Revised: 20Aug2018
	Sample Condition Upon Receipt Form	Page 1 of 1
	Document No.: F-MT-C-184-Rev.13	Issuing Authority: Pace Montana Quality Office

Sample Condition Upon Receipt	Client Name:	Project #:
	<u>Pace-MN</u>	<u>10450829</u>
Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other:		
Tracking Number: <u>4638 01931166</u>		

Custody Seal on Cooler/Box Present? ☒ Yes ☐ No Seals Intact? ☒ Yes ☐ No Optional: Proj. Due Date: Proj. Name:

Packing Material: ☒ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other: Temp Blank? ☒ Yes ☐ No

Thermometer Used: ☒ G86A9181101159 ☐ 140279186 Type of Ice: ☒ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read: 2.2 Date and Initials of Person Examining Contents: mw 10/10/18
 Cooler Temp Corrected: 2.2 Biological Tissue Frozen? ☐ Yes ☒ No

USDA Regulated Soil ☐ Yes ☒ No
 Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA? Check maps & Circle State
 Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

Chain of Custody Present?	Yes	No	N/A	Comments:
Chain of Custody Filled Out?	☒	☐	☐	1.
Chain of Custody Relinquished?	☒	☐	☐	2.
Sampler Name and Signature on COC?	☐	☒	☐	3.
Samples Arrived within Hold Time?	☒	☐	☐	4.
Short Hold Time Analysis (<72 hr)?	☐	☒	☐	5.
Rush Turn Around Time Requested?	☐	☒	☐	6.
Sufficient Volume?	☒	☐	☐	7.
Correct Containers Used?	☒	☐	☐	8.
-Pace Containers Used?	☐	☒	☐	9.
Containers Intact?	☒	☐	☐	10.
Filtered Volume Received for Dissolved Tests? Note if sediment is visible in the dissolved container.	☐	☐	☒	11.
Sample Labels Match COC?	☒	☐	☐	12.
-Includes Date/Time/ID/Analysis Matrix: <u>Soil</u>				
All containers needing acid/base preservation have been checked?	☐	☐	☒	13. ☐ HNO ₃ ☐ H ₂ SO ₄ ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>12 Cyanide)	☐	☐	☒	Sample # ☐ NaOH+ZnAce
Exceptions: VOA, Coliform, TOC, Oil and Grease, WI-DRO (water)	☐	☒		Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐	☐	☒	14.
Trip Blank Present?	☐	☐	☒	15.
Trip Blank Custody Seals Present?	☐	☐	☒	
Pace Trip Blank Lot # (if purchased): <u>N/A</u>				

CLIENT NOTIFICATION/RESOLUTION

Field Data Required? ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____
 Comments/Resolution: _____

Project Manager Review: _____

Date: _____

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

GRAIN SIZE DISTRIBUTION TEST DATA

10/18/2018

Client: Ayers Associates

Project: Saratoga Dam

Location: 1

Sample Number: 10450826-1

Material Description: silt

Sample Date: 10/3/18

Date Received: 10/9/18 **PL:** NP

LL: NV

USCS Classification: ML

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM D422

Tested By: Will Thomas

Test Date: 10/16/18

Checked By: Rhonda Johnson

Title: Lab Manager

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
761.78	572.38	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	0.35	0.00	100
		#4	0.09	0.00	100
		#10	0.24	0.00	100
51.23	0.00	#20	0.63	0.00	98
		#40	0.76	0.00	97
		#60	1.18	0.00	95
		#140	2.72	0.00	89
		#200	0.93	0.00	88

Hydrometer Test Data

Hydrometer test uses material passing #200

Percent passing #200 based upon complete sample = 88

Weight of hydrometer sample = 51.23

Automatic temperature correction

Composite correction (fluid density and meniscus height) at 20 deg. C = -7

Meniscus correction only = 0.0

Specific gravity of solids = 2.65

Hydrometer type = 152H

Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.0	40.0	33.0	0.0136	40.0	9.7	0.0301	56.3
5.00	20.0	31.0	24.0	0.0136	31.0	11.2	0.0204	40.9
15.00	20.0	28.0	21.0	0.0136	28.0	11.7	0.0121	35.8
30.00	20.0	25.0	18.0	0.0136	25.0	12.2	0.0087	30.7
60.00	20.0	22.0	15.0	0.0136	22.0	12.7	0.0063	25.6
250.00	20.0	17.0	10.0	0.0136	17.0	13.5	0.0032	17.0
1440.00	20.0	15.0	8.0	0.0136	15.0	13.8	0.0013	13.6

Pace Analytical Services, Inc.

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
--------------------------------	----------------------------	---------------------------	------------------------------	----------	-----------	-----------------------	---------------------------	--------------------------

Fractional Components

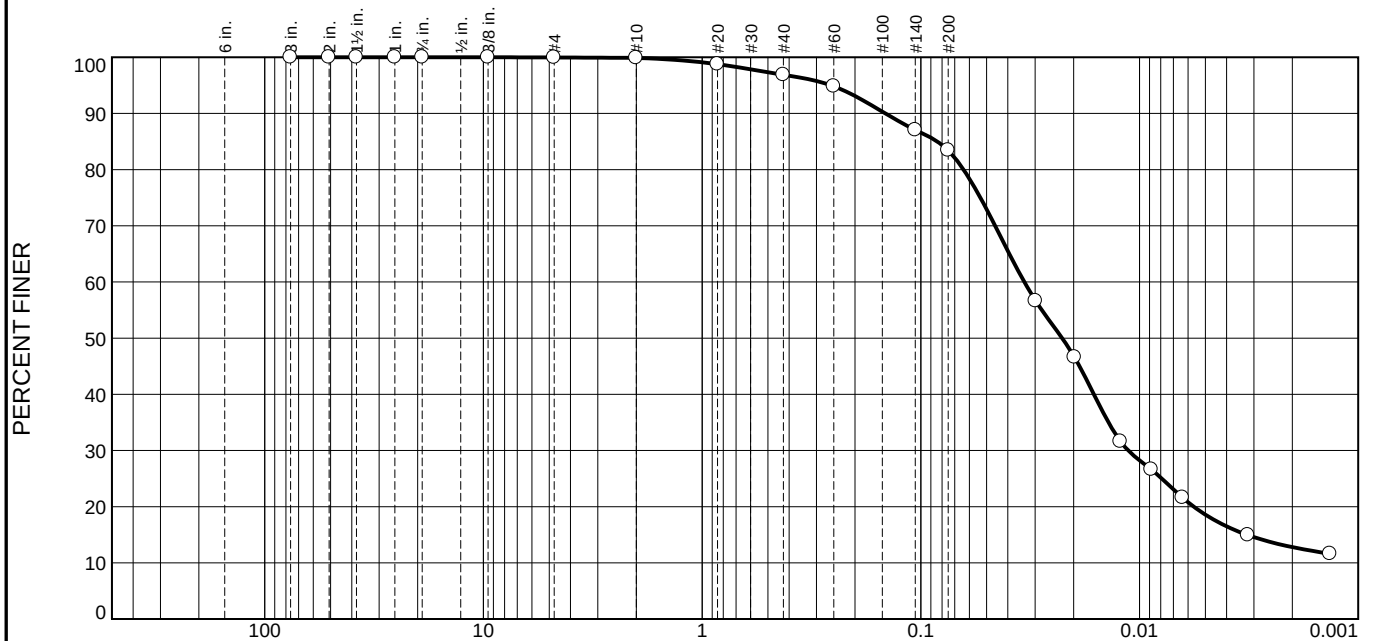
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	0	3	9	12	66	22	88

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
		0.0023	0.0042	0.0084	0.0196	0.0262	0.0326	0.0537	0.0647	0.1243	0.2659

Fineness Modulus
0.17

Pace Analytical Services, Inc.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	3	14	64	19

TEST RESULTS (ASTM D422)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.375	100		
#4	100		
#10	100		
#20	99		
#40	97		
#60	95		
#140	87		
#200	83		
0.0299 mm.	57		
0.0198 mm.	47		
0.0122 mm.	32		
0.0088 mm.	27		
0.0064 mm.	22		
0.0032 mm.	15		
0.0013 mm.	12		

* (no specification provided)

Material Description	
silt with sand	
Atterberg Limits (ASTM D 4318)	
PL= NP	LL= NV PI=
Classification	
USCS (D 2487)= ML	AASHTO (M 145)= A-4(0)
Coefficients	
D ₉₀ = 0.1453	D ₈₅ = 0.0840 D ₆₀ = 0.0336
D ₅₀ = 0.0226	D ₃₀ = 0.0113 D ₁₅ = 0.0032
D ₁₀ =	C _u = C _c =
Remarks	
Date Received: 10/9/18	Date Tested: 10/16/18
Tested By: Will Thomas	
Checked By: Rhonda Johnson	
Title: Lab Manager	

Location: 2
Sample Number: 10450826-2

Date Sampled: 10/3/18

Pace Analytical Services, Inc.

Client: Ayers Associates
Project: Saratoga Dam

Billings, MT

Project No:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

10/18/2018

Client: Ayers Associates

Project: Saratoga Dam

Location: 2

Sample Number: 10450826-2

Material Description: silt with sand

Sample Date: 10/3/18

Date Received: 10/9/18 **PL:** NP

LL: NV

USCS Classification: ML

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM D422

Tested By: Will Thomas

Test Date: 10/16/18

Checked By: Rhonda Johnson

Title: Lab Manager

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
869.47	646.17	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	0.00	0.00	100
		#4	0.08	0.00	100
		#10	0.18	0.00	100
50.05	0.00	#20	0.56	0.00	99
		#40	0.95	0.00	97
		#60	1.02	0.00	95
		#140	3.90	0.00	87
		#200	1.81	0.00	83

Hydrometer Test Data

Hydrometer test uses material passing #200

Percent passing #200 based upon complete sample = 83

Weight of hydrometer sample = 50.05

Automatic temperature correction

Composite correction (fluid density and meniscus height) at 20 deg. C = -7

Meniscus correction only = 0.0

Specific gravity of solids = 2.65

Hydrometer type = 152H

Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.0	41.0	34.0	0.0136	41.0	9.6	0.0299	56.6
5.00	20.0	35.0	28.0	0.0136	35.0	10.6	0.0198	46.6
15.00	20.0	26.0	19.0	0.0136	26.0	12.0	0.0122	31.6
30.00	20.0	23.0	16.0	0.0136	23.0	12.5	0.0088	26.6
60.00	20.0	20.0	13.0	0.0136	20.0	13.0	0.0064	21.6
250.00	20.0	16.0	9.0	0.0136	16.0	13.7	0.0032	14.9
1440.00	20.0	14.0	7.0	0.0136	14.0	14.0	0.0013	11.6

Pace Analytical Services, Inc.

Fractional Components

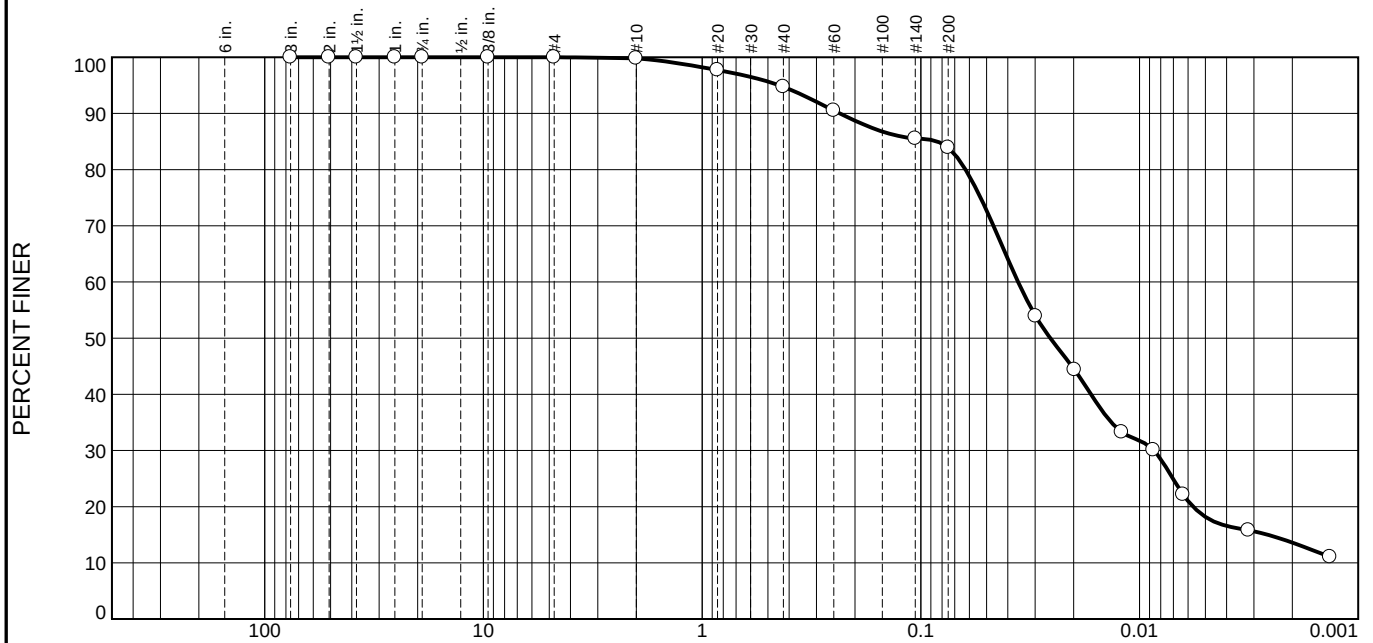
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	0	3	14	17	64	19	83

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
		0.0032	0.0056	0.0113	0.0162	0.0226	0.0336	0.0637	0.0840	0.1453	0.2568

Fineness Modulus
0.17

Pace Analytical Services, Inc.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	5	11	66	18

TEST RESULTS (ASTM D422)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.375	100		
#4	100		
#10	100		
#20	98		
#40	95		
#60	91		
#140	86		
#200	84		
0.0299 mm.	54		
0.0198 mm.	44		
0.0121 mm.	33		
0.0086 mm.	30		
0.0063 mm.	22		
0.0032 mm.	16		
0.0013 mm.	11		

* (no specification provided)

Material Description	
silt with sand	
Atterberg Limits (ASTM D 4318)	
PL= NP	LL= NV PI=
Classification	
USCS (D 2487)= ML	AASHTO (M 145)= A-4(0)
Coefficients	
D ₉₀ = 0.2349	D ₈₅ = 0.0839 D ₆₀ = 0.0359
D ₅₀ = 0.0256	D ₃₀ = 0.0086 D ₁₅ = 0.0026
D ₁₀ =	C _u = C _c =
Remarks	
Date Received: 10/9/18	Date Tested: 10/16/18
Tested By: Will Thomas	
Checked By: Rhonda Johnson	
Title: Lab Manager	

Location: 3
Sample Number: 10450826-3

Date Sampled: 10/3/18

Pace Analytical Services, Inc.

Client: Ayers Associates
Project: Saratoga Dam

Billings, MT

Project No:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

10/18/2018

Client: Ayers Associates**Project:** Saratoga Dam**Location:** 3**Sample Number:** 10450826-3**Material Description:** silt with sand**Sample Date:** 10/3/18**Date Received:** 10/9/18 **PL:** NP**LL:** NV**USCS Classification:** ML**AASHTO Classification:** A-4(0)**Grain Size Test Method:** ASTM D422**Tested By:** Will Thomas**Test Date:** 10/16/18**Checked By:** Rhonda Johnson**Title:** Lab Manager**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
810.54	591.06	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	0.00	0.00	100
		#4	0.00	0.00	100
		#10	0.42	0.00	100
52.87	0.00	#20	1.11	0.00	98
		#40	1.58	0.00	95
		#60	2.23	0.00	91
		#140	2.64	0.00	86
		#200	0.86	0.00	84

Hydrometer Test Data**Hydrometer test uses material passing #200****Percent passing #200 based upon complete sample = 84****Weight of hydrometer sample = 52.87****Automatic temperature correction****Composite correction (fluid density and meniscus height) at 20 deg. C = -7****Meniscus correction only = 0.0****Specific gravity of solids = 2.65****Hydrometer type = 152H****Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.0	41.0	34.0	0.0136	41.0	9.6	0.0299	53.9
5.00	20.0	35.0	28.0	0.0136	35.0	10.6	0.0198	44.4
15.00	20.0	28.0	21.0	0.0136	28.0	11.7	0.0121	33.3
30.00	20.0	26.0	19.0	0.0136	26.0	12.0	0.0086	30.1
60.00	20.0	21.0	14.0	0.0136	21.0	12.9	0.0063	22.2
250.00	20.0	17.0	10.0	0.0136	17.0	13.5	0.0032	15.8
1440.00	20.0	14.0	7.0	0.0136	14.0	14.0	0.0013	11.0

Pace Analytical Services, Inc.

Fractional Components

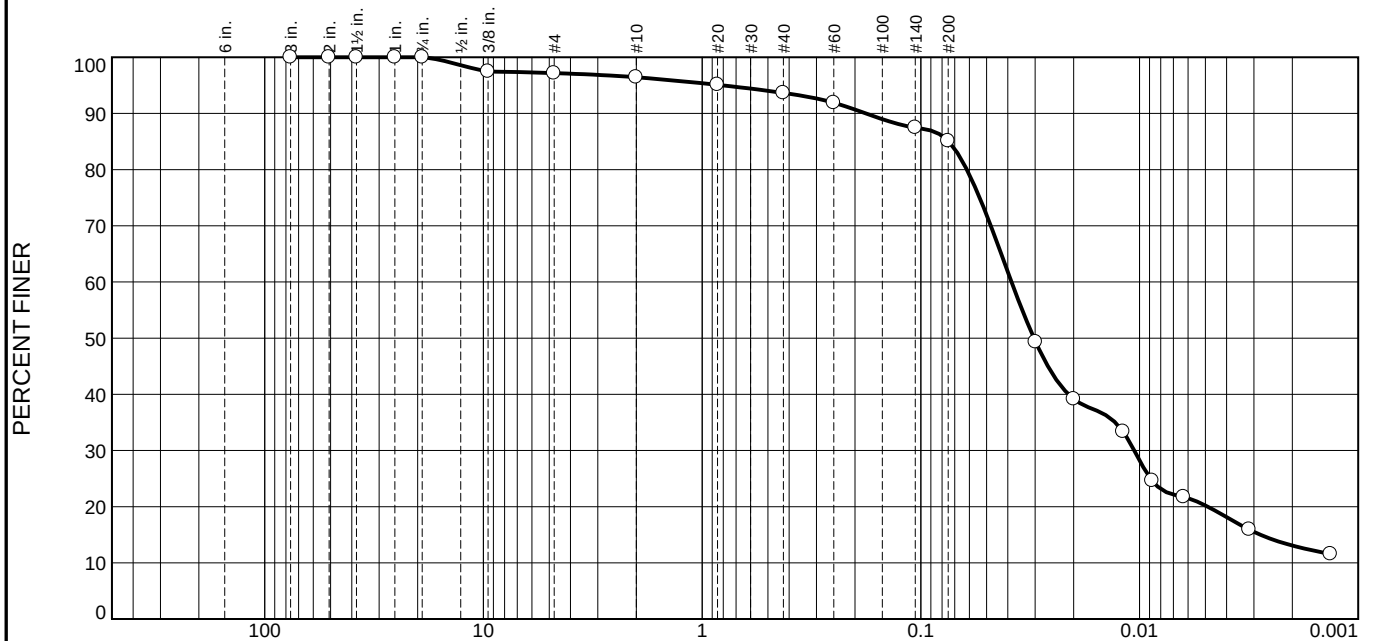
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	0	5	11	16	66	18	84

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
		0.0026	0.0057	0.0086	0.0167	0.0256	0.0359	0.0624	0.0839	0.2349	0.4437

Fineness Modulus
0.26

Pace Analytical Services, Inc.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	3	1	2	9	65	20

TEST RESULTS (ASTM D422)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.375	97		
#4	97		
#10	96		
#20	95		
#40	94		
#60	92		
#140	87		
#200	85		
0.0299 mm.	49		
0.0200 mm.	39		
0.0119 mm.	33		
0.0088 mm.	25		
0.0063 mm.	22		
0.0032 mm.	16		
0.0013 mm.	12		

* (no specification provided)

Material Description	
silt with sand	
Atterberg Limits (ASTM D 4318)	
PL= NP	LL= NV PI=
Classification	
USCS (D 2487)= ML	AASHTO (M 145)= A-4(0)
Coefficients	
D ₉₀ = 0.1784	D ₈₅ = 0.0746 D ₆₀ = 0.0385
D ₅₀ = 0.0304	D ₃₀ = 0.0106 D ₁₅ = 0.0028
D ₁₀ =	C _u = C _c =
Remarks	
Date Received: 10/9/18	Date Tested: 10/16/18
Tested By: Will Thomas	
Checked By: Rhonda Johnson	
Title: Lab Manager	

Location: 4
Sample Number: 10450826-4

Date Sampled: 10/3/18

Pace Analytical Services, Inc.

Client: Ayers Associates
Project: Saratoga Dam

Billings, MT

Project No:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

10/18/2018

Client: Ayers Associates**Project:** Saratoga Dam**Location:** 4**Sample Number:** 10450826-4**Material Description:** silt with sand**Sample Date:** 10/3/18**Date Received:** 10/9/18 **PL:** NP**LL:** NV**USCS Classification:** ML**AASHTO Classification:** A-4(0)**Grain Size Test Method:** ASTM D422**Tested By:** Will Thomas**Test Date:** 10/16/18**Checked By:** Rhonda Johnson**Title:** Lab Manager**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
799.90	622.22	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	4.51	0.00	97
		#4	0.52	0.00	97
		#10	1.29	0.00	96
58.60	0.00	#20	0.82	0.00	95
		#40	0.88	0.00	94
		#60	1.06	0.00	92
		#140	2.70	0.00	87
		#200	1.43	0.00	85

Hydrometer Test Data**Hydrometer test uses material passing #200****Percent passing #200 based upon complete sample = 85****Weight of hydrometer sample = 58.6****Automatic temperature correction****Composite correction (fluid density and meniscus height) at 20 deg. C = -7****Meniscus correction only = 0.0****Specific gravity of solids = 2.65****Hydrometer type = 152H****Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.0	41.0	34.0	0.0136	41.0	9.6	0.0299	49.3
5.00	20.0	34.0	27.0	0.0136	34.0	10.7	0.0200	39.2
15.00	20.0	30.0	23.0	0.0136	30.0	11.4	0.0119	33.3
30.00	20.0	24.0	17.0	0.0136	24.0	12.4	0.0088	24.6
60.00	20.0	22.0	15.0	0.0136	22.0	12.7	0.0063	21.7
250.00	20.0	18.0	11.0	0.0136	18.0	13.3	0.0032	15.9
1440.00	20.0	15.0	8.0	0.0136	15.0	13.8	0.0013	11.6

Pace Analytical Services, Inc.

Fractional Components

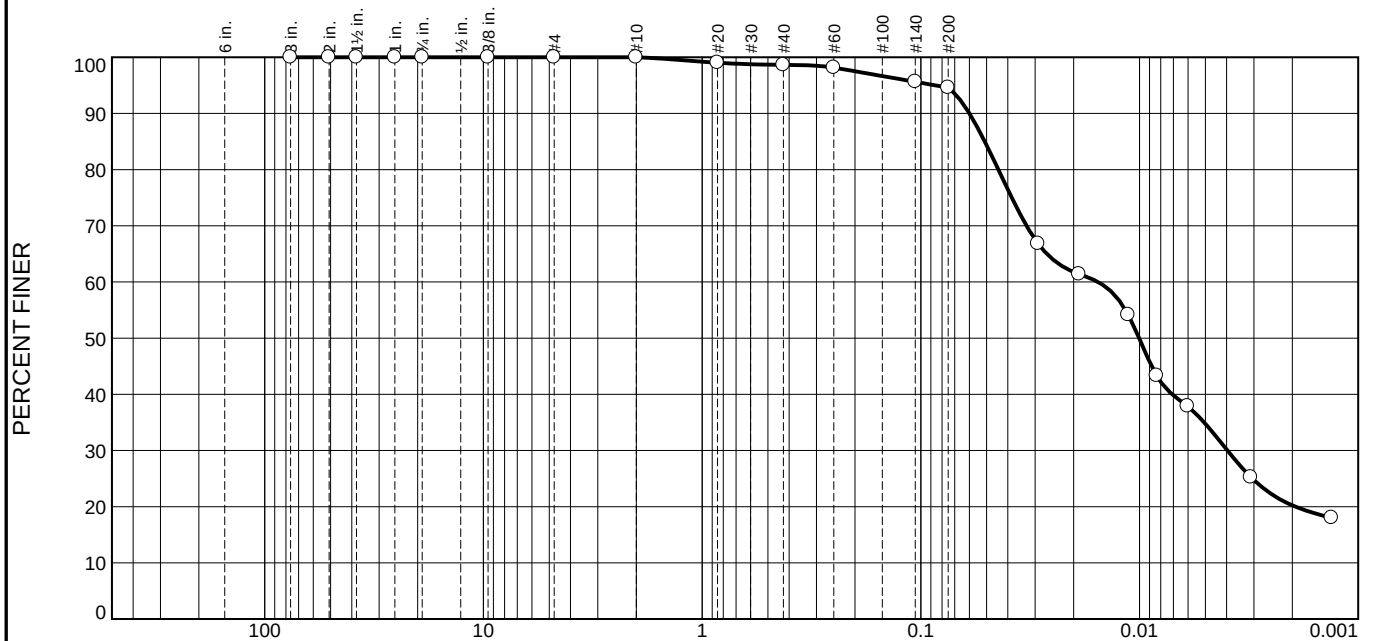
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	3	3	1	2	9	12	65	20	85

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
		0.0028	0.0049	0.0106	0.0212	0.0304	0.0385	0.0616	0.0746	0.1784	0.8076

Fineness Modulus
0.37

Pace Analytical Services, Inc.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	4	60	35

TEST RESULTS (ASTM D422)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.375	100		
#4	100		
#10	100		
#20	99		
#40	99		
#60	98		
#140	96		
#200	95		
0.0291 mm.	67		
0.0189 mm.	61		
0.0113 mm.	54		
0.0083 mm.	43		
0.0060 mm.	38		
0.0031 mm.	25		
0.0013 mm.	18		

* (no specification provided)

Material Description	
silt	
Atterberg Limits (ASTM D 4318)	
PL= NP	LL= NV PI=
Classification	
USCS (D 2487)= ML	AASHTO (M 145)= A-4(0)
Coefficients	
D ₉₀ = 0.0599	D ₈₅ = 0.0510 D ₆₀ = 0.0155
D ₅₀ = 0.0100	D ₃₀ = 0.0040 D ₁₅ =
D ₁₀ =	C _u = C _c =
Remarks	
Date Received: 10/9/18 Date Tested: 10/16/18	
Tested By: Will Thomas	
Checked By: Rhonda Johnson	
Title: Lab Manager	

Location: 5
Sample Number: 10450826-5

Date Sampled: 10/3/18

Pace Analytical Services, Inc.

Client: Ayers Associates
Project: Saratoga Dam

Billings, MT

Project No:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

10/18/2018

Client: Ayers Associates

Project: Saratoga Dam

Location: 5

Sample Number: 10450826-5

Material Description: silt

Sample Date: 10/3/18

Date Received: 10/9/18 **PL:** NP

LL: NV

USCS Classification: ML

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM D422

Tested By: Will Thomas

Test Date: 10/16/18

Checked By: Rhonda Johnson

Title: Lab Manager

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
725.65	577.23	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	0.00	0.00	100
		#4	0.00	0.00	100
		#10	0.00	0.00	100
52.33	0.00	#20	0.51	0.00	99
		#40	0.20	0.00	99
		#60	0.25	0.00	98
		#140	1.33	0.00	96
		#200	0.54	0.00	95

Hydrometer Test Data

Hydrometer test uses material passing #200

Percent passing #200 based upon complete sample = 95

Weight of hydrometer sample = 52.33

Automatic temperature correction

Composite correction (fluid density and meniscus height) at 20 deg. C = -7

Meniscus correction only = 0.0

Specific gravity of solids = 2.65

Hydrometer type = 152H

Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.0	44.0	37.0	0.0136	44.0	9.1	0.0291	66.8
5.00	20.0	41.0	34.0	0.0136	41.0	9.6	0.0189	61.4
15.00	20.0	37.0	30.0	0.0136	37.0	10.2	0.0113	54.2
30.00	20.0	31.0	24.0	0.0136	31.0	11.2	0.0083	43.3
60.00	20.0	28.0	21.0	0.0136	28.0	11.7	0.0060	37.9
250.00	20.0	21.0	14.0	0.0136	21.0	12.9	0.0031	25.2
1440.00	20.0	17.0	10.0	0.0136	17.0	13.5	0.0013	18.0

Pace Analytical Services, Inc.

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	0	1	4	5	60	35	95

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
			0.0019	0.0040	0.0071	0.0100	0.0155	0.0442	0.0510	0.0599	0.0860

Fineness Modulus
0.07

Pace Analytical Services, Inc.

The graph displays the percent finer versus sieve size for a sample. The x-axis represents sieve size in inches on a logarithmic scale, with major ticks at 100, 10, 1, 0.1, 0.01, and 0.001. The y-axis represents the percent finer on a linear scale from 0 to 100. The curve shows that approximately 90% of the material is finer than 0.075 mm (No. 20 sieve), and about 14% is finer than 0.0075 mm (No. 200 sieve).

Sieve Size (inches)	Sieve Size (mm)	Percent Finer (%)
6 in.	152.4	100
3 in.	76.2	100
2 in.	50.8	100
1 1/2 in.	38.1	100
1 in.	25.4	100
3/4 in.	19.0	100
1/2 in.	12.5	100
3/8 in.	9.5	100
1/4 in.	6.3	100
No. 10	2.0	100
No. 20	0.85	90
No. 30	0.60	88
No. 40	0.425	85
No. 60	0.25	75
No. 100	0.15	65
No. 140	0.106	50
No. 200	0.075	28
No. 250	0.060	27
No. 300	0.050	20
No. 400	0.0375	14

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	3	8	65	24

TEST RESULTS (ASTM D422)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.375	100		
#4	100		
#10	100		
#20	99		
#40	97		
#60	96		
#140	91		
#200	89		
0.0272 mm.	65		
0.0190 mm.	49		
0.0114 mm.	42		
0.0087 mm.	27		
0.0062 mm.	27		
0.0031 mm.	19		
0.0013 mm.	13		

Material Description

Atterberg Limits (ASTM D 4318)

$$PI = NP$$

Classification

AASHTO (M 145)= A-4(0)

Coefficients

$$C_y =$$
$$C \equiv C$$

Remarks

Date Tested: 10/16/18

Tested By: Will Thomas

Checked By: Rhonda Johnson

Title: Lab Manager

Date Sampled: 10/3/18

Sample Number: 10450826-6

Pace Analytical Services, Inc.

Client: Ayers Associates

Project: Saratoga Dam

Billings, MT

Project No:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

10/18/2018

Client: Ayers Associates

Project: Saratoga Dam

Location: 6

Sample Number: 10450826-6

Material Description: silt

Sample Date: 10/3/18

Date Received: 10/9/18 **PL:** NP

LL: NV

PI: NP

USCS Classification: ML

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM D422

Tested By: Will Thomas

Test Date: 10/16/18

Checked By: Rhonda Johnson

Title: Lab Manager

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
784.05	639.70	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	0.00	0.00	100
		#4	0.06	0.00	100
		#10	0.28	0.00	100
59.90	0.00	#20	0.61	0.00	99
		#40	0.75	0.00	97
		#60	1.12	0.00	96
		#140	2.92	0.00	91
		#200	1.02	0.00	89

Hydrometer Test Data

Hydrometer test uses material passing #200

Percent passing #200 based upon complete sample = 89

Weight of hydrometer sample = 59.9

Automatic temperature correction

Composite correction (fluid density and meniscus height) at 20 deg. C = -7

Meniscus correction only = 0.0

Specific gravity of solids = 2.65

Hydrometer type = 152H

Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	20.0	51.0	44.0	0.0136	51.0	7.9	0.0272	65.4
5.00	20.0	40.0	33.0	0.0136	40.0	9.7	0.0190	49.0
15.00	20.0	35.0	28.0	0.0136	35.0	10.6	0.0114	41.6
30.00	20.0	25.0	18.0	0.0136	25.0	12.2	0.0087	26.7
60.00	20.0	25.0	18.0	0.0136	25.0	12.2	0.0062	26.7
250.00	20.0	20.0	13.0	0.0136	20.0	13.0	0.0031	19.3
1440.00	20.0	16.0	9.0	0.0136	16.0	13.7	0.0013	13.3

Pace Analytical Services, Inc.

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	0	3	8	11	65	24	89

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
		0.0021	0.0034	0.0094	0.0111	0.0197	0.0245	0.0402	0.0510	0.0894	0.2211

Fineness Modulus
0.14

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