

GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name	<u>GRUBER's GROVE BAY</u>	ProjectID: 05-36
Last Updated:	08/17/04	
City:	Merrimac and Sumpter	
County:	Sauk	
State:	WI	
Country:	USA	
Bodies of Water:	Gruber's Grove Bay; Lake Wisconsin	
US EPA Region:	V	
Status (Active, Complete, or Monitoring Only):	Complete	
Date On NPL:	NA	
ROD/ESD Date:	NA	
Operable Unit:	NA	
Areas of Concern (length or acres):	Approximately 18.2 acres within 25-acre Gruber's Grove Bay.	
Other Characteristics of Water Body:	Gruber's Grove Bay covers an area of about 25 acres and was created as part of the impoundment when Lake Wisconsin flooded a natural drainage channel. Lake Wisconsin was created by the Prairie du Sac dam in 1915.	
Contaminants of Concern:	Primarily mercury (some as soluble methyl mercury); also lead, copper, and ammonia compounds.	
Source of Contamination:	Manufacturing and onsite sewage treatment wastewater discharges to the Bay from the Badger Army Ammunition Plant (a Superfund site) during production years of 1942-77.	
Contaminated Area Physical Characteristics:	The depth below water surface and the total thickness of affected sediment varies from 2 to 18 feet and 1 to 7 feet, respectively. Sediment samples collected from the Bay in 1998, 1999, and 2000 show total mercury, methyl mercury, copper, and lead concentrations ranging from ND to 24 ppm, 0.084 to 149 ppb, 1.8 to 277 ppm, and 2.9 to 1,220 ppm, respectively. Sediment sampling in 1999 and 2000 in Wiegand's Bay, an embayment in Lake Wisconsin similar to Gruber's Grove Bay and considered as background, showed total mercury, methyl mercury, copper, and lead levels at 0.36 ppm (3 samples), 1.4 ppb (one sample), 17 to 99 ppm (3 samples), and 23 to 93 ppm (3 samples), respectively.	
Type of Regulatory Action:	State-lead. Final	
Overall Status Summary:	<p>Gruber's Grove Bay is a 25-acre waterbody that is part of man-made Lake Wisconsin and is located just south of the former Badger Army Ammunition Plant (BAAP) (now a Superfund site) near the towns of Merrimac and Sumpter, Sauk County, WI. Mercury is the primary contaminant (also lead, copper, and ammonia compounds) originating from both manufacturing and onsite sewage treatment wastewater discharges to the Bay from the BAAP. The removal targets about 87,000 cy of sediment containing greater than 0.36 ppm of total mercury from the Bay. Total mercury levels in Bay sediment have been found as high as 24 ppm. Background mercury levels in Lake Wisconsin sediment have been shown to be 0.36 ppm; the removal will target Bay sediments that exceed this level.</p> <p>The USACE - Omaha District provided design and engineering oversight. Stone & Webster was the prime contractor for these services. Bay West, Inc. was contracted to perform the dredging and WDNR provided agency oversight. The U.S. Army is the PRP and funded the removal action.</p>	

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Dredging began in April 2001 and was completed on November 18, 2001. A 10" Ellicott Mudcat MC-2000 hydraulic auger dredge -- the same model dredge modified (to increase dredging depth from 20 feet to 30 feet) for use during 2000 at Fox River SMU 56/57 (Project ID 05-06) -- was operated 8 to 12 hours per day, five to six days per week, and discharged an average 83 cubic yards per hour. (Note: The average discharge rate of 83 cubic yards per hour conflicts with the discharge rate calculated using other operational parameters provided. Assuming that dredging occurred an average of 5.5 days per week, 10 hours per day, for 26 weeks (mid-April through mid-November, with 28 days of non-dredging time subtracted due to geotube tearing problems) and resulted in the removal of 88,300 cy of sediment, the average production rate is calculated to be 62 cy per hour.) Reportedly, a maximum production rate of 1,500 cy per day was achieved during peak periods that included dredge operation during available daylight hours, six days per week.

Dredging began at the silt curtain (placed across the mouth of the Bay) and progressed towards the BAAP using a grid pattern with overlap to provide complete coverage of the target areas. Dredging depth was verified using a mapping-grade differential global positioning system unit in conjunction with an echosounder. Depths from the echosounder were verified with direct measurements in the field. Problems affecting dredge operation included an above-average precipitation event near the beginning of the project, approximately 28 days when dredging was not performed due to geotube tearing problems, and dredge downtime due to encountering debris such as golf balls, tree branches and roots, tires, metal, and anchors. Dredging was completed in November 2001.

Sediment slurry was hydraulically pumped from the dredge through 4,500 feet of 10-inch pipe to the dewatering area located on the BAAP. A booster pump, located on the edge of the BAAP property, was used to pump the sediment slurry to the dewatering and disposal area located in an area of elevated terrain. The dredge slurry was then discharged through a pipe header distribution system into multiple geotubes for dewatering.

Approximately 102 geotubes, stacked parallel to one another (horizontally and vertically) and up to 3 tubes high, were used. Initially, empty tubes were placed on a polyethylene-lined, 245-foot by 895-foot laydown area with berms to contain the water. The geotubes were 200 feet long and 20 feet in diameter, and were filled directly from the dredge slurry transport pipe. Dredged material was concurrently injected into the tops of multiple tubes through a manifold system attached to a series of ports with a pinch valve for each geotube. This allowed for uniform filling of the tubes and allowed the operators to shift from tube to tube without stopping the dredge. Once a maximum sediment depth of six feet (per the manufacturer's instructions) was achieved in the tubes, the tubes were left to settle and dewater, typically overnight. This process was repeated until each tube reached its maximum pressure and fill capacity. Initially, fine clay particles were found to be passing through the geotube filter fabric. A polymer was subsequently added to the dredge slurry pipe prior to the booster pump, about two gallons per hour for a slurry flow rate of 2,000 gallons per minute, to increase flocculent growth and, therefore, retention of fine particles in the water.

Water from the geotubes discharged to a primary catch basin that was divided by a weir to assist in further separating solids from the water. Water flowing over the weir was then pumped to a temporary 2.3 million gallon storage lagoon for spray irrigation. The system was sized to handle the anticipated water load generated from both the geotubes and precipitation events. Mercury levels in the effluent were typically measured at nondetect (less than 0.1 ppb) or, if detected, below the discharge permit level of 2 ppb. In the last two days of dredging, water effluent lead levels exceeded the discharge permit level of 15 ppb. Reportedly, because of the short duration of the project remaining, WDNR allowed the project to be completed without the

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implementation of a corrective action to address the elevated lead levels.

Water from the temporary lagoon was pumped about 0.6 miles to the northeast and applied to three separate effluent application areas, two alfalfa fields (25 and 71 acres) and a 55-acre forested area. The water was sprayed over the fields and tree canopy via spray nozzles. Spray irrigation was limited to 10,000 gallons per 1.21 acres per day, averaged over a week.

Habitat restoration is to be in 0.5 acres of nearshore bottom to a depth of 1.5 feet and approximately 1.7 acres of nearshore bottom in water depths of 5 feet. These areas are to be examined following dredging and, if found disturbed by dredging, replanted with appropriate native species.

Geotube dewatering continued until Summer 2002 when the geotubes were covered by a 2.5-foot layer of clean subsoil followed by a 0.5-foot layer of topsoil. Total project cost is estimated at \$7 million.

In 2003, Michigan DEQ decided to list Gruber's Grove Bay on their 303(d) list of impaired water bodies. Additional sediment sampling was required to verify contaminant levels within the Bay and for eventually removing the site from the MDEQ 303(d) list. In early 2003, MDEQ staff performed limited sampling of Bay sediments and the sample results indicated that areas of sediment still contained levels of total mercury that exceeded the remedy target level of 0.36 ppm. Because of these findings, in February 2004 the USACE implemented a more extensive sediment sampling program within the Bay. The preliminary results of this sampling effort have confirmed the likely existence of sediment above the remedy target level. Preparation of a final report by the USACE is ongoing and its issuance will likely be by October 2004.

Remedial Action Planned: ☒

Risk Assessment: ☐

Remedial Action Implemented: ☒

Status of Dredging ☐

PRPs: ☒

Contacts: ☒

References: ☒

Modeling: ☐

Fishing Advisory: ☐

Key Conditions: dedicated landfill or CDF, dredging, habitat/streambank restoration, property access issues, water handling limitations

REMEDIAL ACTION PLANNED

Project Name	<u>GRUBER's GROVE BAY</u>	ProjectID: 05-36
Last Updated:	05/30/01	
Target Sediment Cleanup Standards (TSCS):	0.36 ppm total mercury	
How TSCS Established:	Based on the higher of either total mercury levels found in other similar embayments in Lake Wisconsin (0.36 ppm) or the WDNR guideline lowest biological effect level (LEL) for mercury in sediment of 0.2 ppm.	
Target Bank and Floodplain Cleanup Levels (if applicable):		
Other Target:	Remove elevated levels of other contaminants coexisting in areas of total mercury exceeding 0.36 ppm.	
Environmental Sample Data References:	<ul style="list-style-type: none">• Sediment:• Water:• Fish:	
Estimated Target Volume:	87,000 cy	
Planned Disposal Method:	Sediment dewatering and disposal is being performed using passive geotextile tube filtration technology (geotubes). Following the completion of dredging, sediment filled and dewatered geotubes, along with the entire laydown area, will be covered in place with clean soil (targeted for Spring 2002).	
Estimated Calendar Time to Implement Remedy:	April - September 2001: Dredging of sediment from Gruber's Grove Bay and filling of geotubes. September 2001 - May 2002: Geotube dewatering and burial, and restoration.	
Estimated Time to Implement Remedy:	Dredging: 6 months; geotube dewatering and burial, and restoration: about 9 months	
Estimated Cost to Implement Remedy:	Project cost: \$5.9 million (\$68 per cy) Dredging contract: \$1.4 million (\$16 per cy)	
Stated Remedial Action Objectives (and Source):	<p>(Source: Reference A-629)</p> <p>"The risks posed by contaminants within the sediment are predominantly associated with ecological receptors in direct contact with the sediment and the food chain pathway. Mercury, particularly methyl mercury, is known to biomagnify in fish and other aquatic species."</p> <p>"Other constituents, i.e., copper, lead, and ammonia nitrogen, are co-located with the mercury, and will also be removed by this remedial action. By cleaning up sediment to the background levels associated with mercury, risks at the site are reduced to the extent practicable."</p> <p>"The aquatic community within GGB has been adversely affected. The mobility and toxicity of the sediment are believed to be responsible for the aquatic degradation. Certain metals, particularly mercury, are toxic to aquatic wildlife, and the physical consistency of the sediment is not hospitable to vegetation or benthic macroinvertebrates. Removal of the existing sediment will provide a stable substrate more suitable for colonization by desirable aquatic plants. Removal of the mercury will promote recovery of the benthic community, allowing recovery of the detrital decomposer components of the food chain. The proposed actions will make GGB better able to support a diverse aquatic community."</p>	

REMEDIAL ACTION PLANNED

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Measures of Success to be Used:	Documented use of GPS and appropriate maps during the removal to verify that targeted sediment was removed. Success will be based on the volume, area, and thickness of sediment removed.	
Planned Monitoring and Restoration:	<p>No water column monitoring is required as part of the removal action. The WDNR is considering performing water column monitoring, but this is unlikely. Long-term monitoring has also not been specified, although it is likely that WDNR will perform long-term monitoring for research purposes.</p> <p>Habitat restoration will be in 0.5 acres of near-shore bottom to a depth of 1.5 feet and approximately 1.7 acres of nearshore bottom water depth of 5 feet. These areas are to be examined following dredging and, if found disturbed by dredging, replanted with appropriate native species.</p>	
Agency Position on Sediment Removal (and Source):		

REMEDIAL ACTION IMPLEMENTED

Project Name:	<u>GRUBER's GROVE BAY</u>	ProjectID: 05-36
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Physical Target:	Sediment containing greater than 0.36 ppm mercury.	
Goals:		
Primary Contractor:	Stone & Webster, Inc.	
Other Contractors:	Bay West, Inc. (dredging)	
Generic Remediation Method:	Hydraulic dredging	
Equipment:	Ten-inch Ellicott Mudcat MC-2000 hydraulic auger dredge; silt curtain; booster pump; geotextile tubes 200 feet long and 20 feet in diameter; filtrate water collection system; spray irrigation system.	
Material Handling:	Sediment slurry was hydraulically pumped with a booster pump through 4,500 feet of 10-inch pipeline from the dredge to a dewatering area located on the Badger Army Ammunition Plant (BAAP). The booster pump was located on the edge of the BAAP property at the bottom of a hill; the pump was used to transport the dredged slurry mixture through the pipeline, up a hill to a lined enclosure, and into geotubes. Dredged material was then concurrently injected into the tops of multiple tubes through a manifold system attached to a series of ports equipped with pinch valves on each geotube, which allowed for more uniform filling of the geotubes by allowing the operators to shift from tube to tube without having to stop the dredge.	
Volume Removed:	88,300 cy	
Calendar Time:	April 2001 to November 18, 2001 for dredging; geotube dewatering and final burial were completed in Summer 2002.	
Time To Implement:	7 months for dredging; 13 months overall	
Total Cost:	about \$7 million; \$79/cy	
Dredging Cost:		
Disposal of Sediment:	Within geotubes, which will be buried in-place using a 2.5-foot layer of clean subsoil followed by a 0.5-foot layer of topsoil.	
Volume of Water:	87.5 million gallons of water were sprayed over approximately 98 acres of agricultural land, grazing land, and forests.	
Method of Water Treatment:	Filtering by geotubes with polymer addition to the sediment slurry prior to discharge into the geotubes. In addition, some gravity settling occurred in a primary catch basin. There was an initial shakedown period during which the dredge and irrigation systems were not operating simultaneously; the filtered water was then temporarily stored in the lagoon and tube areas. Once in production, the irrigation system operated 5 to 7 days a week, alternating between the three discharge areas. The irrigation system did not operate 24 hours a day. In the alfalfa fields, the spray nozzles were portable, allowing for removal during planting and harvesting periods. In the forested area, effluent was sprayed above the tree canopy, which increased the rate of evaporation and minimized runoff and erosion.	
Water Discharge Limit:	Effluent in a temporary lagoon was sampled and analyzed to determine whether constituent levels met the Public Health Groundwater Quality Standards as specified in the WDNR Groundwater Quality Report, Chapter 140.01. The limits were: mercury (enforcement standard of 2 ppb), lead (enforcement standard of 15 ppb), copper (enforcement standard of 1,300 ppb), ammonia nitrogen,	

REMEDIAL ACTION IMPLEMENTED

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	nitrate/nitrite (enforcement standard of 10,000 ppb), and Kjeldahl nitrogen. Most of the geotube lagoon effluent samples were non-detect (less than 0.1 ppb) for mercury. When mercury was detected, concentration levels were below the discharge permit standard of 2 ppb	
	A regulatory limit of 10,000 gallons per 1.21 acres per day averaged over a week was applied for temporary lagoon water application during spray irrigation.	
Air Monitoring During Remediation:	NA	
Water Monitoring During Remediation:	NA	
Outcome:	The dredging was completed on November 18, 2001, resulting in the removal of about 88,300 cy of sediment. Geotubes were used to dewater the dredge slurry. Effluent water from the geotubes was sampled for water quality parameters and, if met, was discharged by spray irrigation. The water was pumped from a temporary lagoon and applied to three effluent application areas; two alfalfa fields (25 and 71 acres) and a 55-acre forested area. The 102 filled geotubes will be buried onsite using three feet of clean soil and topsoil. Project total cost was about \$7 million.	
Restoration and Post-Monitoring:	Bay restoration is scheduled for Summer/Fall 2002. No post-monitoring is planned.	
Site-Specific Difficulties:	<ul style="list-style-type: none">Problems that affected dredging operations included heavy rain at the beginning of the project, the stoppage of dredging for a total of 28 days due to geotube tearing problems, and debris clogging the dredge. The dredge shut down for 2 to 4 days in mid-summer after a heavy rain storm to wait for the irrigation system to remove the rainwater collected in the geotube basin before dredging could resume. Debris such as golf balls, tree branches and roots, tires, metal, and anchors also caused suspension of dredging operations for short periods of time.Fine clay particles were initially passing through rather than being retained by the geotube filter fabric. A polymer (Superfloc C-595 made by Cytec Materials) was added to the slurry upstream of the booster pump at a rate of approximately 2 gallons per hour at a dredge flow rate of approximately 2,000 gallons per minute which, reportedly, corrected the problem.In the final week of the project, a problem occurred with the geotextile tubes. Over the duration of the project, geotube fabric tearing became more of a concern. As dredged material was injected into the installation port, the fabric near the port would begin to tear. In the last week of dredging, one tube tore along its length and dredged material was released within the lined enclosure.In the last several days of dredging, lead concentrations increased to above 15 ppb due to the close proximity of the dredge to the source of contamination. The dredge was shutdown for 2 to 3 days, and Stone & Webster recommended that an additional flocculant be added to the water. Reportedly, WDNR allowed the dredging to be completed without resolving the elevated lead levels in the effluent water.	
Monitoring Data References:	<ul style="list-style-type: none">SedimentWater:Fish:	

POTENTIALLY RESPONSIBLE PARTIES

Project Name **GRUBER's GROVE BAY**

ProjectID: 05-36

PRP Name: PRP INFORMATION NOT RELEASED

PRPID:

Street Address:

City:

State:

KEY CONTACTS

Project Name **GRUBER's GROVE BAY**

ProjectID: 05-36

Last Name: KEY CONTACT INFORMATION NOT RELEASED

Contact ID:

First Name:

Title:

Company:

Address:

City:

State:

Postal Code:

Work Phone # :

Other Phone #:

Fax # :

Email Address:

REFERENCES

Project Name **GRUBER's GROVE BAY**

ProjectID: 05-36

Reference Type: A
Title: ***U.S. Army Corps of Engineers: Permit Applications***
Location: AEM
Category: Remedial Action Plan/Work Plan
Prepared by/Author: Stone & Webster Environmental Technology & Services
Preparer/Author Address: Englewood, CO 80111
Prepared For: U.S. Army Corps of Engineers - Omaha District
Date Published: December 21, 2000
Key Words and Phrases:

ReferenceID: 629

Reference Type: A
Title: ***Water Management Plan, Gruber's Grove Bay Dredging Project - Revision 1***
Location: AEM
Category: Remedial Action Plan/Work Plan
Prepared by/Author: Stone & Webster, Inc.
Preparer/Author Address: 7677 East Berry Avenue
Greenwood Village, CO 80111
Prepared For: U.S. Army Corps of Engineers - Omaha District
Date Published: December 21, 2000
Key Words and Phrases:

ReferenceID: 630

Reference Type: A
Title: ***Draft Sediment Investigation Report - Gruber's Grove Bay - Badger Army Ammunition Plant, Baraboo, Wisconsin - Revision 1***
Location: AEM
Category: ROD/Proposed Plan/Action Memo/Decision Document
Prepared by/Author: Stone & Webster Environmental Technology & Services
Preparer/Author Address: Englewood, CO 80111
Prepared For: U.S. Army Corps of Engineers - Omaha District
Date Published: June 21, 2000
Key Words and Phrases:

ReferenceID: 667

REFERENCES

Project Name GRUBER's GROVE BAY

ProjectID: 05-36

Reference Type: B

ReferenceID: 491

Title: *Gruber's Grove Bay Dredging Plans Are Best Course for Badger, Bay*

Location: AEM

Category: Site Update

Prepared by/Author:

**Preparer/Author
Address:**

Prepared For:

Date Published: February 23, 2001

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 492

Title: *Bay West awarded contaminated sediment project*

Location: AEM

Category: Site Update

Prepared by/Author:

**Preparer/Author
Address:**

Prepared For:

Date Published: 2001 circa

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 518

Title: *Lake Wisconsin Watershed (LW19) (WDNR)*

Location: AEM

Category: Site Update

Prepared by/Author: WDNR

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: June 30, 1998 (Last Revised)

**Key Words and
Phrases:**

REFERENCES

Project Name GRUBER's GROVE BAY

ProjectID: 05-36

Reference Type: C

ReferenceID: 689

Title: *Bay West, St. Paul, Minn., Purchased a hydraulic dredge ...*

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author

Address:

Prepared For: Hazardous Waste/Superfund Week

Date Published: March 12, 2001

**Key Words and
Phrases:**

Reference Type: C

ReferenceID: 690

Title: *Bay West Purchases Dredge For Superfund Job*

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author

Address:

Prepared For: International Dredging Review (IDR), 2001, Vol. 20, No. 3

Date Published: March/April 2001

**Key Words and
Phrases:**

Reference Type: C

ReferenceID: 793

Title: *Innovative Dewatering and Water Treatment Techniques for
Hydraulically Dredged Sediment*

Location: AEM

Category: Contaminated Sediments: Disposal Methods

Prepared by/Author: (1) Martin Wangensteen, (2) Patricia Lafferty, (3) Jane D. Kobler

Preparer/Author (1) Bay West, Inc.

Address: St. Paul, MN

(2) Stone & Webster, Inc.

Denver, CO

(3) U.S. Army Corps of Engineers

Omaha, NE

Prepared For: World Dredging Mining & Construction

Date Published: December 2001

**Key Words and
Phrases:** geotextile tubes

REFERENCES

Project Name GRUBER's GROVE BAY

ProjectID: 05-36

Reference Type: C

ReferenceID: 961

Title: *In Brief: Geotextiles*

Location: AEM

Category: Contaminated Sediments: Disposal Methods

Prepared by/Author:

Preparer/Author

Address:

Prepared For: World Dredging Mining & Construction

Date Published: July 2002

**Key Words and
Phrases:**

Reference Type: I

ReferenceID: 56

Title: *Bay West, Inc. Awarded \$1.4 Million Contaminated Sediment
Dredging Project*

Location: AEM

Category: Site Update

Prepared by/Author: Bay West, Inc.

**Preparer/Author
Address:** 5 Empire Drive
St. Paul, MN 55103

Prepared For: Distribution

Date Published: March 19, 2001

**Key Words and
Phrases:**

Reference Type: I

ReferenceID: 57

Title: *Bay West, Inc. Purchases Hydraulic Dredge for Contaminated
Sediment Cleanup*

Location: AEM

Category: Site Update

Prepared by/Author: Bay West, Inc.

**Preparer/Author
Address:** 5 Empire Drive
St. Paul, MN 55103

Prepared For: Distribution

Date Published: March 8, 2001

**Key Words and
Phrases:**

REFERENCES

Project Name GRUBER's GROVE BAY

ProjectID: 05-36

Reference Type: I

ReferenceID: 58

Title: ***Badger AAP Superfund Site Contaminated Sediment Investigation & Dredging***

Location: AEM

Category: Site Update

Prepared by/Author: Bay West, Inc.

Preparer/Author Address: 5 Empire Drive
St. Paul, MN 55103

Prepared For: Distribution

Date Published: 2001 circa

Key Words and Phrases:

Reference Type: I

ReferenceID: 97

Title: ***U.S. Army Attributes Success of Dredging Clean-Up Project to "Innovative Technology:" New Mud Cat™ MC-2000 Auger Dredge Used***

Location: AEM

Category: Site Update

Prepared by/Author: Gale Smith

Preparer/Author Address: U.S. Army Operations Support Command

Prepared For: Ellicott

Date Published: 2002

Key Words and Phrases:

REFERENCES

Project Name GRUBER's GROVE BAY

ProjectID: 05-36

Reference Type: L

ReferenceID: 108

Title: *Memo re: Gruber's Grove Bay, WI Dredging Project
(with attachments from U.S. Army Corps of Engineers - Omaha District)*

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

Preparer/Author Address: Malvern, PA 19355

Prepared For: Distribution

Date Published: May 25, 2001

Key Words and Phrases:

Reference Type: L

ReferenceID: 188

Title: *Memo re: Gruber's Grove Bay Summary (Dec. 11, 2001)*

Location: AEM

Category: Site Update

Prepared by/Author: Blasland, Bouck & Lee, Inc.

Preparer/Author Address:

Prepared For: Internal Distribution

Date Published: December 11, 2001

Key Words and Phrases:

Reference Type: L

ReferenceID: 189

Title: *Memo re: Gruber's Grove Bay Summary (Jan. 30, 2002)*

Location: AEM

Category: Site Update

Prepared by/Author: Blasland, Bouck & Lee, Inc.

Preparer/Author Address:

Prepared For: Internal Distribution

Date Published: January 30, 2002

Key Words and Phrases:

REFERENCES

Project Name GRUBER's GROVE BAY

ProjectID: 05-36

Reference Type: L

ReferenceID: 226

Title: *Geotube Use Summary Table*

Location: AEM

Category: Dredging: Miscellaneous

Prepared by/Author: AEM, Inc.

**Preparer/Author
Address:**

Prepared For: Distribution

Date Published: February 3, 2004

**Key Words and
Phrases:**

Reference Type: N

ReferenceID: 9

Title: *Notes of Phone Conversation with WDNR*

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

**Preparer/Author
Address:**

Prepared For: File

Date Published: June 9, 2003

**Key Words and
Phrases:**
