Saratoga Survey and Sampling Report

Waukesha County, Wisconsin

Prepared for:

City of Waukesha

November 2019

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Saratoga Survey and Sampling Report

Waukesha County, Wisconsin

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Ayres Associates Project No. 26-1083.00
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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
October 3, 2018 Samples
Detects Only

Detects Only	Sample 1	2	3	4	5	6	Non-Industrial Direct Contact RCL	Industrial Direct Contact RCL	Ground Water RCL	Back ground Threshold Value
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) were 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

Rob Wayne
Environmental Scientist
715.831.7506
WayneR@AyresAssociates.com

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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.*

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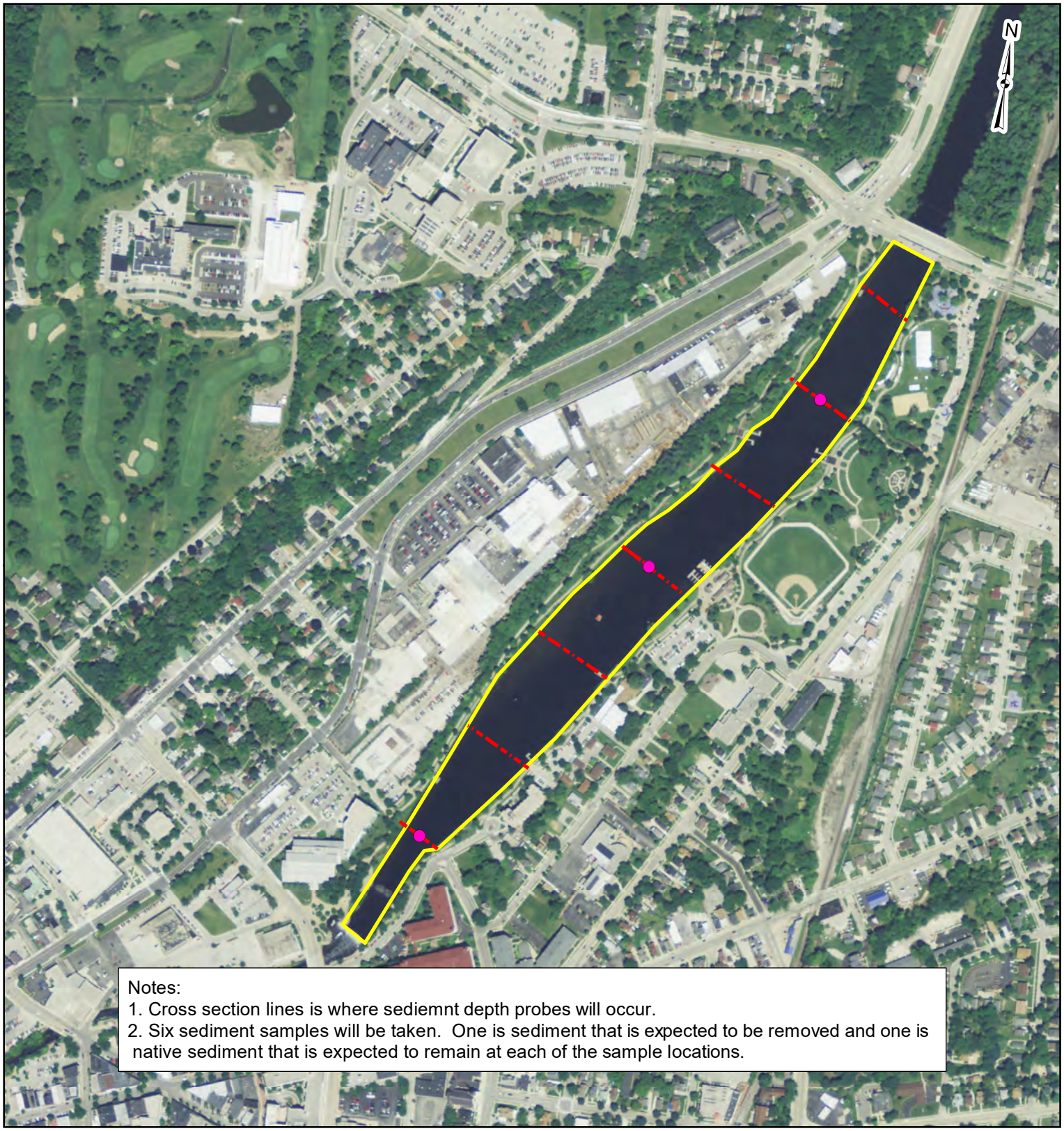
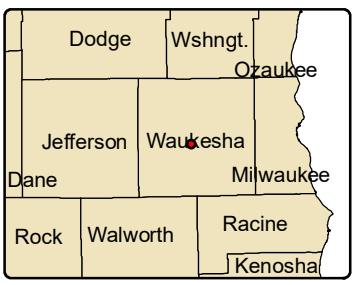
800.666.3103 ● www.AyresAssociates.com

- 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



Location
Sec. 4 T6N, R19E
Waukesha County, Wisconsin

0 400 800
Feet

Legend

- Sediment Sample Location
- Survey Limits
- Probe Cross Sections

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Saratoga Dam Sediment Sampling - Planned Samples include all highlighted fields.

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)		

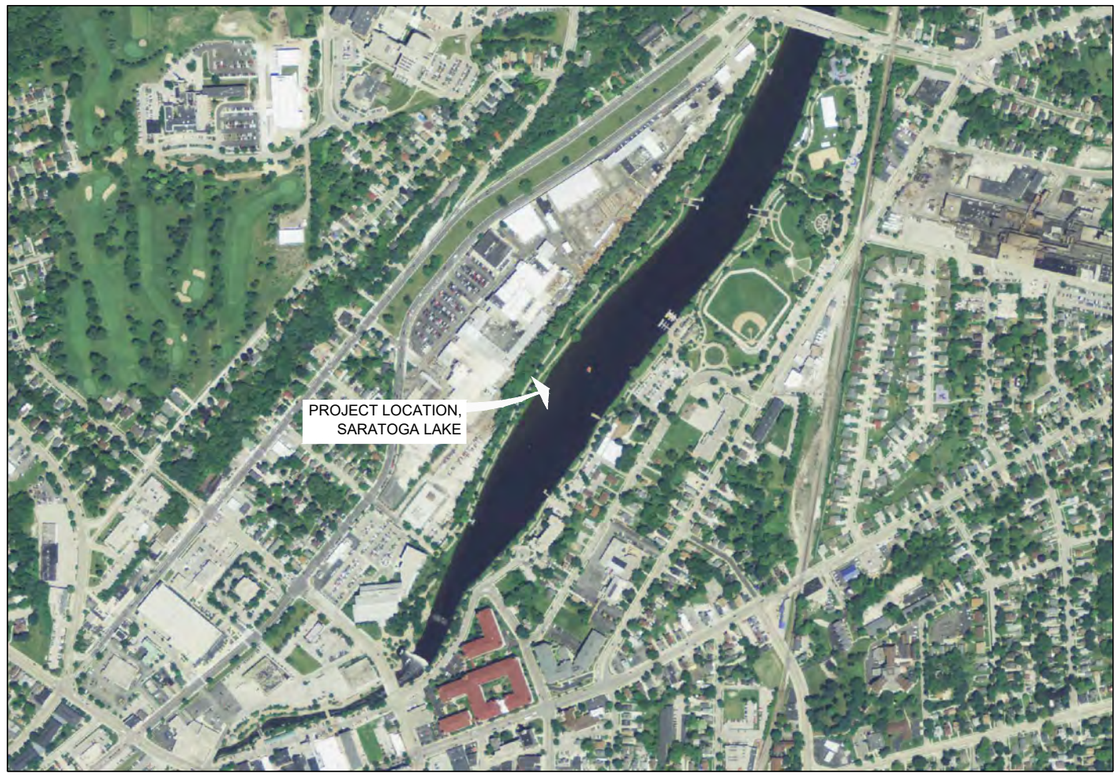
[1] Suggested base parameter list reflects additions to NR347 Table 1, based on scientific research and experience with dredging projects.

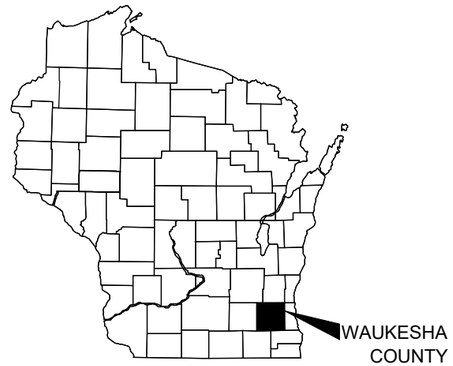
Parameter	Suggested Analytical Method (Suggested Detection Level) *(mg/kg, dry weight unless noted)*	Suggested Base Parameter Analyses[1]	
		Great Lakes or Urban/ Industrial	Inland Waters (Rural/ Forested)
DDT	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)	X	
DDD & DDE	SW-846 8081 EPA 8081, 354440B, 3541 (0.01)	X	
Toxaphene	SW-846 8081 (0.01)		
PCBs (Total)	SW-846 8081	X	X
	EPA 8081, 3540B, 3541 (0.04)	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-Methylnapthelene			
Acenapthene	(0.017)		
Acenaphthlyene	(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





COUNTY MAP
NTS

Sheet Index	
Sheet Number	Sheet Title
1	TITLE
2	LEGEND
3	EXISTING CONTOURS
4	SAMPLES AND PROBE LOCATIONS
5	CROSS SECTIONS
6	CROSS SECTIONS

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WAUKESHA COUNTY, WISCONSIN

NORTH

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11/20/2019
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DES BY	CTG				NOT FOR CONSTRUCTION			SARATOGA CONCEPTUAL DREDGING PLANS CITY OF WAUKESHA WAUKESHA COUNTY, WISCONSIN	AYRES ASSOCIATES EAU CLAIRE, WI	TITLE	SHEET NO.
DR BY	RJW	PROJ NO	26-1083.00								
CHK BY	CTG	DATE	NOVEMBER 2019	NO	DATE	REVISION	NO	DATE	REVISION		1

EXISTING

SANITARY SEWER

WATER MAIN

STORM SEWER

UNDERGROUND GAS

UNDERGROUND ELECTRIC

UNDERGROUND FIBER OPTIC

UNDERGROUND TELEPHONE

UNDERGROUND VIDEO

OVERHEAD ELECTRIC

OVERHEAD UTILITY

UTILITY POLES:

TELEPHONE POLE

LIGHT POLE

CURB AND GUTTER

HARD SURFACED ROADWAY

NON-SURFACED ROADWAY

SIDEWALK

STREET CENTERLINE

RETAINING WALL

TREES

TREE LINE

HEDGE OR BUSH LINE

BUSH / SHRUB

CONTOURS

DITCH

FENCE

RIGHT OF WAY

PROPERTY LINE

SECTION LINE

WETLAND

SWAMP EDGE

WATER'S EDGE

RAILROAD

BUILDING

GUARD RAIL

ANCHOR

CONTROL BOX

METER

PARKING METER

POLE

PULLBOX

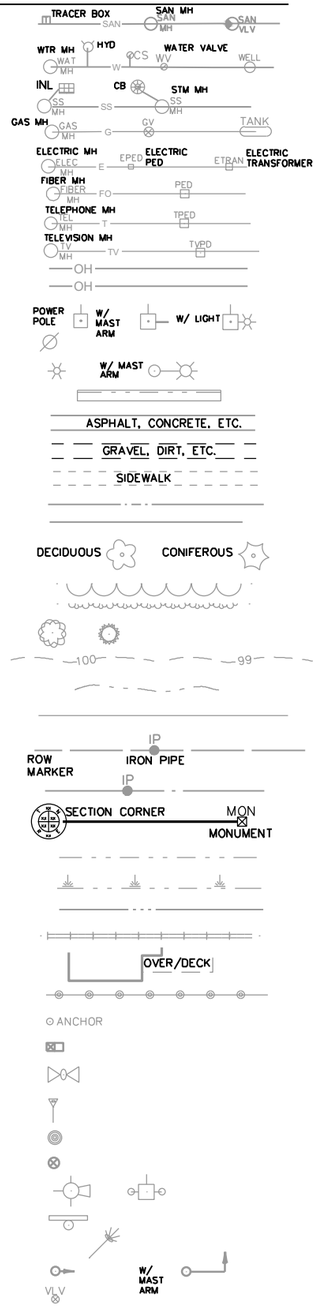
RR SIGNAL FLASHER / BOX

SIGN

SPRINKLER HEAD

TRAFFIC SIGNAL

VALVE



NEW

SANITARY SEWER

FORCE MAIN

WATER MAIN

STORM SEWER

HARD SURFACE ROADWAY

NON-SURFACED ROADWAY

CURB AND GUTTER

SIDEWALK

BASELINE

CONTOURS

FENCE

PERMANENT EASEMENT

TEMPORARY EASEMENT

CONSTRUCTION EASEMENT

UTILITY EASEMENT

SETBACK

RETAINING WALL

POND

DITCH

SILT FENCE

EROSION BALES

EROSION MAT

EROSION LOG

SAW CUT

DEMOLITION / REMOVAL

GUARD RAIL

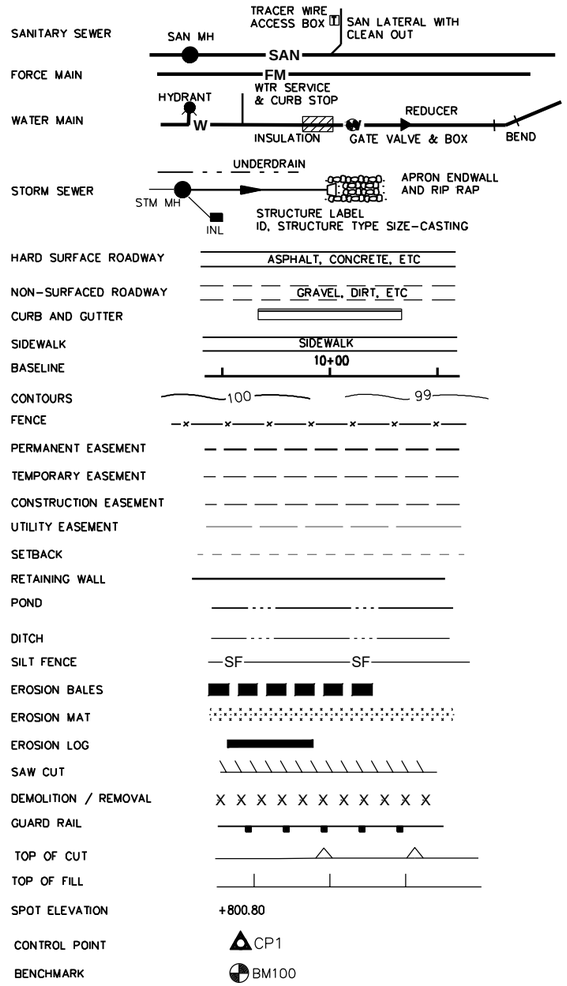
TOP OF CUT

TOP OF FILL

SPOT ELEVATION

CONTROL POINT

BENCHMARK



ABBREVIATIONS:

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

DES BY	CTG				NOT FOR CONSTRUCTION			SARATOGA CONCEPTUAL DREDGING PLANS CITY OF WAUKESHA WAUKESHA COUNTY, WISCONSIN	AYRES ASSOCIATES EAU CLAIRE, WI	LEGEND	SHEET NO.
DR BY	RJW	PROJ NO	26-1083.00								2
CHK BY	CTG	DATE	NOVEMBER 2019	NO	DATE	REVISION	NO	DATE	REVISION		

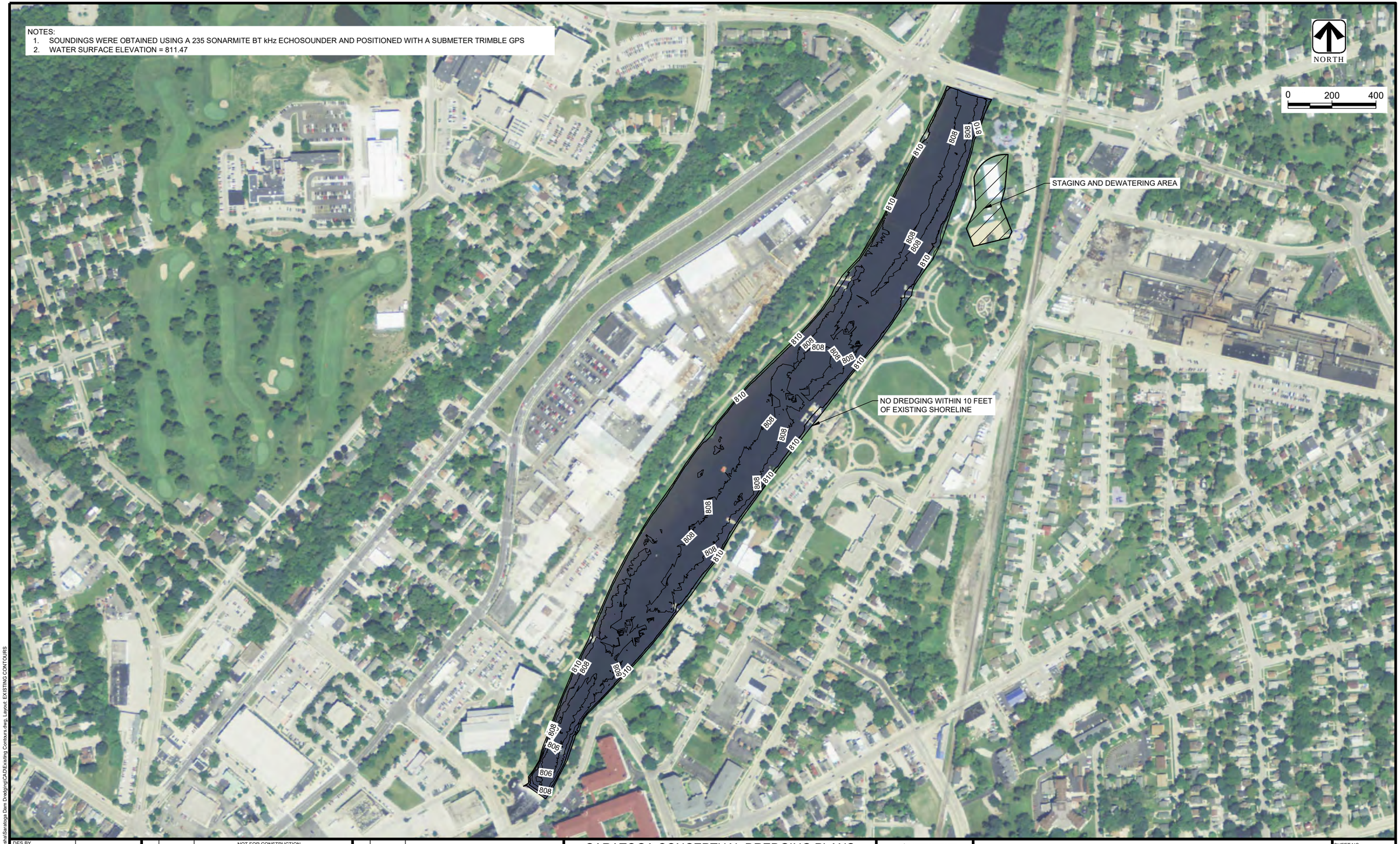
NOTES:
1. SOUNDINGS WERE OBTAINED USING A 235 SONARMITE BT kHz ECHOSOUNDER AND POSITIONED WITH A SUBMETER TRIMBLE GPS
2. WATER SURFACE ELEVATION = 811.47

NORTH

0 200 400

STAGING AND DEWATERING AREA

NO DREDGING WITHIN 10 FEET OF EXISTING SHORELINE



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	REVISION

SARATOGA CONCEPTUAL DREDGING PLANS
CITY OF WAUKESHA
WAUKESHA COUNTY, WISCONSIN

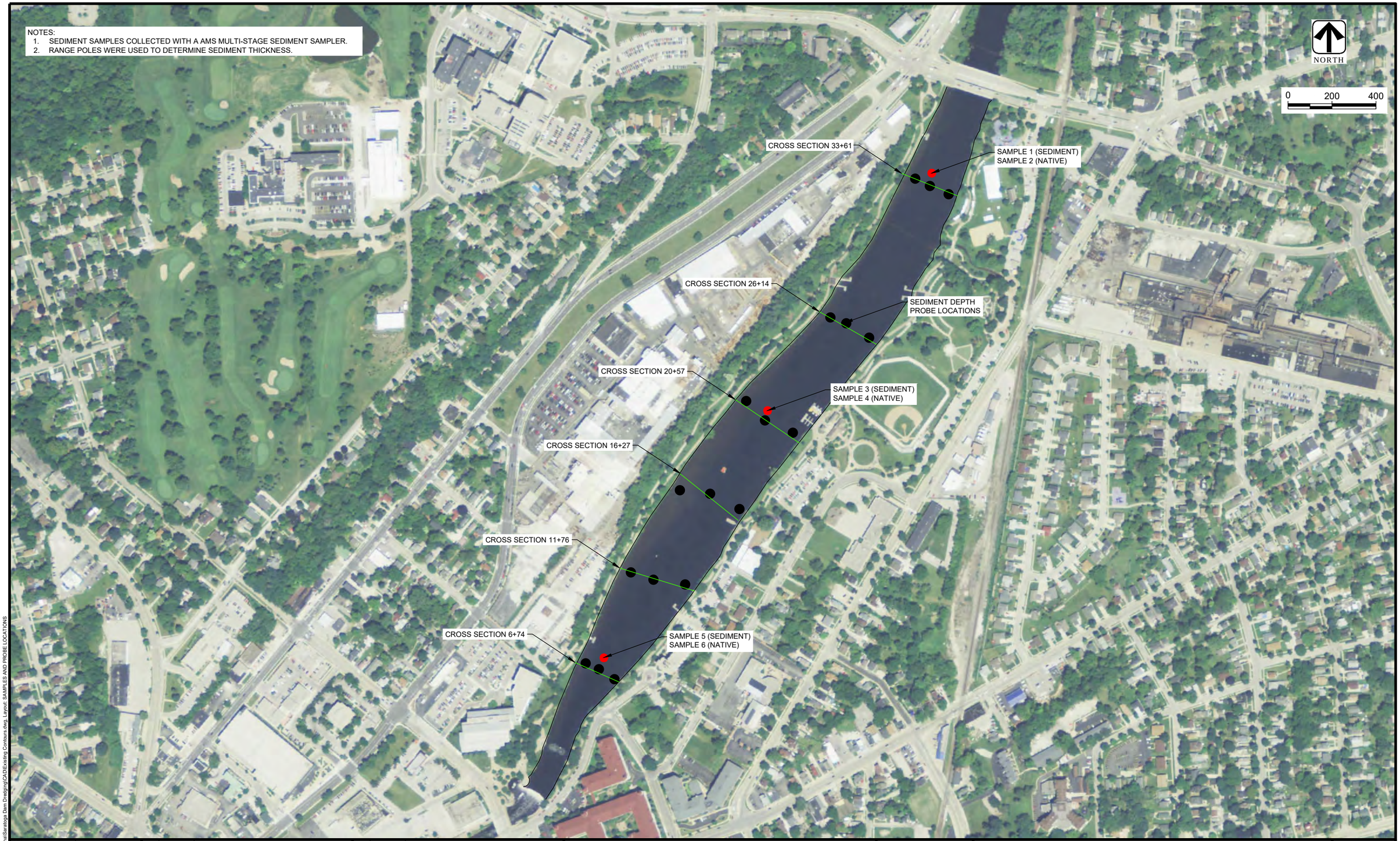
AYRES ASSOCIATES
EAU CLAIRE, WI

EXISTING CONTOURS

SHEET NO. 3

AA-Standard.stb
11/20/2019
V:\WR-EC\Waukesha\Saratoga Dam Dredging\CAD\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.

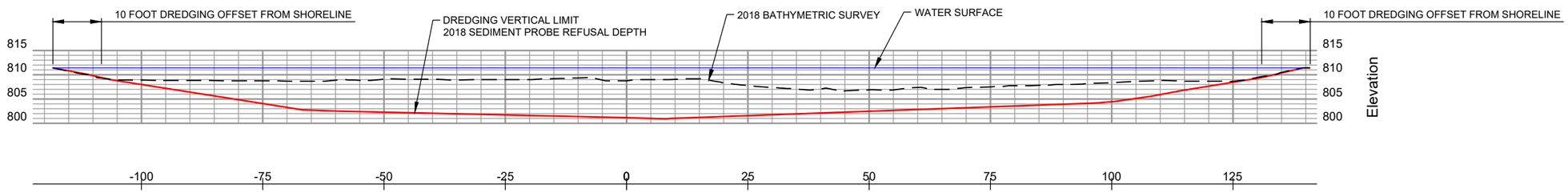


AA-Standard.stb
11/20/2019
V:\WR-ECW\Waukesha\Saratoga Dam Dredging\CAD\Existing Contours.dwg, Layout: SAMPLES AND PROBE LOCATIONS

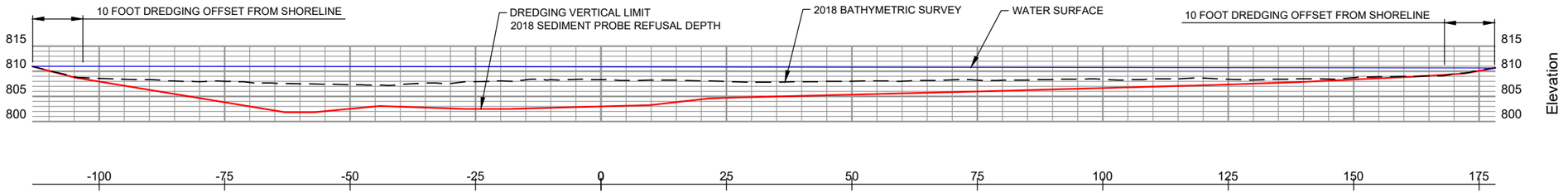
DES BY	CTG								SARATOGA CONCEPTUAL DREDGING PLANS CITY OF WAUKESHA WAUKESHA COUNTY, WISCONSIN	AYRES ASSOCIATES EAU CLAIRE, WI	SAMPLES AND PROBE LOCATIONS	SHEET NO. 4
DR BY	RJW	PROJ NO	26-1083.00									
CHK BY	CTG	DATE	NOVEMBER 2019	NO	DATE	REVISION	NO	DATE	REVISION			

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
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.

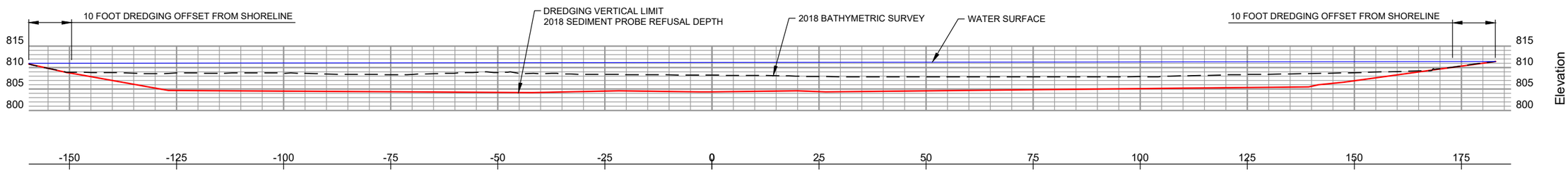
CROSS SECTION 33+61



CROSS SECTION 26+14



CROSS SECTION 20+57

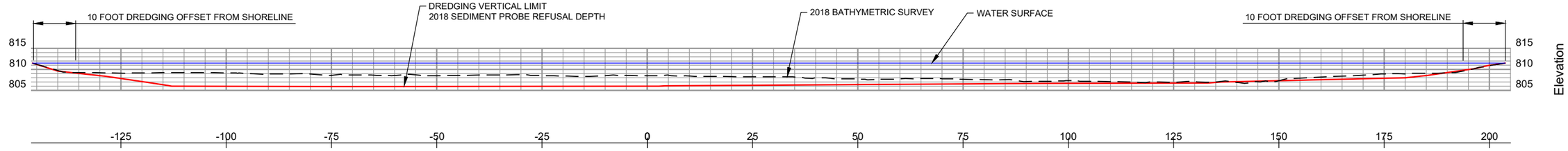


AA-Standard.stb
11/20/2019
V:\WR-EO\Waukesha\Saratoga Dam Dredging\CAD\Existing Contours.dwg, Layout: CROSS SECTIONS

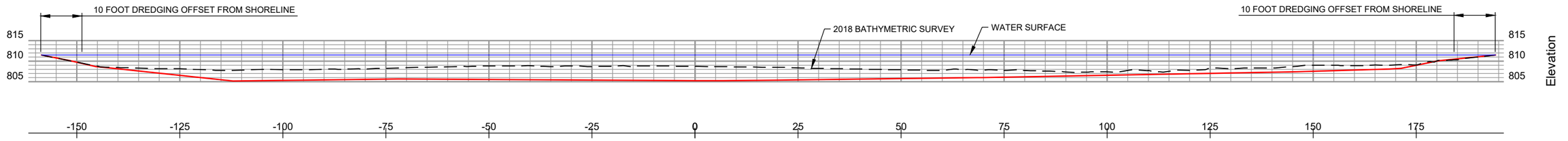
DES BY CTG							SARATOGA CONCEPTUAL DREDGING PLANS CITY OF WAUKESHA WAUKESHA COUNTY, WISCONSIN	AYRES ASSOCIATES EAU CLAIRE, WI	SHEET NO. 5
DR BY RJW	PROJ NO 26-1083.00								
CHK BY CTG	DATE NOVEMBER 2019	NO	DATE	REVISION	NO	DATE	REVISION	CROSS SECTIONS	

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
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.

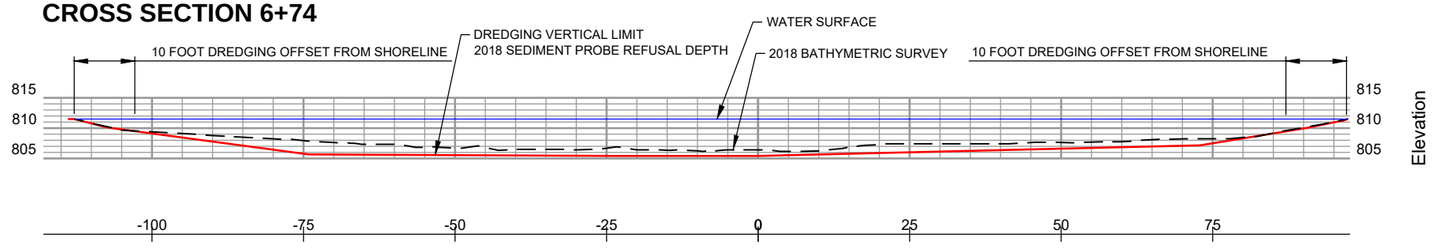
CROSS SECTION 16+27



CROSS SECTION 11+76



CROSS SECTION 6+74



DES BY CTG								SARATOGA CONCEPTUAL DREDGING PLANS CITY OF WAUKESHA WAUKESHA COUNTY, WISCONSIN	AYRES ASSOCIATES EAU CLAIRE, WI	CROSS SECTIONS	SHEET NO. 6
DR BY RJW	PROJ NO 26-1083.00										
CHK BY CTG	DATE NOVEMBER 2019	NO	DATE	REVISION	NO	DATE	REVISION				

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

Attachment 3

Cost Estimate

AYRES ASSOCIATES

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 Material	Labor	Equipment	Total	Total Incl O&P		Total Item Cost Incl O&P	Notes:
35 24 13.13	**Cutter Suction Dredging**										
1500	Hydrualic 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**

October3, 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. 124th 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

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

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

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

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Attachment 4
Sample Analytical Results

Saratoga Lake Sediment Sampling

October 3, 2018 Samples

Complete Sampling Results

Parameter	Sample 1	2	3	4	5	6	Non-Industrial Direct Contact RCL	Industrial Direct Contact RCL	Ground Water RCL	Back ground Threshold Value
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*	0.35 J	0.31 J	71.1	985	0.752	1
Chromium	104	27.6	30.0	30.0	18.1	22.4	100000	100000	360,000.	44
Copper	69.5	69.8	38.4	66.1	25.1	30.1	3,130.	46,700.	91.6	69.5
Lead	*281*	*66.4*	*60.0*	*38.8*	20.8	23.3	400	800	27.	52
Nickel	*48.7*	*18.1*	*21.4*	*20.1*	*14.4*	*18.9*	1,550.	22,500.	13.0612	31
Zinc	444	187	157	186	79.3	94.0	23,500.	100,000.	NA	150
Mercury	0.17 J	0.17 J	0.17 J	0.13 J	0.073 J	0.078 J	3.13	3.13	0.208	NA
PCB, Total	<0.0653	<0.0584	<0.0560	<0.0615	<0.0497	<0.0443	0.234	0.967	0.0094	NA
PCB-1016 (Aroclor 1016)	<0.0761	<0.0680	<0.0653	<0.0716	<0.0579	<0.0516	4.11	28	NA	NA
PCB-1221 (Aroclor 1221)	<0.0960	<0.0858	<0.0824	<0.0904	<0.0731	<0.0652	0.213	0.883	NA	NA
PCB-1232 (Aroclor 1232)	<0.109	<0.0976	<0.0937	<0.103	<0.0832	<0.0742	0.19	0.792	NA	NA
PCB-1242 (Aroclor 1242)	<0.0927	<0.0828	<0.0795	<0.0873	<0.0706	<0.0629	0.235	0.972	NA	NA
PCB-1248 (Aroclor 1248)	<0.0820	<0.0732	<0.0703	<0.0771	<0.0624	<0.0556	0.236	0.975	NA	NA
PCB-1254 (Aroclor 1254)	<0.0804	<0.0718	<0.0689	<0.0757	<0.0612	<0.0546	0.239	0.988	NA	NA
PCB-1260 (Aroclor 1260)	<0.0653	<0.0584	<0.0560	<0.0615	<0.0497	<0.0443	0.243	1	NA	NA
PCB-1262 (Aroclor 1262)	<0.0944	<0.0843	<0.0809	<0.0888	<0.0718	<0.0641	NA	NA	NA	NA
PCB-1268 (Aroclor 1268)	<0.0886	<0.0791	<0.0760	<0.0834	<0.0674	<0.0601	NA	NA	NA	NA
2-Methylnaphthalene	<0.0209	0.420	0.0226	<0.0197	<0.0032	<0.0029	239	3010	NA	NA
Acenaphthene	0.293	3.55	0.0320	<0.0159	<0.0026	<0.0023	3590	45200	NA	NA
Acenaphthylene	0.405	1.73	0.0319	<0.0193	0.0317	<0.0028	NA	NA	NA	NA
Anthracene	0.799	10.1	0.0891	0.143	0.0244	<0.0026	17900	100000	196.9492	NA
Benzo(a)anthracene	**2.80**	**20.1**	0.440	0.744	0.119	0.0300	1.14	20.8	NA	NA
Benzo(a)pyrene	***2.81***	***19.5***	***0.522***	***1.02***	***0.134***	0.0340	0.115	2.11	0.47	NA
Benzo(b)fluoranthene	***3.62***	***23.9***	*0.685*	***1.51***	0.175	0.0490	1.15	21.1	0.4781	NA
Benzo(e)pyrene	2.07	13.2	0.405	0.819	0.0962	0.0258	NA	NA	NA	NA
Benzo(g,h,i)perylene	1.79	11.9	0.381	0.770	0.0904	0.0245	NA	NA	NA	NA
Benzo(k)fluoranthene	1.57	9.59	0.242	0.599	0.0575	0.0174	11.5	211	NA	NA
Chrysene	*2.72*	*19.8*	*0.506*	*1.04*	0.131	0.0351	115	2110	0.1442	NA
Dibenz(a,h)anthracene	**0.436**	**3.46**	0.0792	**0.180**	<0.0029	<0.0026	0.115	2.11	NA	NA
Fluoranthene	7.34	51.5	1.11	2.11	0.214	0.0726	2390	30100	88.8778	NA
Fluorene	0.562	4.35	0.0449	<0.0122	<0.0020	<0.0018	2390	30100	14.8299	NA
Indeno(1,2,3-cd)pyrene	**1.63**	**10.7**	0.310	0.712	0.0741	0.0205	1.15	21.1	NA	NA
Naphthalene	<0.0319	*1.49*	<0.0055	<0.0301	<0.0049	<0.0044	5.52	24.1	0.6582	NA
Phenanthrene	3.68	35.6	0.418	0.715	0.0539	0.0221	NA	NA	NA	NA
Pyrene	5.76	39.0	0.881	1.56	0.206	0.0651	1790	22600	54.5455	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

Saratoga Lake Sediment Sampling

October 3, 2018 Samples

Detects Only

Detects Only	Sample 1	2	3	4	5	6	Non-Industrial Direct Contact RCL	Industrial Direct Contact RCL	Ground Water RCL	Background Threshold Value
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

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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(612)607-1700

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

Pace Analytical Services, LLC
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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 Certifcation #: 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

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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

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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
10450829002	**2**	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
10450829003	**3**	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
10450829004	**4**	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

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SAMPLE ANALYTE COUNT

Project: Saratoga Dam
Pace Project No.: 10450829

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 353.2	DMB	1	PASI-V
		EPA 365.1	DMB	1	PASI-V
		EPA 9060A	CSD	4	PASI-V
10450829005	**5**	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
10450829006	**6**	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

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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

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

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

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612)607-1700

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

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

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

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

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

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

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	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
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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

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
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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

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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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

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

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	

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
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

Pace Analytical Services, LLC
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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

Pace Analytical Services, LLC
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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

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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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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REPORT OF LABORATORY ANALYSIS

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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	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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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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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

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

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

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

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

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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REPORT OF LABORATORY ANALYSIS

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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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REPORT OF LABORATORY ANALYSIS

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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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REPORT OF LABORATORY ANALYSIS

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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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REPORT OF LABORATORY ANALYSIS

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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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REPORT OF LABORATORY ANALYSIS

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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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REPORT OF LABORATORY ANALYSIS

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(612)607-1700

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

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		

Pace Analytical®
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Docun

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accu

WO# : 10450829

10450829

2276298

Section A
Required Client Information:

Company: Aues Associates
Address: 7339 Oakwood Hills Pkwy
Eau Claire WI
Email To: Rob Wayne
Phone: 715-831-7506 Fax:
Requested Due Date/TAT: Nov 1

Section B
Required Project Information:

Report To:
Copy To:
Purchase Order No.:
Project Name:
Project Number:

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #: 3973

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location
STATE:

Section D
Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes
MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	1	SL	G			10/3	12:30													001
2	2	SL	G				12:35													002
3	3	SL	G				12:40													003
4	4	SL	G				12:45													004
5	5	SL	G				12:50													005
6	6	SL	G				12:55													006
7																				
8																				
9																				
10																				
11																				
12																				

Requested Analysis Filtered (Y/N)

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
				Pace	10/4/18	9:20	4.6	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Rob Wayne

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 10/3/18

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

2

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pace Container Order #405675

Addresses

Order By :		Ship To :		Return To:	
Company	Ayres & Associates	Company	Ayres & Associates	Company	Pace Analytical Minnesota
Contact	Wayne, Rob	Contact	Wayne, Rob	Contact	Michels, Bob
Email	wayner@ayresassociates.com	Email	wayner@ayresassociates.com	Email	bob.michels@pacelabs.com
Address	3433 Oakwood Hills Parkway	Address	3433 Oakwood Hills Parkway	Address	1700 Elm Street
Address 2		Address 2		Address 2	Suite 200
City	Eau Claire	City	Eau Claire	City	Minneapolis
State	WI Zip 54701	State	WI Zip 54701	State	MN Zip 55414
Phone	(715) 831-7506	Phone	(715) 831-7506	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
- [X] Pre-Printed No Sample IDs
- [ ] Pre-Printed With Sample IDs

Bottles

- [ ] Boxed Cases
- [X] Individually Wrapped
- [ ] Grouped By Sample

Return Shipping Labels

- [X] No Shipper Number
- [ ] With Shipper Number

COC Options

- [X] Number of Blanks 2
- [ ] Pre-Printed

Misc

- [ ] Sampling Instructions
- [X] Custody Seal
- [X] Temp. Blanks
- [X] 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:	

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

Sample Condition Upon Receipt

Client Name: Ayres Associates

Project #: WO#: 10450829

PM: BM2 Due Date: 10/16/18

CLIENT: AYRES ASSOC.

Courier: ☐Fed Ex ☑UPS ☐USPS ☐Client

☐Commercial ☐Pace ☐SpeeDee ☐Other:

Tracking Number: 1Z 583 684 03 7460 5734

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: ☑G87A9170600254 ☐G87A9155100842 **Type of Ice:** ☑Wet ☐Blue ☐None ☐Dry ☐Melted

Cooler Temp Read (°C): 4.4 **Cooler Temp Corrected (°C):** 4.6 **Biological Tissue Frozen?** ☐Yes ☐No ☑N/A

Temp should be above freezing to 6°C **Correction Factor:** +0.2 **Date and Initials of Person Examining Contents:** PE 10/9/18

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

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. No Analysis Stated
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: SL	☑Yes	☐No		12.
All containers needing acid/base preservation have been checked?	☐Yes	☐No	☑N/A	13. ☐HNO_3 ☐H_2SO_4 ☐NaOH Positive for Res. Chlorine? Y N
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_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): N/A				

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐Yes ☐No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: BM 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

WO#: 12117109

12117109

☐ Samples were sent directly to the Subcontracting Laboratory.

State Of Origin: WI
Cert. Needed: ☒ Yes ☐ I
Owner Received Date: 10/9/2018 Results Requested By: 10/23/2018

Workorder: 10450829 Workorder Name: 1

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

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers: JGFU						Requested Analysis: Nitrate + Nitrite	Nitrogen, Ammonia	Total Kjeldahl Nitrogen	Total Organic Carbon 9060	Total Phosphorus								LAB USE ONLY
1	1	PS	10/3/2018 12:30	10450829001	Solid	2						X	X	X	X	X								
2	2	PS	10/3/2018 12:35	10450829002	Solid	2						X	X	X	X	X								
3	3	PS	10/3/2018 12:40	10450829003	Solid	2						X	X	X	X	X								
4	4	PS	10/3/2018 12:45	10450829004	Solid	2						X	X	X	X	X								
5	5	PS	10/3/2018 12:50	10450829005	Solid	2						X	X	X	X	X								
6	6	PS	10/3/2018 12:55	10450829006	Solid	2						X	X	X	X	X								

Transfers	Released By	Date/Time	Received By	Date/Time
1	[illegible] Pace	10/9/18 1700	DJCL 10.9.18	1945
2	DJCL 10.9.18	2330	B Matthews	10/10/18 0730
3				

Comments

Cooler Temperature on Receipt 0.4 °C | Custody Seal (Y) or N | Received on Ice (Y) or N | 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: 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: Pace MN

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 ☒ NA

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 BR	☐ N/A	3.
Sampler Name and Signature on COC?	☐ Yes BAK	☒ 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? -Includes Date/Time/ID/Analysis Matrix: SL	☒ Yes	☐ No	☐ N/A	12.
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: Carrie Jern **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).

SM 40177349

Chain of Custody

Pace Analytical®
www.pacelabs.com

☐ Samples were sent directly to the Subcontracting Laboratory.

State Of Origin: WI
Cert. Needed: ☒ Yes ☐ No
Owner Received Date: 10/9/2018 Results Requested By: 10/23/2018

Workorder: 10450829 Workorder Name: 1

Report To	Subcontract To
Bob Michels Pace Analytical Minnesota 1700 Elm Street Suite 200 Minneapolis, MN 55414 Phone (612)709-5046	Pace Analytical Green Bay 1241 Bellevue Street Suite 9 Green Bay, WI 54302 Phone (920)469-2436

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Unpreserved	Requested Analysis: Metals by 6010/7471 **	LAB USE ONLY
1	1	PS	10/3/2018 12:30	10450829001	Solid	1	X	001
2	2	PS	10/3/2018 12:35	10450829002	Solid	1	X	002
3	3	PS	10/3/2018 12:40	10450829003	Solid	1	X	003
4	4	PS	10/3/2018 12:45	10450829004	Solid	1	X	004
5	5	PS	10/3/2018 12:50	10450829005	Solid	1	X	005
6	6	PS	10/3/2018 12:55	10450829006	Solid	1	X	006

Transfers	Released By	Date/Time	Received By	Date/Time
1	Kyle Place	10/9/18 1550		
2	UNKNOWN	10/10/18 0015	PACE	10/10/18 0415
3				

Comments

**metals: As, Cd, Cr, Cu, Pb, Hg, Ni, Zn

Cooler Temperature on Receipt 2.0 °C | Custody Seal (Y) or N | Received on Ice (Y) or N | 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.

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: PACE-MN   Project # 40177349

All containers needing preservation have been checked and noted below: ☒Yes ☐No N/A

Lab Lot# of pH paper: 10320761   Lab Std #ID of preservation (if pH adjusted):

Initial when completed: JM   Date/ Time:

Pace Lab #	Glass: AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic: BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S	Vials: DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars: JGFU	WGFU	WPFU	General: SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
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 ☒N/A ***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	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	4oz AG jar unpres

Page 1 of 2

Pace Analytical™ 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 #: WO#: 40177349

Client Name: PACE-MN

Courier: ☐ CS Logistics ☐ Fed Ex ☐ Speedee ☐ UPS ☑ Waltco ☐ 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 /Corr: 2.0

Temp Blank Present: ☑ yes ☐ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C.

Person examining contents:
Date: 10/10/18
Initials: JM

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. IRWD JM 10/10/18
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: For Analysis: ☑ Yes ☐ No MS/MSD: ☐ Yes ☑ No ☐ N/A		8.
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: -Includes date/time/ID/Analysis Matrix: S	☑ Yes ☐ No ☐ N/A	12.
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: _____ **Date:** 10/10/18

Intra-Regional Chain of Custody

Pace Analytical®
www.pacelabs.com

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

Received at:	Send To Lab:
Pace Analytical Minnesota 1700 Elm Street Suite 200 Minneapolis, MN 55414 Phone (612)709-5046	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: ZPLK	Requested Analysis: ASTM D422	LAB USE ONLY
1	1	PS	10/3/2018 12:30	10450829001	Solid	1	X	
2	2	PS	10/3/2018 12:35	10450829002	Solid	1	X	
3	3	PS	10/3/2018 12:40	10450829003	Solid	1	X	
4	4	PS	10/3/2018 12:45	10450829004	Solid	1	X	
5	5	PS	10/3/2018 12:50	10450829005	Solid	1	X	
6	6	PS	10/3/2018 12:55	10450829006	Solid	1	X	

Transfers	Released By	Date/Time	Received By	Date/Time
1	[illegible] Pace	10/9/18 1530		
2	FedEx		Matthew Pace	10/10/18 0920
3				
4				

Comments

Cooler Temperature on Receipt 2.2 °C | **Custody Seal** (Y) or N | **Received on Ice** (Y) or N | **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.*

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

Sample Condition Upon Receipt

Client Name: Pace-MN

Project #: 10450829

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other:

Tracking Number: 4638 0193 1166

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.

				Comments:
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.
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? Note if sediment is visible in the dissolved container.	☐ Yes	☐ No	☑ N/A	11.
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: Soil	☑ Yes	☐ No	☐ N/A	12.
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☒ N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl ☐ NaOH+ZnAce
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☑ N/A	Sample #
Exceptions: VOA, Coliform, TOC, Oil and Grease, WI-DRO (water)	☐ Yes	☑ No		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): N.A				

CLIENT NOTIFICATION/RESOLUTION Field Data Required? ☐ Yes ☐ No

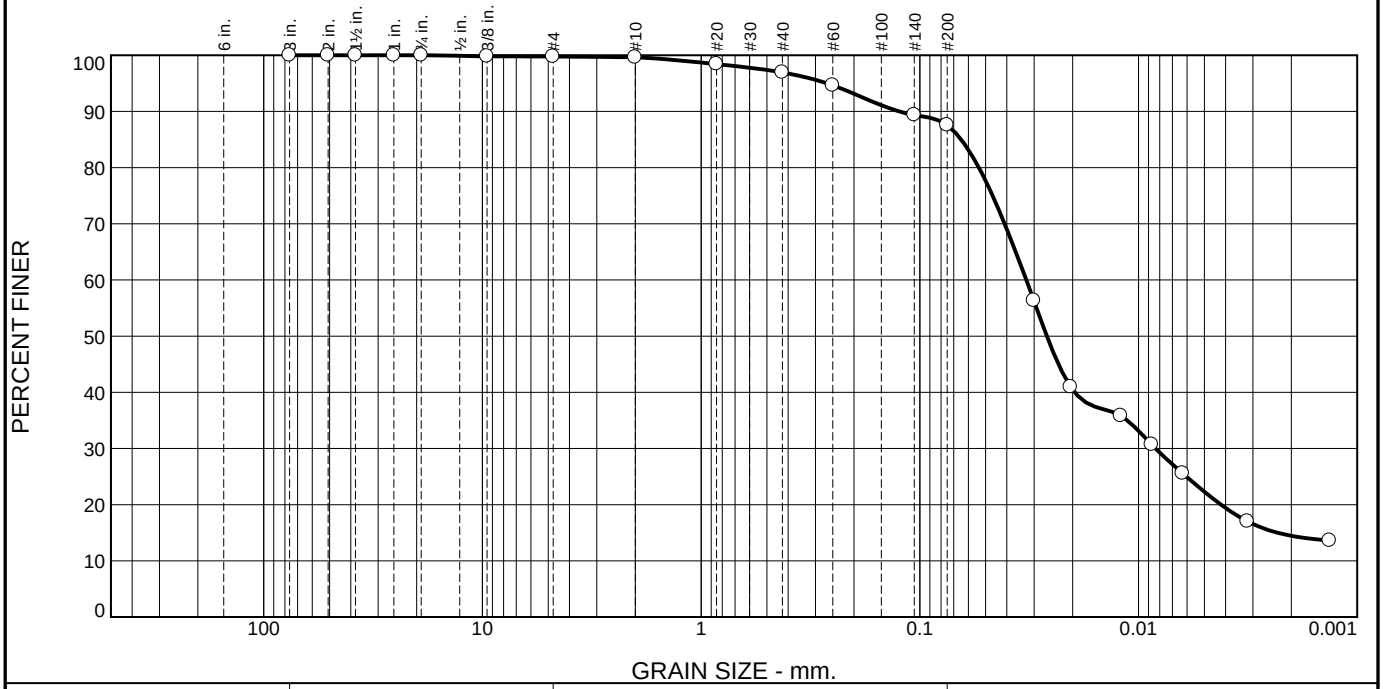
Person Contacted: Date/Time:

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)

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	3	9	66	22

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	97		
#60	95		
#140	89		
#200	88		
0.0301 mm.	56		
0.0204 mm.	41		
0.0121 mm.	36		
0.0087 mm.	31		
0.0063 mm.	26		
0.0032 mm.	17		
0.0013 mm.	14		

* (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}= 0.1243 D_{85}= 0.0647 D_{60}= 0.0326
D_{50}= 0.0262 D_{30}= 0.0084 D_{15}= 0.0023
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: 1
Sample Number: 10450826-1

Date Sampled: 10/3/18

Pace Analytical Services, Inc.

Billings, MT

Client: Ayers Associates
Project: Saratoga Dam

Project No: **Figure**

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 **x Rm**

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

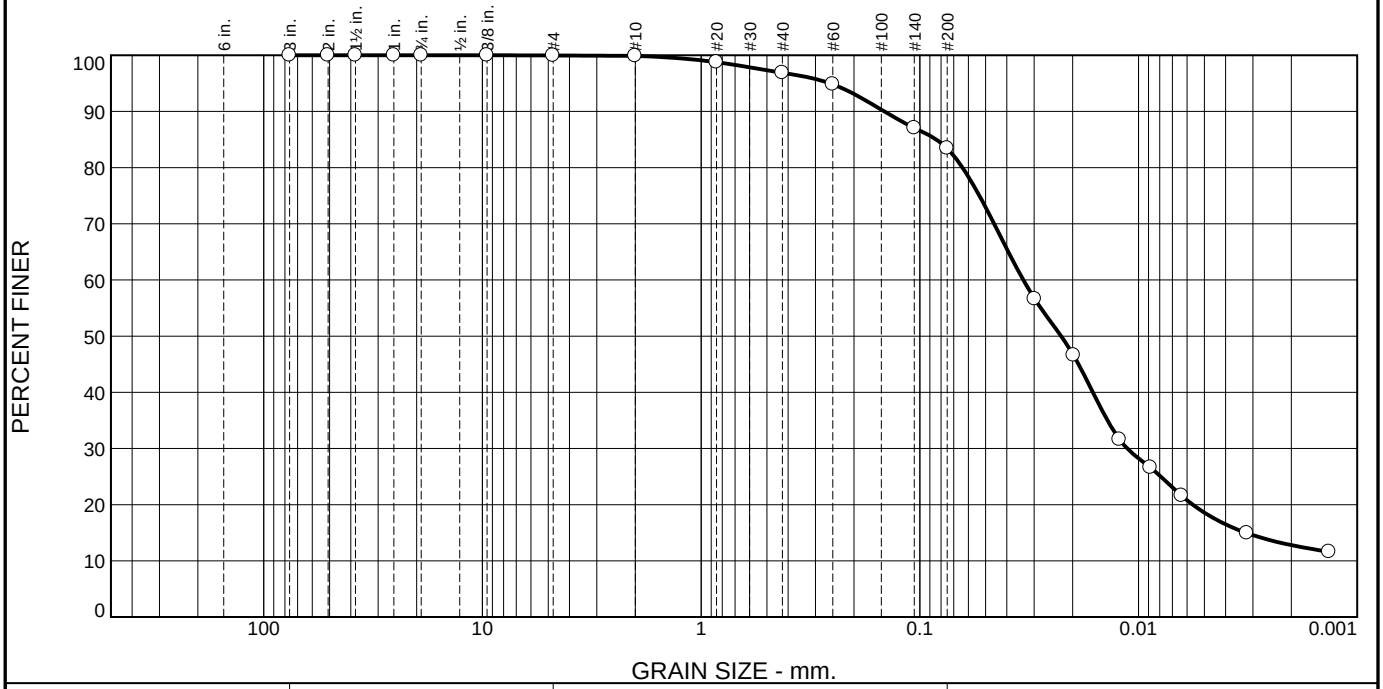
Fractional Components

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

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.

Billings, MT

Client: Ayers Associates
Project: Saratoga Dam

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 **x Rm**

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.

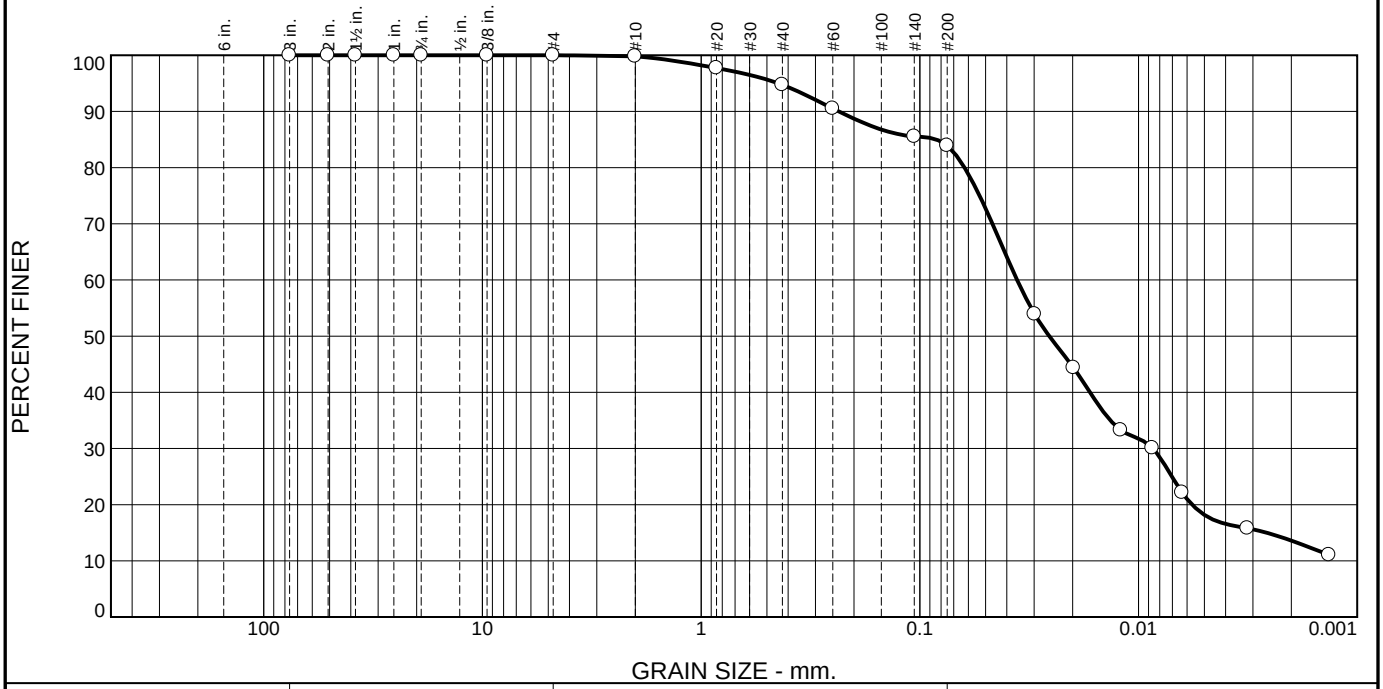
Fractional Components

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

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.

Billings, MT

Client: Ayers Associates
Project: Saratoga Dam

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 **x Rm**

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.

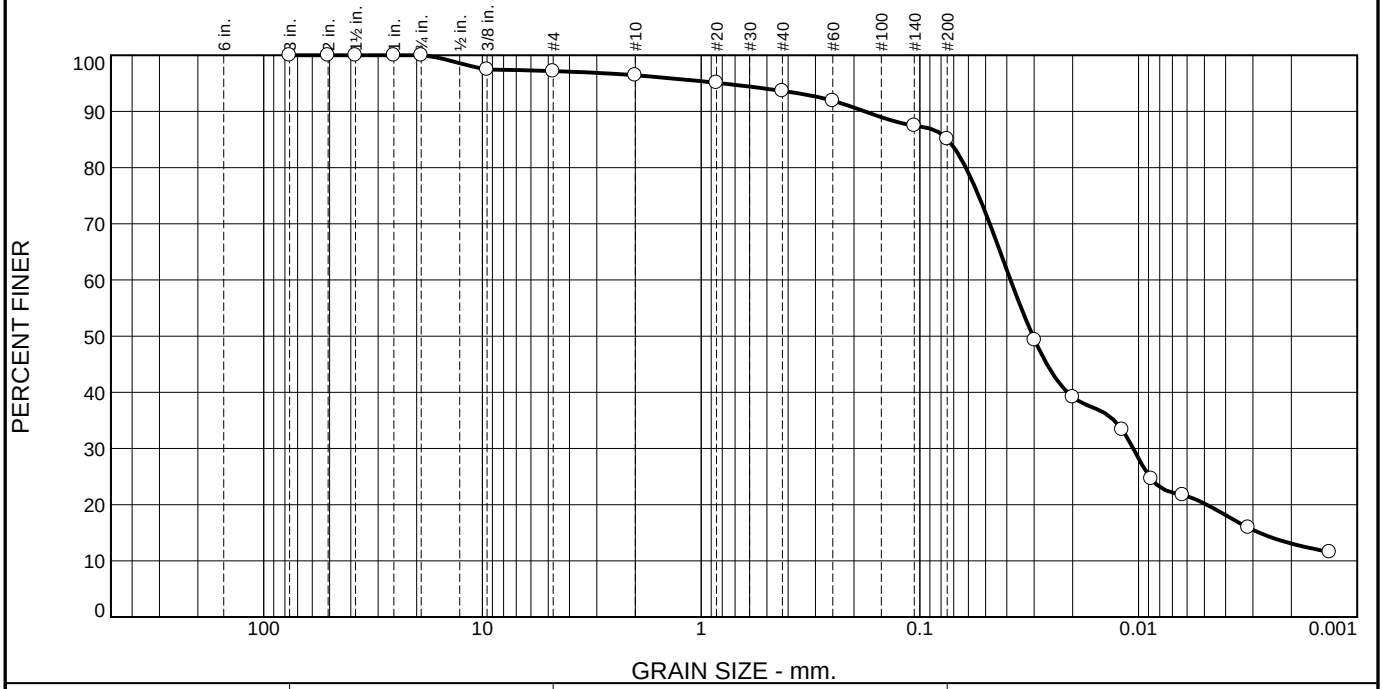
Fractional Components

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

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.

Billings, MT

Client: Ayers Associates
Project: Saratoga Dam

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 **x Rm**

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.

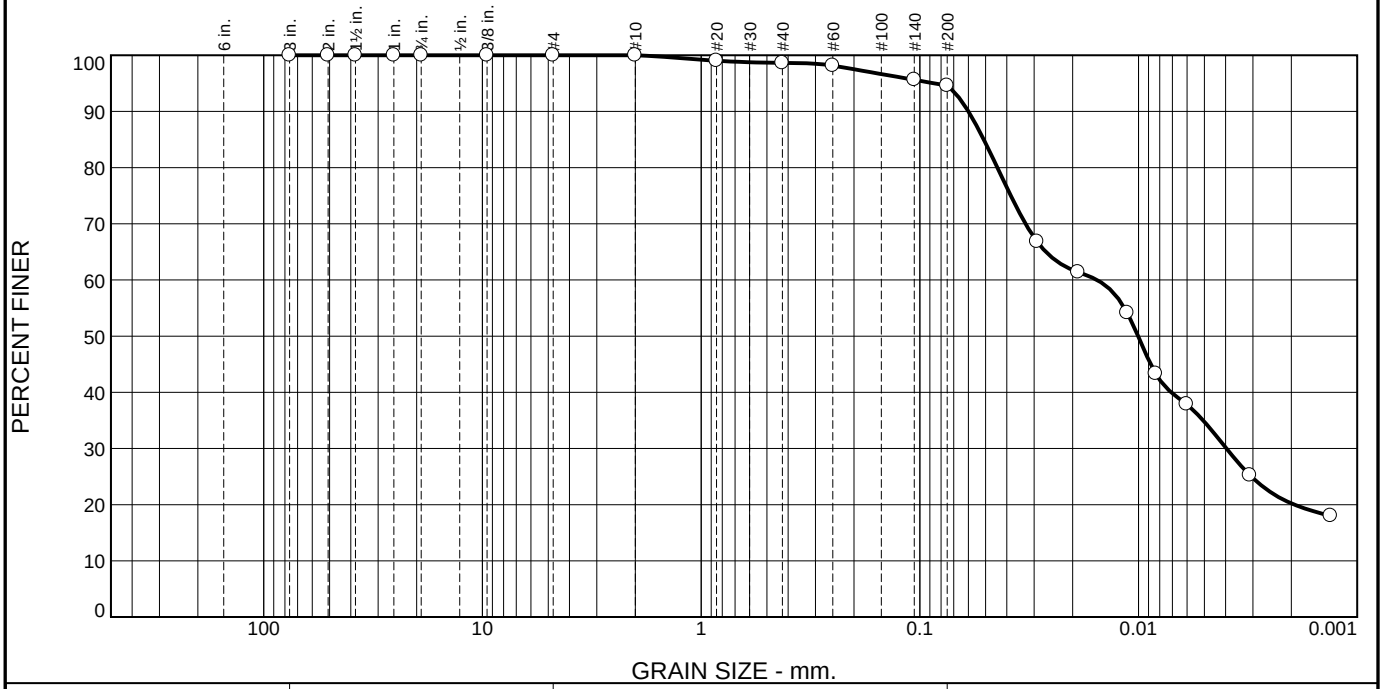
Fractional Components

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

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.

Billings, MT

Client: Ayers Associates
Project: Saratoga Dam

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 **x Rm**

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.

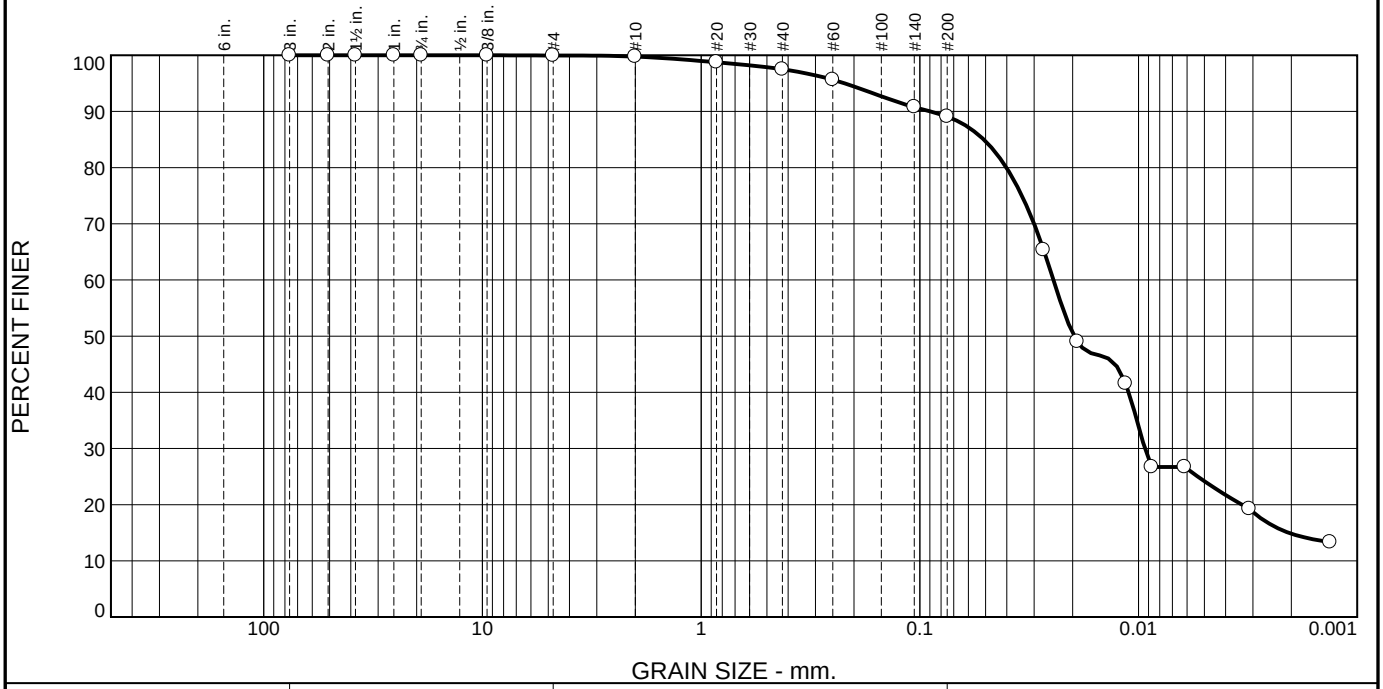
Fractional Components

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

Particle Size Distribution Report



% +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		

* (no specification provided)

Material Description

silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.0894 D_{85}= 0.0510 D_{60}= 0.0245
D_{50}= 0.0197 D_{30}= 0.0094 D_{15}= 0.0021
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: 6
Sample Number: 10450826-6

Date Sampled: 10/3/18

Pace Analytical Services, Inc.

Billings, MT

Client: Ayers Associates
Project: Saratoga Dam

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 **x Rm**

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