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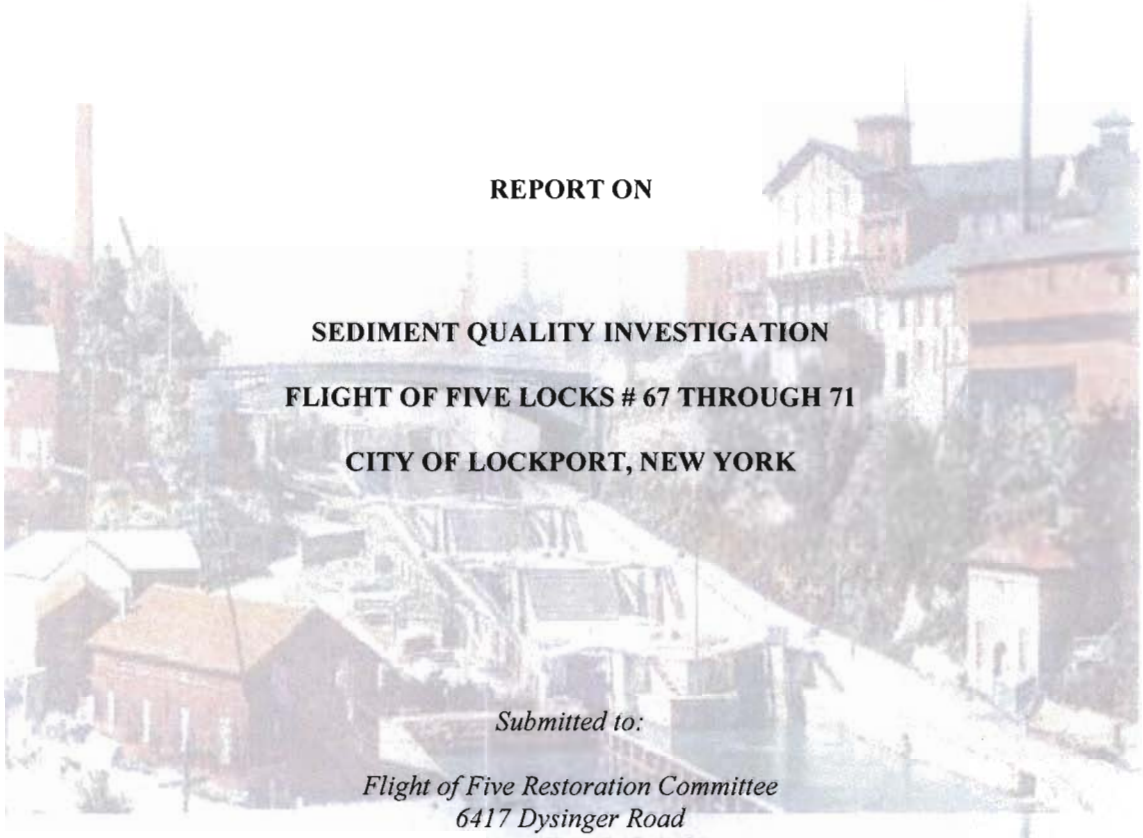


REPORT ON

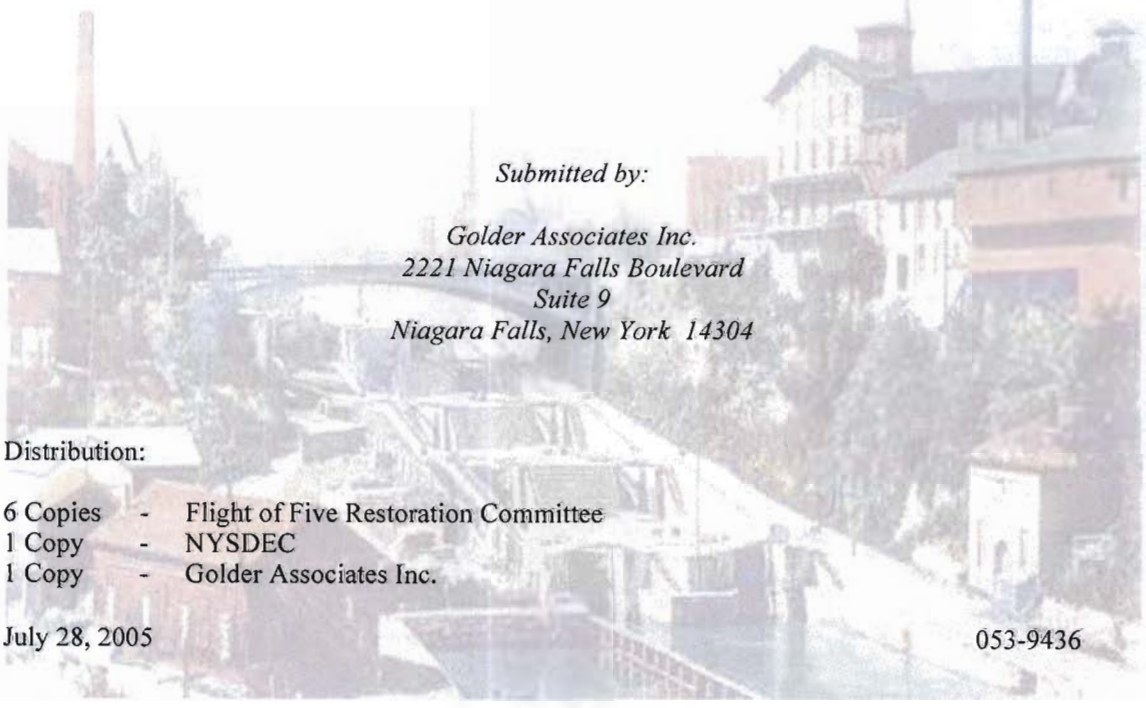
SEDIMENT QUALITY INVESTIGATION

FLIGHT OF FIVE LOCKS # 67 THROUGH 71

CITY OF LOCKPORT, NEW YORK

Submitted to:

Flight of Five Restoration Committee
6417 Dysinger Road
Lockport, New York 14094



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July 28, 2005

053-9436

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July 28, 2005

Our Ref.: 053-9436

Flight of Five Restoration Committee
6417 Dysinger Road
Lockport, New York 14094

Attention: Mr. Peter Welsby, Chairman

Phone: (716) 433-5993
Fax: (716) 433-7604
email pwelsby@wd-ae.com

RE: REPORT FOR A SEDIMENT QUALITY INVESTIGATION AND ASSOCIATED ENVIRONMENTAL SAMPLING RESULTS: FLIGHT OF FIVE LOCKS: ERIE CANAL LOCKS # 67 THROUGH 71; CITY OF LOCKPORT, NEW YORK

Dear Mr. Welsby:

Golder Associates Inc. (Golder) is submitting this report for the sediment quality investigation (Investigation) and the associated environmental sampling performed as part of the referenced investigation. The Investigation was completed in accordance with Golder's accepted proposal, which was in response to the request for proposal (RFP) received from Mr. Peter Welsby, Chairman of the Flight of Five Restoration Committee, dated March 19, 2005.

Golder recommends that the Committee forward the data collected as part of this Investigation to the Solid Waste Division of Region 9 of the New York State Department of Environmental Conservation (NYSDEC) for review, and to provide an opinion whether or not the sediment within the Flight of Five Locks can be disposed of as non-hazardous solid waste. Disposal as non-hazardous solid waste is the most cost effective sediment disposal alternative.

Once this opinion is received, Golder will solicit information from local remediation contractors and waste disposal facilities (both locally and regionally) to provide the project stakeholders with a Sediment Management Plan, which can be used to excavate and dispose of the sediment that is presently contained within the five referenced locks.

Golder appreciates the opportunity to provide the Committee with this proposal, and we look forward to assisting you in the future. If you have any questions regarding this project or if additional assistance is needed, please call.

Sincerely,

GOLDER ASSOCIATES INC.

Norman K. Wohlabaugh, CPG, PG
Senior Geologist

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1.0 INTRODUCTION

This Investigation report provides a summary of the sediment sampling services that were utilized to collect sediment samples from the Flight of Five locks in Lockport, New York. These samples were subsequently shipped to a contract laboratory for chemical analyses to determine sediment quality, as well as the material characteristics for sediment disposal purposes that will be required for the potential restoration of the "Lockport's Flight of Five Locks; Erie Canal Locks # 67 through 71" (Flight of Five) in the City of Lockport, New York. Stakeholders in this project include: the City of Lockport; the Erie Canalway National Heritage Corridor Commission, the Erie Canal Flight of Five Restoration Committee, the New York State Canal Corporation; the New York State Department of Transportation; Niagara County; the Niagara County Canal Development Task Force; the Niagara County Historical Society; and the U.S. Department of the Interior. Golder Associates Inc. (Golder) understands that stabilization and restoration of the "Flight of Five" to their 1862 function and condition is a key mission as part of the stakeholders' vision of creating a world-renowned tourist destination at the Lockport Locks Heritage District.

The intended future use of this site is for tourism, since the Erie Canalway was designated a National Heritage Corridor by Congress in 2000, and because the Lockport Locks Heritage District represents the most significant historic site from the 1862-era Erie Canal that is still in operating condition.

The following environmental consulting services were completed as part of this investigation:

- Task 1 – Collection of sediment samples to establish estimated quantity of sediment to be removed and to be characterized for disposal;
- Task 2 – Calculation of the estimated total cubic yards of sediment within the five locks that is expected for removal;
- Task 3 – Laboratory analysis of the materials; and
- Task 4 – Preparation of an Investigation Report summarizing the findings of the Investigation

A Management Plan describing recommendations for removal and disposal, along with an estimate of anticipated removal, hauling, and disposal costs is forthcoming once an opinion is received from the NYSDEC on disposal options.

1.1 SITE BACKGROUND AND PROJECT UNDERSTANDING

The Flight of Five is located in the center of the City of Lockport, directly under the Pine Street Arch Bridge in an area currently zoned for residential and business use. Surrounding land consists mostly of a mix of commercial and retail businesses. The project area is approximately 600 feet long in the northeast-southwest direction, and is located on the Lockport Escarpment with a steep slope to the northeast. The Flight of Five is bordered by an access road along the northwest side of the locks, and by the operating Lock 34 on the southeast.

On April 12 and 13, 2005, Golder collected the sediment samples from the Flight of Five Locks just prior to the re-flooding of the Locks. This information will then be used to design a Management Plan for removal of sediment within the Flight of Five Locks. Sediment removal activities will be completed in the winter months of 2006, once the Flight of Five Locks are drained for winter. Sediment removal activities will actually be conducted in a relatively "dry" environment, so while the sediment has accumulated within the Flight of Five Locks, sediment removal and confirmation

sampling activities will not be "in-water" activities. Thus, the effect of removal activities on the Canal waters is expected to be minimal.

1.2 PREVIOUS WORK

According to the stakeholders, prior environmental sampling was completed in the vicinity of the Flight of Five; however, the actual analytical results were not available for the preparation of Golder's proposal. In the late 1990's, the Canal Corporation applied for and received a grant from the USEPA to investigate a portion of the Erie Canal between the Niagara River and Rochester. That document titled "Evaluation of Sediment Quality of the Erie Canal between the Niagara River and Rochester, New York" dated January, 2000 reportedly identified hazardous waste levels of polychlorinated biphenyls (PCBs), elevated levels of dioxin/furans and metals in canal sediment immediately upstream and downstream of the Flight of Five.

Based on this information and discussions with Niagara County, one grab sample was collected in mid-November, 2001, from within the Flight of Five. This sample also showed elevated levels of dioxin/furans and heavy metals. This one sample was not considered representative of all of the material sediment within the Flight of Five.

The Canal Corporation was contacted to procure the analytical results for these two sampling events. The data were received and reviewed as part of this project, and confirmed these findings.

2.0 SCOPE OF WORK

The scope of work was developed to conform with the RFP and the New York State Department of Environmental Conservation (NYSDEC) Division of Water Technical and Operational Guidance Series (TOGS) 5.1.9 titled, "In-Water and Riparian Management of Sediment and Dredged Material" dated November, 2004. Golder also received from the Canal Corporation the analytical results from the previous sampling events described under Section 1.2 Previous Work. This information, which consists of one sample within the Flight of Five, and samples upstream and downstream of the Flight of Five, was reviewed for comparison purposes to the analytical results that were obtained as part of this Investigation.

2.1 Task 1: Sample Collection and Measurement of Sediment Depth

Field work was consistent with NYSDEC TOGS 5.1.9. Field activities were performed by a three-person Golder field crew who are experienced in field investigation methods and have completed the Occupational Safety and Health Act (OSHA) approved 40-hour HAZWOPER health and safety training course. The sampling activities were conducted on April 12 and 13, 2005 using Level C personal protective equipment [Tyvek suit, gloves, hard hat, safety glasses, respirator, and organic vapor photo-ionization detector (PID)] during initial entry in the Locks, but was downgraded to modified Level D (no respirator) once a determination was made that volatile organic compounds (VOCs) were generally absent in the breathing zone within the Locks. Access to the locks was via ladder entry. Ladders were tied off, and the work area was periodically screened with a PID to assure a safe atmosphere within the work area. Two workers were stationed at the top of the Lock, while the sampler entered the respective Lock tethered to a rope via a man-harness.

Per our approved proposal, sediment samples and the measurement of the depth of sediments was completed at two locations within each of the five locks within the Flight of Five, for a total of ten sampling and sediment thickness measuring points. Sediment samples were collected and sediment thickness measured at the following locations as shown on Figure 1:

- Lock 67 – Sampling points 67A and 67B;
- Lock 68 – Sampling points 68A and 68B;
- Lock 69 – Sampling points 69A and 69B;
- Lock 70 – Sampling points 70 A and 70 B; and
- Lock 71 – Sampling points 71A and 71B.

Sediment sample collection and measurement of sediment thickness at each sampling location was accomplished using a hand auger with a sampling bucket head attached to the auger. The auger and sample bucket were manually advanced to the bottom of each lock at each sampling location. It should be noted that the depth of sediment at sampling point 71A was greater than the length of the hand auger (greater than 8 feet); thus sediment depth at this location was estimated with reference to the lock wall elevation (see Section 2.2).

Sediment samples from each interval within the respective sediment boring were composited vertically into one sample in a sample container, and the sample was then head space screened with a PID to determine the general presence of VOCs within the respective sediment sample. The head space screening information was then recorded for each sampling point. A subsurface log that describes the type of material encountered in each boring and the thickness of this material was also

prepared. Last, measurements were made from the lock walls to provide a relative location of the sampling location for reporting and reference purposes. This information is included as Table 1 to this report.

Once the hand auger was advanced to the bottom of the lock or could not be further advanced, the sampling crew moved to the second sampling point within that respective lock. The sampling and sediment measurement process described above was then repeated at the next sampling location. Borehole logs for each location are attached as Appendix A.

The sediment collection process was as follows. Sediment samples collected for VOC analyses, which can not be composited, were collected as a discrete grab sample (one per lock) and were selected based on staining, and/or elevated PID readings obtained during head space readings. The discrete sample locations in each lock where VOC analysis was performed are shown on Figure 1. Once the sediment grab samples were collected and placed into laboratory-supplied containers and measurement of sediment thickness was completed within the respective lock, the two sediment sub-samples collected from each lock for the remaining (non-VOC) analytes [e.g. sediment samples (67A and 67B)] were then combined into one composite sample representing the entire lock. The same process was repeated for sediment samples 68A and 68B; 69A and 69B, 70A and 70B, and 71A and 71B, so that one representative composite sample from each lock for all analytes except VOCs, and one discrete grab sample from each lock for VOC analysis, were collected for laboratory analysis.

The five composite and five VOC sediment samples were packed on ice, stored in a cooler, and delivered to the contract laboratory following strict chain of custody protocols. A field duplicate, and the appropriate quality assurance/quality control samples were also collected for submission to the contract laboratory.

2.1.1 Quality Assurance Quality Control (QA/QC)

A blind duplicate sample, an equipment rinse blank, and a matrix spike/matrix spike duplicate were included in the program to provide a basis for assessing the quality of the data. The equipment rinse blank was collected by pouring laboratory-supplied deionized water over non-dedicated field equipment. Equipment rinse blank samples were analyzed to check for potential procedural contamination at the site. Trip blanks were analyzed to assess the potential for contamination of samples during sample shipment and storage. Duplicate samples were included in the program to check sampling and analytical reproducibility. Matrix spikes provided information about the effect of the sample matrix on analytical methodology. Matrix spikes were performed in duplicate for organics and will hereinafter be referred to as MS/MSD samples.

The general level of the QC effort was one blind field duplicate and one equipment rinse blank for every 20 or fewer investigative samples. Non-dedicated equipment was used for collecting the sediment samples. The equipment rinse blank consisted of HPLC grade water or deionized water that was passed over or through the decontaminated sampling equipment. Additional soil samples were collected for MS/MSD analysis. A total of four QA/QC samples were collected and analyzed as follows:

- The equipment rinse blank sample was analyzed for volatile organic compounds (VOCs) and tentatively identified compounds (TICs), semi-volatile organic compounds (SVOCs), metals, pesticides and herbicides, polychlorinated biphenyls (PCBs), and dioxins/furans.

- A duplicate sample, collected from Lock 68, was analyzed for VOCs, TICs, SVOCs, metals, pesticides and herbicides, PCBs, and dioxins/furans.

- The MS/MSD samples were also analyzed for VOCs, TICs, SVOCs, metals, pesticides and herbicides, and PCBs but were not analyzed for dioxin/furans as indicated in Table C-1 of Appendix C of the TOGs 5.1.9.

2.2 Task 2: Estimated Volume of Sediment for Removal

The thickness of sediment information collected from the ten sampling points (two from each lock) was used to estimate the volume of sediment material that is present within the five locks. Additionally, in cases where the sediment profile of a lock was irregular, the profile was divided into sections, and separate volumes were calculated. At sampling point 71A where the sediment thickness was thicker than the length of the hand auger (8 feet), total thickness of sediment was estimated by extrapolating along horizontal seams created by the cut rock blocks within the Lock 71, from the known thickness of sediment at sampling point 71B. These volumes were then summed to yield the total sediment profile of the lock.

2.3 Task 3: Laboratory Analysis of the Sediment Samples

Laboratory analysis of the sediment was performed to comply with New York State law, and to control waste disposal costs. For example, based on the analytical results, it may be possible to dispose of the sediment in a local landfill as non-hazardous waste at a significant cost savings, instead of disposal at a hazardous waste facility.

General sediment characterization is typically completed as part of an investigation to determine the presence/absence and concentration of VOCs and SVOCs present in the sediment, as wells as total metals, pesticides/herbicides, polychlorinated biphenyls (PCBs), and in this case dioxins and furans. These results are then compared to state regulatory guidance to evaluate whether or not the sediment constituent concentrations exceed regulatory values. The following state guidance was used for comparison purposes:

- Technical and Administrative Guidance Memorandum (TAGM) 4046, "Determination of Soil Cleanup Objectives and Cleanup Levels"; January, 1994;

- Technical and Administrative Guidance Memorandum (TAGM) 3028, "Contained-In Criteria for Environmental Media"; August, 1997; and

- Technical and Operational Guidance Series (TOGS) 5.1.9, "In-Water and Riparian Management of Sediment and Dredged Materials"; November, 2004.

Appendix B of TOGS 5.1.9- "Various Methods for Calculating How Many Samples Should Be Collected to Characterize a Dredge Site" provides guidance for the analytical methods and parameters that should be analyzed, as well as the amount of samples to be collected. According to the Balduck Method, dredge areas consisting of under 5,000 square yards with documented contamination from

past sediment data; in areas of established fish advisories, spills or site specific contaminants of concern (e.g., copper, mirex, dioxin, or PCBs) in the drainage basin; or where there is a likelihood of contamination and dredging has not occurred in the last five years should have a minimum of three samples analyzed for this project.

Initial estimates of volume indicated that the project area consisted of five locks, each approximately 17 feet wide and 120 feet in length, or approximately 1150 square yards total. Since the project is subdivided into five distinct containers, or locks, the potential existed for variability of sediment quality and associated contaminants within each respective lock. Therefore, Golder recommended analysis of one composite sample from each lock, or five composite samples, with the inclusion of a grab sample from each lock for VOC analysis.

The technique of compositing samples is not recommended for determination of the concentration of VOCs in sediment samples. Thus, VOC analyses were completed on grab samples collected; one from each of the five Locks. All other analytical methods were completed on composite samples.

2.3.1 Characterization of Sediment Quality

Volatile Organic Compounds. One discrete grab sample from each lock was submitted to the contract laboratory to be analyzed for volatile organic compounds (VOCs) as follows: Sampling Location 67A, 68A; 69A; 70A; and 71A (Figure 1). These samples were analyzed for Target Compound List (TCL) VOCs using USEPA Method 8260B.

Semi-volatile Organic Compounds. The five composite sediment samples were analyzed for TCL SVOCs using USEPA Method 8270C.

Total Metals. The five composite samples were analyzed for Target Analyte List (TAL) metals plus mercury and cyanide by USEPA method 6010/7471 and 9012 respectively.

Pesticides/Herbicides/PCBs. The five composite samples were analyzed for pesticides (including mirex, chlordane, and dieldrin) by EPA Method 8081; herbicides by USEPA Method 8151, and PCBs by Method 8082.

Dioxins/Furans. The five composite samples were also analyzed for dioxins and furans using USEPA Method 1613B.

The analytical data report is reported via Analytical Services Protocol (ASP, June 2000) Category B deliverables.

2.3.2 Characterization of Sediment for Landfill Disposal

To dispose of the sediment, the waste is required to be properly characterized prior to disposal, to evaluate which options for waste disposal are available to the stakeholders. A waste generator of potentially hazardous waste is required to initially determine if his/her waste is **excluded** from regulation. Excluded wastes are found in 40 CFR 261.4. As the sediment waste in the "flight of five"

is not excluded by 40 CFR 261.4, the next two steps are followed to determine if the waste is a hazardous waste:

1. Since the waste is not excluded, it needs to be determined if it is a **listed** hazardous waste. Listed wastes include: a) wastes from non-specific sources, such as spent solvents ("F" wastes); b) source specific wastes, such as wastewater treatment system sludges from specific processes ("K" wastes); c) certain discarded commercial chemical products, off-spec materials, container residues or spill residues thereof ("P" or "U" wastes). The listed wastes are identified in 40 CFR 261, Subpart D. Flight of Five sediment (waste) is not identified in this subpart so the next step applies.

2. Because the waste was not excluded or listed, then a determination needs to be made if it is a **characteristic** hazardous waste. A waste is a characteristic waste if it exhibits the properties of *ignitability*, *corrosivity*, *reactivity*, or *toxicity* as defined in 40 CFR 261, Subpart C. The criteria used to determine if a waste is characterized as hazardous are described below.

Ignitability: (40 CFR 261.21). A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

- If it is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than 60 °C (140 °F), using test methods approved under procedures set forth in 40 CFR 260.20 and 40 CFR 260.21;

- If it is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption or moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard;

- It is an ignitable compressed gas as defined in 49 CFR 173.300 and as determined by the test methods described in that regulation or equivalent test methods approved by the Commissioner under 40 CFR 260.20 and 40 CFR 260.21; or

- It is an oxidizer as defined in 49 CFR 173.151.

Solid waste that exhibits the characteristic of ignitability has the EPA Hazardous Waste Number of D001.

Corrosivity: (40 CFR 261.22). A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

- If it is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter using Method 9040 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA Publication SW-846, as incorporated by reference in 40 CFR 260.11; or

- If it is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55 °C (130 °F) as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69 as standardized in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA Publication SW-846, as incorporated by reference in 40 CFR 260.11.

Solid waste that exhibits the characteristic of corrosivity has the EPA Hazardous Waste Number of D002.

Reactivity: (40 CFR 261.23). A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

- It is normally unstable and readily undergoes violent change without detonating;
- It reacts violently with water;
- It forms potentially explosive mixtures with water;
- When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment;
- It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment;
- It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement;
- It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure;
- It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53, or a Class B explosive as defined in 49 CFR 173.88;

A solid waste that exhibits the characteristic of reactivity has the EPA Hazardous Waste Number of D003.

Toxicity: (40 CFR 261.24). A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure (TCLP), Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in 40 CFR 260.11, the extract from a representative sample of the waste contains any of the listed contaminants at the concentration equal to or greater than the respective value given in the regulations. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract for this purpose. A solid waste that exhibits the characteristic of toxicity has an EPA Hazardous Waste Number specified based on the constituent which makes it hazardous.

The results of the sediment characterization for landfill disposal purposes are provided in Section 3.2 of this report.

3.0 INVESTIGATION RESULTS

The following section of this report presents the results of this Investigation. This information is being used to complete a Sediment Management Plan that can be used to guide sediment removal and disposal activities for sediment that has accumulated within the Flight of Five Locks.

3.1 Estimate of Sediment Volume

Sediment thickness information collected from the ten sampling points (two from each lock) was used to estimate the volume of sediment material that is present within the five locks. Based on observations made by Golder, preliminary calculations indicate that approximately 740 cubic yards total of sediment is present in the Flight of Five Locks. For sediment removal purposes, this volume is approximately equal to 1,035 tons of sediment, using a density of 1.4 tons/cubic yard for conversion purposes. If the sediment is saturated at the time of removal, actual tonnage of sediment could greater, up to as much as 1,350 tons using a density of 1.8 tons/cubic yard for conversion to wet sediment for purposes of this report.

This information is presented as Table 2, which is attached to this document. This table describes the estimated volume of material in cubic yards of sediment that is present in each lock, as well as estimated total volume for sediment removal purposes.

3.2 General Sediment Characterization

The analytical results for sediment characterization have been summarized on Tables 3 and 4, which are attached to this report. The actual laboratory reports that described the results are voluminous, and have therefore been attached in electronic format as Appendix B.

Volatile Organic Compounds. Several VOCs were detected in the grab samples collected from three of the five locks. There were no VOCs detected in Lock 67 and Lock 69. Acetone was present in Lock 70 and 71; 2-butanone and methylcyclohexane were both present in Lock 71; and trichloroethylene was present in Lock 68. The NYSDEC T.O.G.S. 5.1.9 document did not present any threshold values for these compounds; therefore, the Recommended Soil Cleanup Objectives (NYSDEC TAGM 4046) and Soil/Sediment Action Level (TAGM 3028) documents were used as comparison values. The concentrations of acetone, 2-butanone and trichloroethylene were below both TAGM 4046 and TAGM 3028 standards; no standards were given for methylcyclohexane. It should be noted that none of these compounds were detected in the duplicate sample, which was collected from Lock 68.

Semi-Volatile Organic Compounds. Numerous SVOCs were detected in the composite samples collected from each of the five locks, as well as in the duplicate sample. However, most SVOCs were present at concentrations below both the TAGM 4046 and TAGM 3028 standards. The only compounds that were present at concentrations in exceedance of one or both of the TAGM levels were the following polyaromatic hydrocarbons:

- benzo(a)anthracene (present in Lock 69, Lock 70 and Lock 71);

- benzo(b)fluoranthene and benzo(k)fluoranthene (both present in Lock 71);
- benzo(a)pyrene (present in each sample, including the duplicate);
- chrysene (present in Lock 70 and Lock 71); and
- dibenzo(a,h)anthracene (present in Lock 67, Lock 68, Lock 69, Lock 71, and the duplicate sample).

The NYSDEC T.O.G.S. 5.1.9 Document did not present any individual threshold values for these compounds; however, Class A Sediment Quality Threshold Values for Dredging were given as a sum of all polyaromatic hydrocarbons. Using these criteria, only the composite sample from Lock 71 was in exceedance of the threshold value.

Pesticides/Herbicides. The concentrations of pesticides detected in the composite samples collected from three of the five locks were in exceedance of one of the NYSDEC standards. Dieldrin was present in Lock 70 at a concentration of 0.071 mg/kg, which was in exceedance of both TAGM 4046 and TAGM 3028 values, but below the T.O.G.S. 5.1.9 threshold value.

Gamma-chlordane was detected in Lock 68 at a concentration of 0.0063 mg/kg, which exceeds the T.O.G.S. 5.1.9 threshold value, but was below both TAGM standards. It should be noted that this compound was not detected in the duplicate sample, which was collected from Lock 68.

Heptachlor epoxide was detected in Lock 70 at a concentration of 0.024 mg/kg, which exceeded the TAGM 4046 value, but was below the TAGM 3028 value. No T.O.G.S. 5.1.9 threshold value was given for this compound.

The pesticide 4,4'-DDD was detected in Lock 67, Lock 68 and Lock 69, while 4,4'-DDE was detected in Lock 68. Taken individually, these compounds are not in exceedance of either the TAGM 4046 or TAGM 3028 guidance values, and there is no individual T.O.G.S. 5.1.9 threshold value given for either of these compounds. However, T.O.G.S. 5.1.9 does report threshold values for these compounds as a sum of the concentrations of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT (which was not detected in any of the samples. Taken as a whole, the concentrations of these compounds in Lock 67 (0.0042 mg/kg), Lock 68 (0.0077 mg/kg) and Lock 69 (0.012 mg/kg) were all in exceedance of the T.O.G.S. 5.1.9 threshold value of 0.003 mg/kg.

There were no herbicides detected in the composite samples collected.

Polychlorinated Biphenyls. PCBs were detected in each of the composite samples collected, including the duplicate sample. Taken individually, the concentrations of these PCBs (Aroclor-1248 and Aroclor-1254) are not in exceedance of either the TAGM 4046 or TAGM 3028 guidance values (no individual T.O.G.S. 5.1.9 threshold value is given for either of these compounds). However, T.O.G.S. 5.1.9 does report threshold values for these compounds as a sum of the concentrations of all Aroclors. Taken as a whole, the concentrations of these compounds in each sample were in exceedance of the T.O.G.S. 5.1.9 threshold value of 0.1 mg/kg.

Inorganics. Most of the metals analyzed for were detected in the composite samples collected from each of the five locks, as well as in the duplicate sample. However, most metals were present at concentrations below both the TAGM 4046 and TAGM 3028 standards, as well as the T.O.G.S. 5.1.9 threshold values (where applicable) except for the following:

- Arsenic was present in each of the samples, at concentrations above the TAGM 3028 values, but below the TAGM 4046 and T.O.G.S. 5.1.9 values.

- Beryllium was present in each of the samples at concentrations above both the TAGM 3028 and TAGM 4046 guidance values. No T.O.G.S. 5.1.9 threshold values were given for this metal.

- Iron and chromium were both present in each sample at concentrations above the TAGM 4046 guidance values. No TAGM 3028 or T.O.G.S. 5.1.9 values were given for these metals.

- Zinc (in each sample) and nickel (in all but Lock 67) were detected at concentrations above the TAGM 4046 guidance values, but below the TAGM 3028 guidance values. No T.O.G.S. 5.1.9 threshold values were given for this metal.

- Lead was present in Lock 68 and the duplicate sample at concentrations above the T.O.G.S. 5.1.9 threshold values, but below the TAGM 3028 guidance values. Additionally, lead was present in each of the remaining samples at concentrations above both the T.O.G.S. 5.1.9 threshold values and the TAGM 3028 guidance values. Only a soil background level is specified for TAGM 4046.

- Copper was detected in Lock 67 at a concentration above both the TAGM 4046 guidance values and the T.O.G.S. 5.1.9 threshold value. No TAGM 3028 guidance value was given for this metal.

- Cadmium was detected in Lock 70 and Lock 71 at concentrations above both the TAGM 4046 guidance values and the T.O.G.S. 5.1.9 threshold value, but below the TAGM 3028 guidance value.

- Finally, mercury was detected in Lock 69 at a concentration above the TAGM 4046 guidance values but below both the T.O.G.S. 5.1.9 threshold value, and the TAGM 3028 guidance value. Additionally, mercury was detected in Lock 70 and Lock 71 at a concentration above both the TAGM 4046 guidance values and the T.O.G.S. 5.1.9 threshold value, but below the TAGM 3028 guidance value.

Dioxins and Furans. Dioxins and furans were detected in the composite samples collected from each of the five locks, as well as in the duplicate sample. As indicated in Table 4, dioxins and furans have different congeners, which are listed separately in the table. Each congener has a different relative strength, and their relative concentrations are calculated using the Toxic Equivalent Factor (TEF). The TEF is effectively a weighing factor which, if multiplied by the known concentration of a congener, gives a toxic equivalent (TEQ). The toxicity of any mixture is given by the sum of the TEQs. Applying the toxicity factors to each congener and summing the results takes into account the

relative strengths of each congener. The T.O.G.S. 5.1.9 document does not list threshold values for individual congeners; however, the document does list a threshold value of 4.5 nanograms per kilogram (ng/kg) for the sum of all TEQs. Each of the samples, including the duplicate sample (collected from Lock 68), were in exceedance of this threshold value.

3.3 Sediment Characterization for Disposal Purposes

A RCRA characteristics analysis was performed on the composite sample from each lock consisting of ignitability (1010), corrosivity (Method 9045) and reactivity (Section 7.3). The Toxicity Characteristic Leaching Procedure (TCLP) was performed on each sample (USEPA Method 1311), and the extract was analyzed for VOCs, SVOCs, metals, pesticides/herbicides using the methods described above. The results of the RCRA characterization is summarized on Table 5.

Ignitability. The five composite samples from Locks 67 to 71 all had flashpoints above 200°F. The samples do not have the RCRA characteristic for ignitability.

Corrosivity. The five composite samples from Locks 67 to 71 were solids with a leachable pH between 2 and 12.5 standard units. The samples do not have the RCRA characteristic for corrosivity.

Reactivity. The five composite samples from Locks 67 to 71 did not exhibit reactivity, including releasing H_2S (hydrogen sulfide) or HCN (hydrogen cyanide) when acidified. The samples do not have the RCRA characteristic for reactivity.

Toxicity. The five composite samples from Locks 67 to 71 did not have any detections of RCRA characteristic TCLP volatiles. The five composite samples from Locks 67 to 71 did not have any detections of RCRA characteristic TCLP semi-volatiles. The five composite samples from Locks 67 to 71 had detections of Barium, Cadmium, and Lead. In addition the composite sample from Lock 71 had a detection of Arsenic. The detections of TCLP inorganics were at least one order of magnitude below TCLP RCRA toxicity characteristic comparison criteria.

Based upon the above analyses, samples do not have the RCRA characteristic for toxicity. Since the waste is not a characteristic or listed waste, as defined under RCRA, the waste is classified as "RCRA non-hazardous" for disposal purposes.

4.0 SUMMARY

The Following provides as summary of the project findings:

- Based on observations made by Golder, preliminary calculations indicate that sediment volumes in the Locks vary from approximately 87.4 cubic yards (Lock 69) to 229.4 cubic yards (Lock 71) for a total sediment volume of approximately 740 cubic yards. For sediment removal purposes, this volume is approximately equal to 1,035 tons of relatively dry sediment, and approximately 1,350 tons of saturated sediment.

- There were no VOCs detected in the sediments within the Flight of Five Locks at concentrations above the TAGM guidance values.

- The SVOCs benzo (a) anthracene, benzo (b) fluoranthene, benzo (k) fluoranthene, benzo (a) pyrene, chrysene and dibenzo (a,h) anthracene were detected at concentrations that exceeded one or both of the TAGM standards.

- Sediment in Lock 71 was in exceedance of the threshold value for SVOCs for Class A Sediment Quality Standards for dredging of sediments contaminated with polycyclic aromatic hydrocarbons.

- The concentrations of the pesticides dieldrin, gamma-chlordane and heptachlor exceeded TAGM standards in two of the five Locks.

- The sum concentrations of the pesticides 4.4-DDD and 4,4,-DDE in Locks 67, 68, and 69 were all in exceedance of the T.O.G.S. 5.1.9 threshold value of 0.003 mg/kg.

- There were no herbicides detected in the samples collected.

- PCBs were detected in each of the composite samples collected, but not at concentrations that exceeded either the TAGM 4046 or TAGM 3028 guidance values. Taken as a whole, the concentrations of these compounds in each sample were in exceedance of the T.O.G.S. 5.1.9 threshold value of 0.1 mg/kg.

- Arsenic, beryllium, iron, chromium, zinc, lead, copper, cadmium and mercury were detected at concentrations exceeding one or both TAGM values and/or T.O.G.S. 5.1.9 threshold values.

- Dioxins and furans were detected in the composite samples collected from each of the five locks above the threshold value, as listed, for the sum of these compounds.

- The five composite samples from Locks 67 to 71 do not have the RCRA characteristic for ignitability, corrosivity nor reactivity.

- The five composite samples from Locks 67 to 71 did not have any detections of RCRA characteristic TCLP volatiles or TCLP semi-volatiles. The five composite samples from Locks 67 to 71 had detections of Barium, Cadmium, and Lead, and arsenic (Lock 71). These detections of TCLP inorganics were at least one order of magnitude below TCLP RCRA toxicity characteristic comparison criteria.

5.0 CONCLUSIONS & RECOMMENDATIONS

Based on the testing performed as part of this Investigation the waste is not a characteristic or listed waste, as defined under RCRA. Therefore, the waste is classified as "RCRA non-hazardous" for disposal purposes.

Golder recommends that the Committee forward the data collected as part of this Investigation to the Solid Waste Division of Region 9 of the NYSDEC for review, and to provide an opinion whether or not the sediment within the Flight of Five Locks can be disposed of as non-hazardous solid waste before completion of the Management Plan for sediment removal, handling and disposal. Disposal as non-hazardous solid waste is the most cost effective sediment disposal alternative (approximately $50 to $60 per ton), and could result in significant cost savings for the project versus disposal as hazardous waste (approximately $85 to $90 per ton).

Once an opinion is received from the NYSDEC, Golder will prepare a Management Plan for sediment removal, handling and disposal, including anticipated costs. The Management Plan will be provided to the Committee within one month of receipt of the NYSDEC's opinion on waste disposal options.

6.0 CLOSURE

Golder appreciates the opportunity to provide our environmental consulting services for this project to the Committee for the Historic Restoration of the Flight of Five Locks in Lockport, New York.

GOLDER ASSOCIATES INC.

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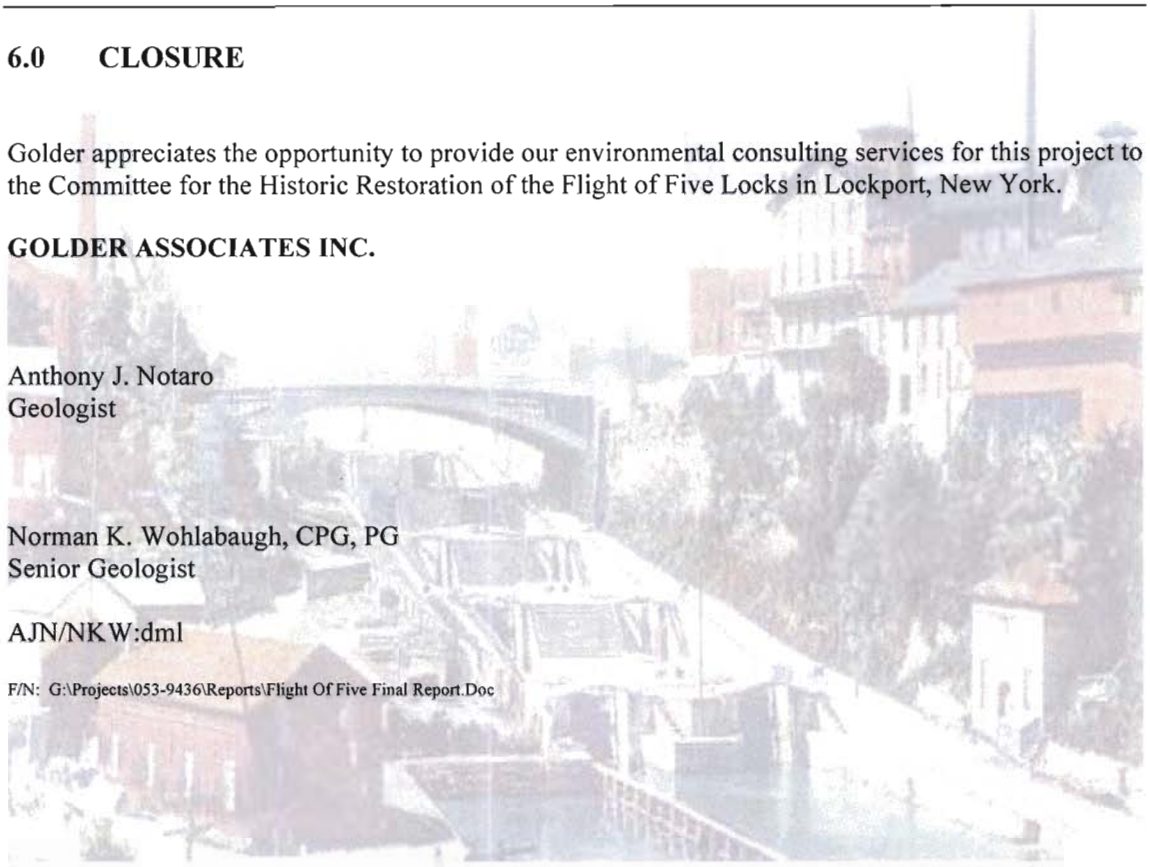

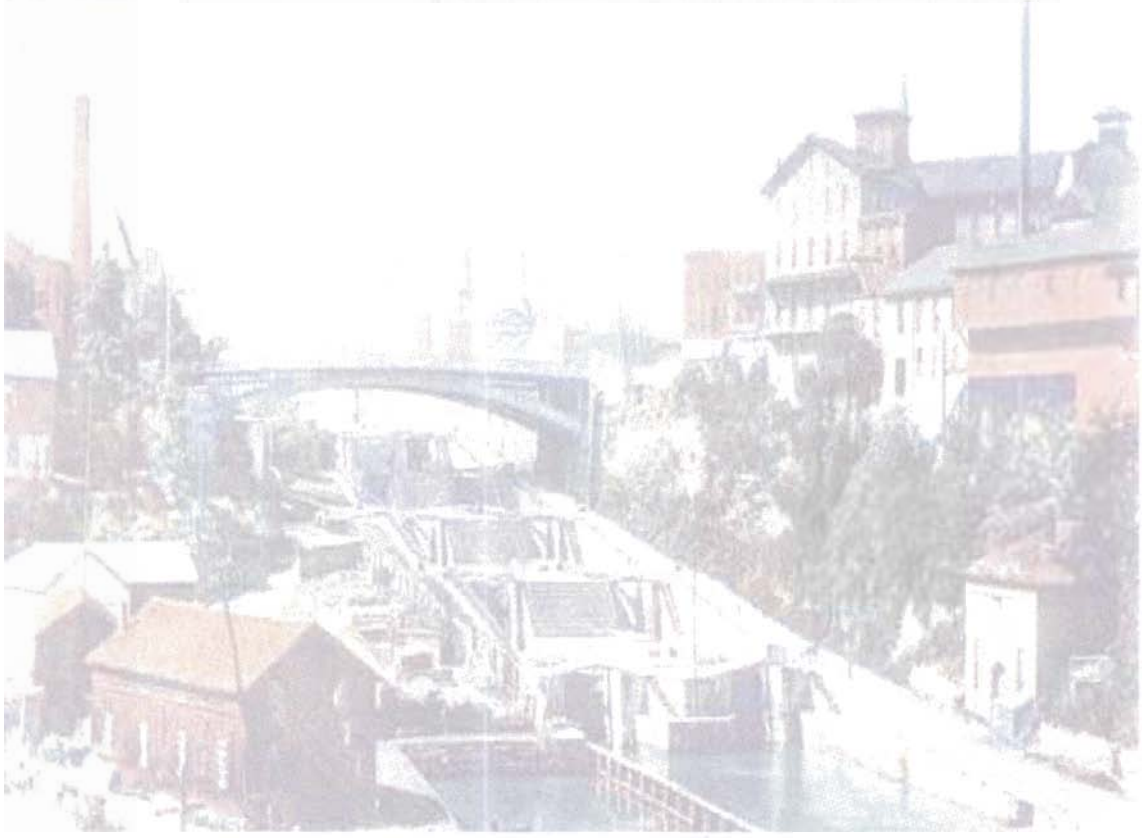

TABLE 1
MEASURED SEDIMENT SAMPLE LOCATIONS
FLIGHT OF FIVE
LOCKPORT, NEW YORK

Lock Number	Boring Number	North/South Location, or landmark*	East/West Location, or landmark*
LOCK 67	67A	10' South of North Wall	at Lock "Knockout"**
	67B	11' South of North Wall	at Base of Stairs†
LOCK 68	68A	6' 3" South of North Wall	13' 6" West of Lock "Knockout"
	68B	9' South of North Wall	at Base of Stairs
LOCK 69	69A	7' 9" South of North Wall	12' 8" West of Lock "Knockout"
	69B	9' South of North Wall	10' 8" West of Base of Stairs
LOCK 70	70A	7' 6" South of North Wall	4' West of Lock "Knockout"
	70B	12' 9" South of North Wall	3' West of Top of Stairs
LOCK 71	71A	10' South of North Wall	2' East of Bridge‡
	71B	6' 6" South of North Wall	27' East of West Wall

* = Distances measured manually with a tape measure.
** = Lock "Knockouts" are wider areas near the east end of each lock (see Figure 1).
† = Stairs are located on the north side of Locks 67, 68, 69 and 70.
‡ = Refers to bridge that traverses Lock 71 (See Figure 1).

TABLE 2
APPROXIMATE SEDIMENT VOLUME CALCULATIONS
FLIGHT OF FIVE
LOCKPORT, NEW YORK

LOCATION	MEASURED LENGTH (feet)	ESTIMATED WIDTH* (feet)	MEASURED/ AVERAGE DEPTH** (feet)	CALCULATED SEDIMENT VOLUME (cubic feet)	CONVERSION FACTOR (ft^3-->yd^3)	CALCULATED SEDIMENT VOLUME (cubic yards)	TOTAL SEDIMENT VOLUME (cubic yards)
LOCK 67	135	17.5	1.29	3052	0.03704	113.0	113.0
LOCK 68†							
Section 1:	110.5	17.75	1.67	3269	0.03704	121.1	183.3
Section 2:	44.5	8.875	4.25	1678	0.03704	62.2	
LOCK 69	108.5	18	1.21	2360	0.03704	87.4	87.4
LOCK 70	109.5	18.25	1.71	3414	0.03704	126.5	126.5
LOCK 71†							
Section 1:	112	18.5	1.00	2072	0.03704	76.7	229.4
Section 2:	7	18.5	9.17	1187	0.03704	44.0	
Section 3:	15	9.25	2.21	306	0.03704	11.3	
Section 4:	31	9.25	9.17	2629	0.03704	97.4	
Total Estimated Volume:							740

Notes:

*=Canal locks were measured at 17.5' on the west side of Lock 67, and 18.5' on the east side of Lock 71. Estimated widths represent a three inch increase in width for each successive lock from west to east.

**=Depth measurements were taken at the west and east end of Lock 67, Lock 69 and Lock 70. Listed value is an average of the two.

†=Sediment in Lock 68 and Lock 71 was situated in an irregular pattern. The sediment profiles in these two locks was divided into sections, and the sum of the volume of these sections yielded the total sediment volume.

TABLE 3
NON-TCLP SEDIMENT ANALYTICAL RESULTS
FLIGHT OF FIVE
LOCKPORT, NEW YORK

Official Name Sample Date Sample ID Sample Type	Recommended Soil Cleanup Objectives TAGM 4046 (Jan. 24, 1994)	Soil/Sediment Action Level TAGM 3028 (August 26, 1997)	NYSDEC TOGS 5.1.9 (2004) Class A Sed. Quality Threshold Values for Dredging	LOCK 67 4/12/05 A5346701 Composite	LOCK 68 4/12/05 A5346702 Composite	LOCK 69 4/12/05 A5346703 Composite	LOCK 70 4/12/05 A5346704 Composite	LOCK 71 4/13/05 A5355901 Composite	Duplicate 4/12/05 A5346705 Composite (LOCK 68)
Volatiles									
Acetone	0.2	7800	NV	ND	ND	ND	0.008 J	0.021	ND
Benzene				ND	ND	ND	ND	ND	ND
Bromodichloromethane				ND	ND	ND	ND	ND	ND
Bromoform				ND	ND	ND	ND	ND	ND
Bromomethane				ND	ND	ND	ND	ND	ND
2-Butanone (MEK)	0.3	47000	NV	ND	ND	ND	ND	0.008 J	ND
Carbon Disulfide				ND	ND	ND	ND	ND	ND
Carbon Tetrachloride				ND	ND	ND	ND	ND	ND
Chlorobenzene				ND	ND	ND	ND	ND	ND
Chloroethane				ND	ND	ND	ND	ND	ND
Chloroform				ND	ND	ND	ND	ND	ND
Chloromethane				ND	ND	ND	ND	ND	ND
Cyclohexane				ND	ND	ND	ND	ND	ND
Dibromochloromethane				ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane				ND	ND	ND	ND	ND	ND
1,2-Dibromoethane				ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene				ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene				ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene				ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane				ND	ND	ND	ND	ND	ND
1,1-Dichloroethane				ND	ND	ND	ND	ND	ND
1,2-Dichloroethane				ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene				ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene				ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethylene				ND	ND	ND	ND	ND	ND
1,2-Dichloropropane				ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene				ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene				ND	ND	ND	ND	ND	ND
Ethylbenzene				ND	ND	ND	ND	ND	ND
2-Hexanone				ND	ND	ND	ND	ND	ND
Isopropylbenzene				ND	ND	ND	ND	ND	ND
Methyl Acetate				ND	ND	ND	ND	ND	ND
Methylcyclohexane	NV	NV	NV	ND	ND	ND	ND	0.004 J	ND
Methylene Chloride (Dichloromethane)				ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)				ND	ND	ND	ND	ND	ND
Methyl-t-Butyl Ether (MTBE)				ND	ND	ND	ND	ND	ND
Styrene				ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane				ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene				ND	ND	ND	ND	ND	ND
1,1,2-Trichloro-1,2,2-trifluoroethane				ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane				ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane				ND	ND	ND	ND	ND	ND
Tetrachloroethylene				ND	ND	ND	ND	ND	ND
Trichlorofluoromethane				ND	ND	ND	ND	ND	ND
Toluene (Methylbenzene)				ND	ND	ND	ND	ND	ND
Trichloroethylene	0.7	58	NV	ND	0.002 J	ND	ND	ND	ND
Vinyl Chloride				ND	ND	ND	ND	ND	ND
Xylene (total)				ND	ND	ND	ND	ND	ND

Notes:
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FLIGHT OF FIVE
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Tentatively Identified Compounds (TICs)									
Hexane	NV	4700	NV	0.016 JN	0.02 JN	0.018 JN	0.015 JN	ND	0.015 JN
Trimethylsilanol	NV	NV	NV	0.009 BJN	0.01 BJN	0.014 BJ	0.008 BJN	ND	0.013 BJN
Semi-Volatiles									
Acenaphthene	50	4700	NV	0.071 J	0.019 J	0.012 J	ND	0.35 J	0.02 J
Acenaphthylene	41	NV	NV	0.049 J	0.046 J	0.081 J	ND	0.22 J	0.051 J
Acetophenone				ND	ND	ND	ND	ND	ND
Anthracene	50	23000	NV	0.068 J	0.063 J	0.049 J	ND	0.37 J	0.062 J
Atrazine				ND	ND	ND	ND	ND	ND
Benzaldehyde				ND	ND	ND	ND	ND	ND
Benzo(a) anthracene	0.224 or MDL	0.9	NV	0.21 J	0.2 J	0.23 J	0.38 J	0.85	0.22 J
Benzo(b) fluoranthene	1.1	0.9	NV	0.31 J	0.37 J	0.38	0.58 J	1.5	0.52
Benzo(k) fluoranthene	1.1	9	NV	0.088 J	0.38 J	0.1 J	0.16 J	1.6	0.54
Benzo(g,h,i) perylene	50	NV	NV	0.1 J	0.11 J	0.11 J	0.18 J	0.2 J	0.11 J
Benzo(a) pyrene	0.061 or MDL	0.09	NV	0.21 J	0.21 J	0.28 J	0.4 J	0.7	0.26 J
Biphenyl				ND	ND	ND	ND	ND	ND
4-Bromophenyl phenyl ether				ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	50	16000	NV	ND	ND	ND	ND	ND	4.8 D
Caprolactam				ND	ND	ND	ND	ND	ND
Carbazole	NV	32	NV	0.061 J	0.034 J	0.025 J	ND	ND	0.037 J
bis(2-chloroethoxy)methane				ND	ND	ND	ND	ND	ND
bis(2-chloroethyl)ether				ND	ND	ND	ND	ND	ND
4-Chloroaniline				ND	ND	ND	ND	ND	ND
4-Chloro-3-Methylphenol				ND	ND	ND	ND	ND	ND
2-Chloronaphthalene				ND	ND	ND	ND	ND	ND
2-Chlorophenol				ND	ND	ND	ND	ND	ND
4-Chlorophenol Phenyl Ether				ND	ND	ND	ND	ND	ND
Chrysene	0.4	88	NV	0.28 J	0.2 J	0.25 J	0.42 J	0.86	0.28 J
Dibenzo(a,h) anthracene	0.014 or MDL	0.09	NV	0.029 J	0.028 J	0.031 J	ND	0.065 J	0.033 J
Dibenzofuran	6.2	NV	NV	0.026 J	0.015 J	0.011 J	ND	0.15 J	0.011 J
3-3'-Dichlorobenzidine				ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol				ND	ND	ND	ND	ND	ND
Diethylphthalate				ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol				ND	ND	ND	ND	ND	ND
Dimethylphthalate				ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-methylphenol				ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol				ND	ND	ND	ND	ND	ND
2,4-Dinitrotoluene				ND	ND	ND	ND	ND	ND
2,6-Dinitrotoluene				ND	ND	ND	ND	ND	ND
Di-n-Butyl Phthalate	8.1	NV	NV	0.014 J	0.03 J	0.016 J	ND	0.23 J	0.025 J
Di-n-Octyl Phthalate	50	1600	NV	ND	0.045 J	0.087 J	ND	ND	0.41
bis(2-Ethylhexyl)phthalate	50	46	NV	0.096 J	0.1 J	0.15 J	7	11 D	0.31 J
Fluoranthene	50	3100	NV	0.62	0.44	0.4	0.74 J	2.6	0.63
Fluorene	50	3100	NV	0.043 J	0.031 J	ND	ND	0.47 J	0.025 J
Hexachlorobenzene				ND	ND	ND	ND	ND	ND
Hexachlorobutadiene				ND	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene				ND	ND	ND	ND	ND	ND
Hexachloroethane				ND	ND	ND	ND	ND	ND

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Indeno(1,2,3-cd) pyrene	3.2	0.9	NV	0.099 J	0.1 J	0.1 J	0.17 J	0.18 J	0.095 J
Isophorone				ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	36.4	NV	NV	0.013 J	0.013 J	0.015 J	ND	0.037 J	0.013 J
2-Methylphenol (o-cresol)				ND	ND	ND	ND	ND	ND
4 Methylphenol (p-cresol)				ND	ND	ND	ND	ND	ND
Naphthalene	13	310	NV	0.042 J	0.015 J	0.016 J	ND	0.05 J	ND
2-Nitroaniline				ND	ND	ND	ND	ND	ND
3-Nitroaniline				ND	ND	ND	ND	ND	ND
4-Nitroaniline				ND	ND	ND	ND	ND	ND
Nitrobenzene				ND	ND	ND	ND	ND	ND
2-Nitrophenol				ND	ND	ND	ND	ND	ND
4-Nitrophenol				ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine				ND	ND	ND	ND	ND	ND
N-Nitroso-di-n-propylamine				ND	ND	ND	ND	ND	ND
2,2'-Oxybis (1-Chloropropane)				ND	ND	ND	ND	ND	ND
Pentachlorophenol				ND	ND	ND	ND	ND	ND
Phenanthrene	50	NV	NV	0.41	0.25 J	0.099 J	0.23 J	1.8	0.27 J
Phenol				ND	ND	ND	ND	ND	ND
Pyrene	50	2300	NV	0.38	0.31 J	0.28 J	0.56 J	1.2	0.36 J
2,4,5-Trichlorophenol				ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol				ND	ND	ND	ND	ND	ND
Sum of PAHs	NV	NV	4	2.642	2.475	2.153	3.26	11.852	3.129
Tentatively Identified Compounds (TICs)									
2-(1-Methylethyl) Naphthalene	NV	NV	NV	ND	ND	ND	ND	0.41 JN	ND
9-10-Anthracenedione	NV	NV	NV	0.11 JN	ND	ND	ND	ND	ND
18-Norabietane	NV	NV	NV	ND	0.15 JN	ND	ND	1.9 JN	0.28 JN
22,23-Dihydrostigmasterol	NV	NV	NV	ND	ND	ND	ND	0.38 JN	0.16 JN
.Beta.-Sitosterol	NV	NV	NV	ND	0.16 JN	ND	ND	ND	ND
.Gamma.-Sitosterol	NV	NV	NV	0.31 JN	ND	0.56 JN	ND	ND	ND
Stigmastanol	NV	NV	NV	ND	ND	0.19 JN	ND	ND	ND
Sulfur	NV	NV	NV	0.12 JN	ND	ND	ND	ND	ND

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Pesticides and Mirex									
Aldrin				ND	ND	ND	ND	ND	ND
alpha-BHC				ND	ND	ND	ND	ND	ND
alpha-Chlordane				ND	ND	ND	ND	ND	ND
beta-BHC				ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	ND	ND	ND
Dieldrin	0.044	0.04	0.11	ND	ND	ND	0.071 J	ND	ND
Endosulfan I				ND	ND	ND	ND	ND	ND
Endosulfan II				ND	ND	ND	ND	ND	ND
Endosulfan Sulfate				ND	ND	ND	ND	ND	ND
Endrin				ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND
Endrin Ketone				ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)				ND	ND	ND	ND	ND	ND
gamma-Chlordane	0.54	0.49	0.003	ND	0.0063 J	ND	ND	ND	ND
Heptachlor				ND	ND	ND	ND	ND	ND
Heptachlor epoxide	0.02	0.07	NV	ND	ND	ND	0.024 J	ND	ND
Methoxychlor				ND	ND	ND	ND	ND	ND
Mirex				ND	ND	ND	ND	ND	ND
Toxaphene				ND	ND	ND	ND	ND	ND
4,4'-DDD	2.9	2.7	NV	0.0042 J	0.0045 J	0.012 J	ND	ND	ND
4,4-DDE	2.1	1.9	NV	ND	0.0032 J	ND	ND	ND	ND
4,4'-DDT				ND	ND	ND	ND	ND	ND
Sum of DDT+DDD+DDE	NV	NV	0.003	0.0042	0.0077	0.012	0	0	0
Herbicides									
2,4-D				ND	ND	ND	ND	ND	ND
2,4,5-T				ND	ND	ND	ND	ND	ND
2,4,5-TP (Silvex)				ND	ND	ND	ND	ND	ND
Polychlorinated Biphenyls (PCBs)									
Aroclor 1016				ND	ND	ND	ND	ND	ND
Aroclor 1221				ND	ND	ND	ND	ND	ND
Aroclor 1232				ND	ND	ND	ND	ND	ND
Aroclor 1242				ND	ND	ND	ND	ND	ND
Aroclor 1248	1	1	NV	0.049 J	0.083 J	0.14	0.32	0.84	0.2
Aroclor-1254	1	1	NV	0.067 J	0.083 J	0.11	0.18	0.48	0.15
Aroclor 1260				ND	ND	ND	ND	ND	ND
Sum of aroclors	NV	NV	0.1	0.116	0.166	0.25	0.5	1.32	0.35

Notes:
All results are reported in milligrams per kilogram (mg/kg).
Analytical qualifiers and other notes are presented on final page.

TABLE 3
NON-TCLP SEDIMENT ANALYTICAL RESULTS
FLIGHT OF FIVE
LOCKPORT, NEW YORK

Official Name Sample Date Sample ID Sample Type	Recommended Soil Cleanup Objectives TAGM 4046 (Jan. 24, 1994)	Soil/Sediment Action Level TAGM 3028 (August 26, 1997)	NYSDEC TOGS 5.1.9 (2004) Class A Sed. Quality Threshold Values for Dredging	LOCK 67 4/12/05 A5346701 Composite	LOCK 68 4/12/05 A5346702 Composite	LOCK 69 4/12/05 A5346703 Composite	LOCK 70 4/12/05 A5346704 Composite	LOCK 71 4/13/05 A5355901 Composite	Duplicate 4/12/05 A5346705 Composite (LOCK 68)
Inorganics									
Aluminum-Total	SB	NV	NV	3360 E	4080 E	4070 E	5280 E	9120 E	5770 E
Antimony-Total	SB	31	NV	ND N	ND N	0.83 BN	0.73 BN	ND N	0.48 BN
Arsenic-Total	7.5 or SB	0.4	14	3.2 N	4.4 N	3 N	6.6 N	6.1 N	3.4 N
Barium-Total	300 or SB	5500	NV	71.5 NE	38.6 NE	40.7 NE	78.1 NE	80.3 NE	67.6 NE
Beryllium-Total	0.16(heast) or SB	0.15	NV	0.35 BN	0.37 BN	0.29 BN	0.35 BN	0.47 BN	0.5 BN
Cadmium-Total	1 or SB	78	1.2	0.24 BN	0.09 BN	0.07 BN	1.3 N	1.9 N	0.17 BN
Calcium-Total	SB	NV	NV	84800 E	38500 E	36900 E	21000 E	18300 E	67900 E
Chromium-Total	10 or SB	NV	NV	45 NE	22.4 NE	30 NE	31.2 NE	66.7 NE	34 NE
Cobalt-Total	30 or SB	NV	NV	2.8 BNE	3.6 BNE	4.6 BNE	6.1 BNE	8.5 BNE	3.9 BNE
Copper-Total	25 or SB	NV	33	22.7 NE	114 NE	36.7 NE	71.8 NE	84.3 NE	151 NE
Cyanide				ND	ND	ND	ND	ND	ND
Iron-Total	2,000 or SB	NV	NV	10500 E	15200 E	24800 E	23400 E	20900 E	15500 E
Lead-Total	SB****	400	33	1530 E*	256 E*	668 E*	479 E*	469 E*	214 E*
Magnesium-Total	SB	NV	NV	19200 E	11800 E	14400 E	7990 E	9500 E	28000 E
Manganese-Total	SB	11000	NV	367 NE	320 NE	293 NE	287 NE	196 NE	347 NE
Mercury-Total	0.1	23	.17	0.033 N	0.083 N	0.129 N	0.445 N	0.28 N	0.058 N*
Nickel-Total	13 or SB	1600	NV	9.5 NE	14.1 NE	23.2 NE	29.8 NE	42.6 NE	15.2 NE
Potassium-Total	SB	NV	NV	990	779	581	657 B	1250	1000
Selenium-Total				ND N	ND N	ND N	ND N	ND N	ND N
Silver-Total	SB	390	NV	ND N*	ND N*	ND N*	0.18 BN*	0.77 BN*	ND N*
Sodium-Total	SB	NV	NV	225 B	155 B	155 B	135 B	309 B	220 B
Thallium-Total				ND N	ND N	ND N	ND N	ND N	ND N
Vanadium-Total	150 or SB	550	NV	5.9 NE	8.2 NE	7.8 NE	10.9 NE	17.1 NE	10.4 NE
Zinc-Total	20 or SB	23000	NV	203 NE	181 NE	931 NE	437 NE	608 NE	195 NE
Leachable pH				7.9	7.87	7.66	7.41	6.96	7.83

Notes:
All results are reported in milligrams per kilogram (mg/kg).
Analytical qualifiers and other notes are presented on final page.

TABLE 3
SEDIMENT ANALYTICAL QUALIFIERS AND FOOTNOTES
NON-TCLP DETECTED COMPOUNDS
FLIGHT OF FIVE
LOCKPORT, NEW YORK

USEPA Defined Organic Data Qualifiers:

B = Analyte detected in method blank.
D = Result is from a dilution.
N = Presumptive evidence of compound. Applied to all TIC results.
J = Estimated concentration value:
1) Result is for a Tentatively Identified Compound (TIC)
2) Result is below the PQL but identification criteria are met.

Footnotes:

No regulatory values presented for Not Detected (ND) constituents.
NV = No value.
ND = Not Detected
0.79 = Sample concentration exceeds respective TAGM 3028 "Contained-In" Action Level, TAGM 4046 Recommended Soil Cleanup Objectives, and/or TOGS 5.1.9 Class A Sediment Quality Threshold Values for Dredging, Riparian, or in-water Placement.

USEPA Defined Inorganic Data Qualifiers:

B = Reported value was obtained from a reading that was less than the Contract Required Quantitation Limit (CRQL), but greater than or equal to the Instrument Detection Limit (IDL).
E = The reported value is estimated because of the presence of interference.
N = Spiked sample recovery not within control limits.
* = Duplicate analysis not within control limits.

Footnotes:

No regulatory values presented for Not Detected (ND) constituents.
NV = No value.
ND = Not Detected
0.79 = Sample concentration exceeds respective TAGM 3028 "Contained-In" Action Level, TAGM 4046 Recommended Soil Cleanup Objectives, and/or TOGS 5.1.9 Class A Sediment Quality Threshold Values for Dredging, Riparian, or in-water Placement.

TABLE 4
SEDIMENT ANALYTICAL RESULTS
DIOXINS AND FURANS
FLIGHT OF FIVE
LOCKPORT, NEW YORK

Official Sample ID	NYSDEC Toxic Equivalent Class A Sediment Quality Guidelines for Dredging	Factor (TEF) †	DB-1 Composite			DB-2 Composite			DB-3 Composite		
Sample Date											
Sample ID											
Sample Type			Concentration	Qualifier	Toxic Equivalent (TEQ)	Concentration	Qualifier	Toxic Equivalent (TEQ)	Concentration	Qualifier	Toxic Equivalent (TEQ)
Dioxins (ng/kg)											
2,3,7,8-TCDD		1	10.1		10.1	14		14	16.7		16.7
1,2,3,7,8-PeCDD		0.5	0.646	QBJ	0.323	1.24	BJ	0.62	1.95	BJ	0.975
1,2,3,4,7,8-HxCDD		0.1	1.49	BJ	0.149	4.09	BJ	0.409	5.24	BJ	0.524
1,2,3,6,7,8-HxCDD		0.1	5.87	B	0.587	12.5	B	1.25	18.7	B	1.87
1,2,3,7,8,9-HxCDD		0.1	2.46	BJ	0.246	4.48	BJ	0.448	6.37	BJ	0.637
1,2,3,4,6,7,8-HpCDD		0.01	182	B	1.82	305	B	3.05	444	B	4.44
OCDD		0.001	2150	B	2.15	3770	B	3.77	6440	BE	6.44
Furans (ng/kg)											
1,2,3,7,8-PeCDF		0.05	0.867	QBJ	0.04335	2.04	QBJ	0.102	2.75	BJ	0.1375
2,3,4,7,8-PeCDF		0.5	1.73	BJ	0.865	3.38	QBJ	1.69	3.04	QBJ	1.52
1,2,3,4,7,8-HxCDF		0.1	8.84	QB	0.884	26.3	QB	2.63	21.4	QB	2.14
1,2,3,6,7,8-HxCDF		0.1	2.49	BJ	0.249	6.3	BJ	0.63	7.02	B	0.702
2,3,4,6,7,8-HxCDF		0.1	0.999	QBJ	0.0999	2.17	BJ	0.217	5.88	BJ	0.588
1,2,3,7,8,9-HxCDF		0.1	0.264	QBJ	0.0264	0.36	QBJ	0.036	ND		0
1,2,3,4,6,7,8-HpCDF		0.01	53.7	B	0.537	165	B	1.65	169	B	1.69
1,2,3,4,7,8,9-HpCDF		0.001	2.78	BJ	0.00278	6.23	QBJ	0.00623	9.33	B	0.00933
OCDF		0.001	42.6	B	0.0426	160	B	0.16	153	B	0.153
2,3,7,8-TCDF		0.1	1.28	Q	0.128	2.68		0.268	2.65		0.265
Sum of TEQs (ng/kg)	4.5				18.25303			30.93623			38.79083
Total											

* = The Toxic Equivalent Factor (TEF) is effectively a weighting factor which, if multiplied by the known concentration of a congener, gives a Toxic Equivalent (TEQ). The toxicity of any mixture is given by the sum of the TEQs. Applying the toxicity factors to each congener and summing the results takes into account the relative strengths of each congener.

† = Taken from "Dioxins and Furans in the Chemical Industry," found at *Chlorine Online*, http://www.eurochlor.org/chlorine/issues/dioxins.htm

TABLE 4
SEDIMENT ANALYTICAL RESULTS
DIOXINS AND FURANS
FLIGHT OF FIVE
LOCKPORT, NEW YORK

Official Name Sample Date Sample ID Sample Type	NYSDEC Toxic Equivalent NYDGS Class A Sed. Quality Guidelines Freshwater Values for Dredging	Factor (TEF) †	DB-1 Composite			DB-2 Composite			Duplicate DB-2 Composite		
			Concentration	Qualifier	Toxic Equivalent (TEQ)	Concentration	Qualifier	Toxic Equivalent (TEQ)	Concentration	Qualifier	Toxic Equivalent (TEQ)
Dioxins (ng/kg)											
2,3,7,8-TCDD		1	8.15		8.15	20.8		20.8	13.3		13.3
1,2,3,7,8-PeCDD		0.5	4.62	BJ	2.31	15.2	QSB	7.6	1.63	BJ	0.815
1,2,3,4,7,8-HxCDD		0.1	14.2	B	1.42	20.6	QB	2.06	13.7	B	1.37
1,2,3,6,7,8-HxCDD		0.1	67.1	B	6.71	181	B	18.1	16.2	B	1.62
1,2,3,7,8,9-HxCDD		0.1	17.9	B	1.79	57.2	B	5.72	9.7	B	0.97
1,2,3,4,6,7,8-HpCDD		0.01	1620	B	16.2	3640	B	36.4	388	B	3.88
OCDD		0.001	26900	BE	26.9	55500	BE	55.5	4470	B	4.47
Furans (ng/kg)											
1,2,3,7,8-PeCDF		0.05	5.32	QBJ	0.266	20.3	QB	1.015	3.61	BQJ	0.1805
2,3,4,7,8-PeCDF		0.5	7.99	B	3.995	34.8	QB	17.4	5.75	QBJ	2.875
1,2,3,4,7,8-HxCDF		0.1	44.6	B	4.46	299	B	29.9	109	QB	10.9
1,2,3,6,7,8-HxCDF		0.1	26.4	B	2.64	132	QB	13.2	22.7	B	2.27
2,3,4,6,7,8-HxCDF		0.1	8.1	QB	0.81	23.7	B	2.37	4.45	QBJ	0.445
1,2,3,7,8,9-HxCDF		0.1	ND		0	3.45	QBJ	0.345	ND		0
1,2,3,4,6,7,8-HpCDF		0.01	726	B	7.26	3010	B	30.1	522	B	5.22
1,2,3,4,7,8,9-HpCDF		0.001	38.8	B	0.0388	95.8	B	0.0958	17.8	B	0.0178
OCDF		0.001	992	B	0.992	2610	B	2.61	317	B	0.317
2,3,7,8-TCDF		0.1	6.06		0.606	16.6		1.66	3.09	Q	0.309
Sum of TEQs (ng/kg)	4.5				84.5478			244.8758			48.9593
Total											

* = The Toxic Equivalent Factor (TEF) is effectively a weighting factor which,
the sum of the TEQs. Applying the toxicity factors to each congener and s

† = Taken from "Dioxins and Furans in the Chemical Industry," found at *Chlo*

TABLE 4
SEDIMENT ANALYTICAL QUALIFIERS AND FOOTNOTES
DIOXIN AND FURAN ANALYSIS
FLIGHT OF FIVE
LOCKPORT, NEW YORK

USEPA Defined Organic Data Qualifiers:

Q = Estimated maximum possible concentration (EMPC)
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result. Result is less than the reporting limit.
E = Estimated result. Result concentration exceeds the calibration range.

Footnotes:

18.25303 = Sample concentration exceeds respective T.O.G.S. 5.1.9 Class A Sediment Quality Threshold Values for Dredging, Riparian, or In-Water Placement.

TABLE 5
RCRA CHARACTERISTICS SEDIMENT CHARACTERIZATION
FLIGHT OF FIVE
LOCKPORT, NEW YORK

Official Name Sample Date Sample ID Sample Type	TCLP STANDARDS USEPA, 1990 (adopted by NYSDEC, 1995)	LOCK 67 4/12/05 A5347001 Composite	LOCK 68 4/12/05 A5347002 Composite	LOCK 69 4/12/05 A5347003 Composite	LOCK 70 4/12/05 A5347004 Composite	LOCK 71 4/13/05 A5356001 Composite
TCLP Volatiles (mg/L)						
Benzene	0.5	ND	ND	ND	ND	ND
2-Butanone (MEK)	200	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.5	ND	ND	ND	ND	ND
Chlorobenzene	100	ND	ND	ND	ND	ND
Chloroform	6	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	ND	ND	ND
1,1-Dichloroethylene	0.7	ND	ND	ND	ND	ND
Tetrachloroethylene	0.7	ND	ND	ND	ND	ND
Trichloroethylene	0.5	ND	ND	ND	ND	ND
Vinyl Chloride	0.2	ND	ND	ND	ND	ND
TCLP Semi-Volatiles (mg/L)						
1,4-Dichlorobenzene	7.5	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	0.13	ND	ND	ND	ND	ND
Hexachlorobenzene	0.13	ND	ND	ND	ND	ND
Hexachlorobutadiene	0.5	ND	ND	ND	ND	ND
Hexachloroethane	3	ND	ND	ND	ND	ND
2-Methylphenol (o-cresol)	200	ND	ND	ND	ND	ND
3-Methylphenol (m-cresol)	200	ND	ND	ND	ND	ND
4 Methylphenol (p-cresol)	200	ND	ND	ND	ND	ND
Nitrobenzene	2	ND	ND	ND	ND	ND
Pentachlorophenol	100	ND	ND	ND	ND	ND
Pyridine	5	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	400	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	2	ND	ND	ND	ND	ND
TCLP Inorganics (ug/L)						
Arsenic-Total	5000	ND	ND	ND	ND	25.4
Barium-Total	100000	439 N	398 N	427 N	425 N	610 N
Cadmium-Total	1000	1.9	4.5	7.7	1.5	33.3 N
Chromium-Total	5000	ND	ND	ND	ND	ND
Lead-Total	5000	187	333	2640	169	639 N
Mercury-Total	200	ND	ND	ND	ND	ND
Selenium-Total	1000	ND	ND	ND	ND	ND
Silver-Total	5000	ND	ND	ND	ND	ND
Wet Chemistry						
Flashpoint (°F)	140	>200	>200	>200	>200	>200
H_2S Released (mg/kg)		ND	ND	ND	ND	ND
HCN Released (mg/kg)		ND	ND	ND	ND	ND
Leachable pH (standard units)	<2, or >12.5	7.9	7.87	7.66	7.41	7.17
Paint Filter Test	PASS/FAIL	PASS	PASS	PASS	PASS	PASS

Notes:
Analytical qualifiers and other notes are presented on final page.

TABLE 5
RCRA CHARACTERISTICS SEDIMENT CHARACTERIZATION
FLIGHT OF FIVE
LOCKPORT, NEW YORK

Official Name Sample Date Sample ID Sample Type	TCLP STANDARDS USEPA, 1990 (adopted by NYSDEC, 1995)	LOCK 67 4/12/05 A5347001 Composite	LOCK 68 4/12/05 A5347002 Composite	LOCK 69 4/12/05 A5347003 Composite	LOCK 70 4/12/05 A5347004 Composite	LOCK 71 4/13/05 A5356001 Composite
TCLP Pesticides (mg/L)						
gamma-BHC (Lindane)	0.4	ND	ND	ND	ND	ND
Chlordane	0.03	ND	ND	ND	ND	ND
Endrin	0.02	ND	ND	ND	ND	ND
Heptachlor	0.008	ND	ND	ND	ND	ND
Heptachlor epoxide	0.008	ND	ND	ND	ND	ND
Methoxychlor	10	ND	ND	ND	ND	ND
Toxaphene	0.5	ND	ND	ND	ND	ND
TCLP Herbicides (mg/L)						
2,4-D	10	ND	ND	ND	ND	ND
2,4,5-TP (Silvex)	1	ND	ND	ND	ND	ND
2,4,5-TP (Silvex)	1	ND	ND	ND	ND	ND

Notes:
Analytical qualifiers and other notes are presented on final page.

SEDIMENT ANALYTICAL QUALIFIERS AND FOOTNOTES
RCRA CHARACTERISTICS SEDIMENT CHARACTERIZATION
FLIGHT OF FIVE
LOCKPORT, NEW YORK

USEPA Defined Inorganic Data Qualifiers:

N = Spiked sample recovery not within control limits.

Footnotes:

ND = Not Detected

APPENDIX A

SEDIMENT BORINGS

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Location: LOCK 67A

Project: 053-9436; Flight of Five
Project Location: Lockport, New York

Start Date: 4/12/05
Finish Date: 4/12/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

Grade: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL/ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec. / % Rec.	USCS / % RQD.	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0	3" DIA. BOREHOLE		1	NOT APPLICABLE	13"/13"	GP		0.0-1.1 ft. Loose, brown-gray, fine to coarse GRAVEL and coarse SAND, trace silt, trace fine to medium sand, moist.	VOC grab sample collected at 0.5 ft. bgs. Soil retained for composite sample "LOCK 67".
0.5									
1									
	1.1 FT. END OF BOREHOLE							1.1 FT. HAND AUGER REFUSAL - WOODEN BOTTOM	
1.5									

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Locotion: LOCK 67B

Project: 053-9436; Flight of Five
Project Location: Lockport, New York

Start Date: 4/12/05
Finish Date: 4/12/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

Grade: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL/ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec.	USCS / % RQD.	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0	3" DIA. BOREHOLE		1	NOT APPLICABLE	18"/18"	GP		0.0-1.5 ft. Loose, brown-gray, fine to coarse GRAVEL and coarse SAND, trace silt, trace fine to medium sand, moist.	Soil retained for composite sample "LOCK 67".
0.5									
1									
1.5	1.5 FT. END OF BOREHOLE							1.5 FT. HAND AUGER REFUSAL - WOODEN BOTTOM	

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Location: LOCK 68A

Project: 053-9436; Flight of Five
Project Location: Lockport, New York

Start Date: 4/12/05
Finish Date: 4/12/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

Grade: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL/ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec.	USCS / % RQD.	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0	3" DIA. BOREHOLE		1	NOT APPLICABLE	31"/31"	GP		0.0-2.6 ft. Loose, brown-gray, fine to coarse GRAVEL and fine SAND, trace to little fine to medium sand, trace silt, moist.	VOC grab sample collected at 1.0 ft. bgs. Soil retained for composite sample "LOCK 68". Duplicate sample collected for both grab VOC and composite.
0.5									
1									
1.5									
2									
2.5									
	2.6 FT. END OF BOREHOLE							2.6 FT. HAND AUGER REFUSAL - WOODEN BOTTOM	

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Location: LOCK 68B

Project: 053-9436; Flight of Five
Project Locotion: Lockport, New York

Start Date: 4/12/05
Finish Date: 4/12/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

Grade: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL / ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec.	USCS / % RQD	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0									
0.5	3" DIA. BOREHOLE		1	NOT APPLICABLE	20"/20"	GP		0.0-1.7 ft. Loose, gray, fine to coarse GRAVEL and coarse SAND, little fine to medium sand, trace silt, moist. Water encountered at bottom of borehole.	Soil retained for composite sample "LOCK 68". Duplicate sample collected for composite.
1									
1.5									
	1.7 FT. END OF BOREHOLE							1.7 FT. HAND AUGER REFUSAL - WOODEN BOTTOM	
2									

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Location: LOCK 69A

Project: 053-9436; Flight of Five
Project Location: Lockport, New York

Start Date: 4/12/05
Finish Date: 4/12/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

Grade: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL/ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec.	USCS / % RQD	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0	3" DIA. BOREHOLE		1	NOT APPLICABLE	20"/20"	GM		0.0-1.7 ft. Loose, gray, fine to coarse SAND, some fine to coarse gravel, little silt and clay, moist. Some black/gray staining from 1.3-1.7 ft. bgs.	VOC grab sample collected at 1.3 ft. bgs. Soil retained for composite sample "LOCK 69".
0.5									
1									
1.5									
1.7	1.7 FT. END OF BOREHOLE							1.7 FT. HAND AUGER REFUSAL - WOODEN BOTTOM	
2									

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Location: LOCK 69B

Project: 053-9436; Flight of Five
Project Location: Lockport, New York

Start Date: 4/12/05
Finish Date: 4/12/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

Grade: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL / ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec.	USCS / % RQD	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0	3" DIA. BOREHOLE		1	NOT APPLICABLE	20"/20"	GP		0.0-1.7 ft. Loose, gray, fine to coarse GRAVEL and coarse SAND, little fine to medium sand, trace silt, moist. Water encountered at bottom of borehole.	Soil retained for composite sample "LOCK 68". Duplicate sample collected for composite.
0.5									
1									
1.5									
	1.7 FT. END OF BOREHOLE							1.7 FT. HAND AUGER REFUSAL - WOODEN BOTTOM	

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Location: LOCK 70A

Project: 053-9436; Flight of Five
Project Location: Lockport, New York

Start Date: 4/12/05
Finish Date: 4/12/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

Grade: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL/ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec.	USCS / % RQD	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0	3" DIA. BOREHOLE		1	NOT APPLICABLE	25"/25"	SM		0.0-2.1 ft. Loose, gray-brown to gray, fine SANDY SILT, little medium to coarse sand, trace fine to medium gravel, moist.	VOC grab sample collected from 1.2-1.4 ft. bgs. Soil retained for composite sample "LOCK 70".
0.5									
1									
1.5									
2	2.1 FT. END OF BOREHOLE							2.1 FT. HAND AUGER REFUSAL - WOODEN BOTTOM	

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Location: LOCK 70B

Project: 053-9436; Flight of Five
Project Location: Lockport, New York

Start Date: 4/12/05
Finish Date: 4/12/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

Grade: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL / ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec.	USCS / % RQD.	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0	3" DIA. BOREHOLE		1	NOT APPLICABLE	16"/16"	SM		0.0-1.3 ft. Loose, brown, fine SANDY SILT, little medium to coarse sand, little fine to coarse gravel, moist.	Soil retained for composite sample "LOCK 70".
0.5									
1									
	1.3 FT. END OF BOREHOLE							1.3 FT. HAND AUGER REFUSAL - WOODEN BOTTOM	

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Location: LOCK 71A

Project: 053-9436; Flight of Five
Project Location: Lockport, New York

Start Date: 4/13/05
Finish Date: 4/13/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

Grode: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL/ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec.	USCS / % RQD	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0			1	NOT APPLICABLE	12"/12"	CL		0.0-8.0 ft. Soft, very dark gray to black, CLAYEY SILT, some fine to coarse gravel, some coarse sand, very moist. Brown mottling throughout. Sample was consistent throughout.	Slight odor detected in sediment. VOC, VOC MS/MSD & TCLP VOC grab sample collected from 2.3-2.7 ft. bgs. Soil retained for composite samples "LOCK 71", "LOCK 71MS" and LOCK 71MSD".
1			2	NOT APPLICABLE	12"/12"	CL			
2			3	NOT APPLICABLE	12"/12"	CL			
3			4	NOT APPLICABLE	12"/12"	CL			
4	3" DIA. BOREHOLE		5	NOT APPLICABLE	12"/12"	CL			
5			6	NOT APPLICABLE	12"/12"	CL			
6			7	NOT APPLICABLE	12"/12"	CL			
7			8	NOT APPLICABLE	12"/12"	CL			
8									

8.0 FT. END OF BOREHOLE

8.0 FT. EXTENT OF HAND AUGER

CITY OF LOCKPORT

Subsurface Boring Log

Sampling Location: LOCK 71B

Project: 053-9436; Flight of Five
Project Location: Lockport, New York

Start Date: 4/13/05
Finish Date: 4/13/05

DRILLING DATA

Consultant: GOLDER ASSOCIATES INC.
Contractor: N/A
Equipment: HAND AUGER
Method: HAND CORE

SAMPLING METHODS

	Sampler	Tube	Core
TYPE:	HAND AUGER		
DIAMETER:	3-INCH	N/A	N/A
OTHER:			

WELL CONSTRUCTION

	RISER	SCREEN
Material:		
Diameter (ID):	N/A	N/A
Coupling:		

WELL DEVELOPMENT

NOT APPLICABLE

SURVEY DATA KP DATUM

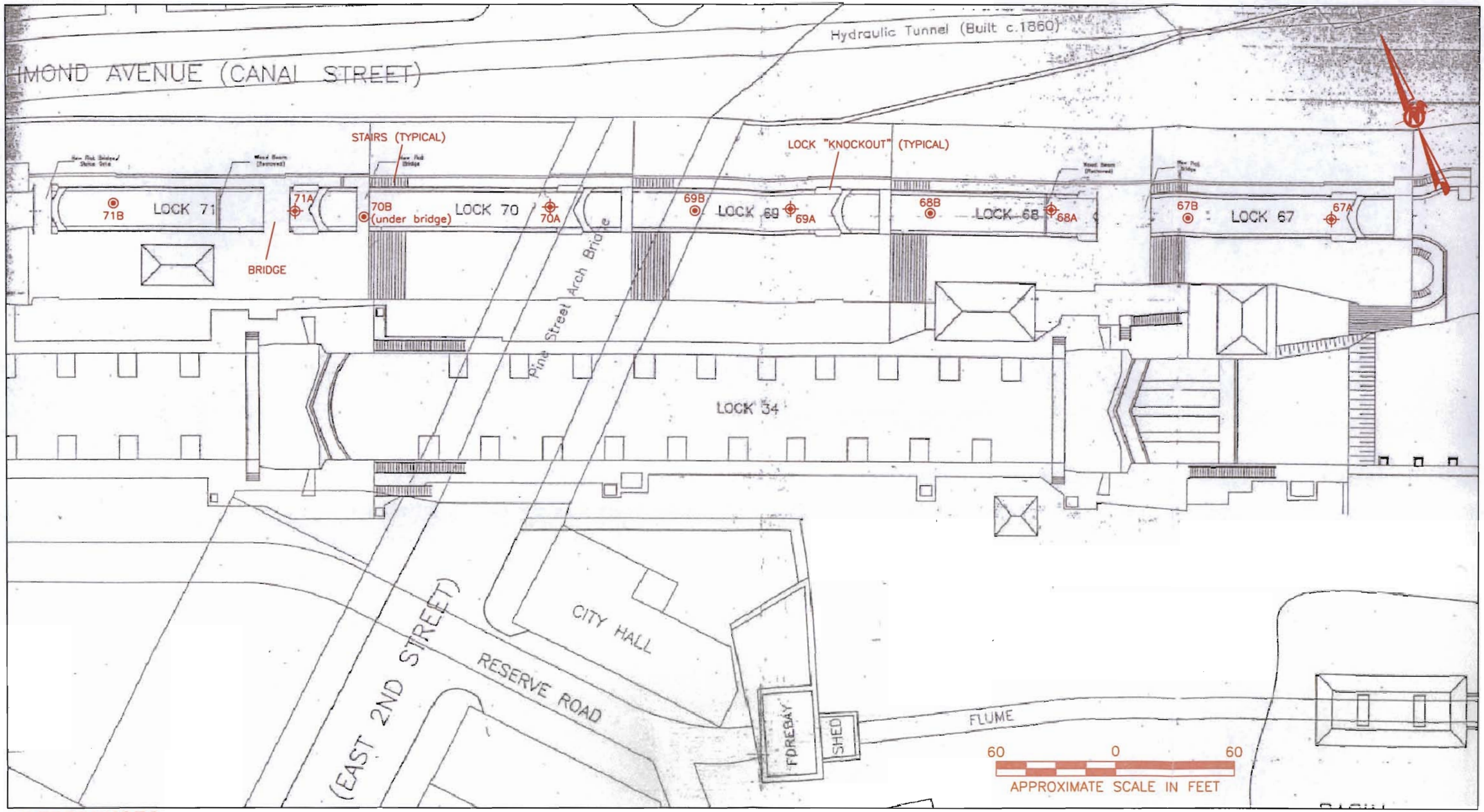
Grade: N/A
TWC: N/A
TCB: N/A
North: N/A
East: N/A

Geophysical Log: ☐ YES ☒ NO
Comments:

Depth (feet)	WELL CONSTRUCTION	SOIL/ROCK	SAMP. NO. / RUN NO.	BLOW 6/in. / HYDRAUL. COND. cm/sec.	% Rec.	USCS / % RQD	OVA / HNU	VISUAL CLASSIFICATION	REMARKS
0	3" DIA. BOREHOLE		1	NOT APPLICABLE	12"/12"	GP		0.0-1.0 ft. Loose, brown, fine to coarse GRAVEL, very moist to wet. Sample also contains a considerable amount of glass pieces.	No odor detected in sediment. Soil retained for composite samples "LOCK 71", "LOCK 71MS" and "LOCK 71MSD".
0.5									
1	1.0 FT. END OF BOREHOLE							1.0 FT. HAND AUGER REFUSAL	

APPENDIX B

LABORATORY ANALYTICAL RESULTS (ELECTRONIC FORMAT)



REFERENCES

1.) DRAWING WAS ADAPTED FROM "DRAWING 6: BARGE CANAL PLAN 7 EXISTING CONDITIONS," PROVIDED BY THE NEW YORK STATE CANAL COMMISSION.

LEGEND

- COMPOSITE SEDIMENT SAMPLE LOCATION ONLY
- VOC AND COMPOSITE SEDIMENT SAMPLE LOCATION

Golder Associates
Buffalo, New York

FILE No.	0539436A053
PROJECT No.	053-9436
REV.	0
SCALE	AS SHOWN
DATE	7/19/05
DESIGN	AJN
CADD	AJN
CHECK	NKW
REVIEW	NKW

TITLE

SEDIMENT BORING AND SAMPLING LOCATIONS

CITY OF LOCKPORT/FLIGHT OF FIVE

FIGURE 1