

**West Newton Chute
Dredged Material Transfer Project
Ground Water Monitoring
Scope of Work**

Scope of Work for the Collection and Analysis of Ground Water Samples for the West Newton Chute Dredged Material Placement Project.

1. GENERAL

The St. Paul District, Corps of Engineers (Corps) requires the services of a Contractor to collect ground water and surface samples for metals, fecal coliform, pesticides, PCB's, and some other basic parameters at a dredged material placement site near Kellogg, Minnesota. The project will be completed in 3 phases. Phase 1 involves the collection of pre-project samples (back ground water and ground water samples), phase 2 involves the collection of project samples (samples collected while material is being placed in the placement site), and phase 3 involves the collection of post project samples (after material placement is completed). The sample collection network will consist of 3 monitoring wells, 14 residential wells, and 2 surface water sites.

The project location is in Wabasha County. Figure 1 shows the approximate location of the sampling sites. At each site the contractor shall be responsible for the collection and analysis of water and ground water samples as described in this scope of work and the attached sampling protocol. The contractor shall also conduct in situ monitoring of water level, temperature, specific conductance, pH, dissolved oxygen (DO), and turbidity at each site.

The project will begin in SUMMER 2003 and phase 2 of the project should be complete by Fall, 2003. Phase 3 may extend into the spring of 2004 to complete the post project data collection.

2. OBJECTIVE

The monitoring objective is to characterize pre-project groundwater conditions in the monitoring and surrounding residential wells, monitor the range of impact of the dredging operation using specific conductance as a tracer, and ensure that residential well water quality meets State and Federal water quality criteria after the project is completed. Analytical methods were selected on the basis of ability to detect potential contaminants at low levels. Low level data is required to determine the effects of the project. Data collected will be used to assess the effects of this and future dredged material disposal on the surrounding groundwater quality.

3. LOCATION OF THE WELLS

The project location is shown on Figure 1. 3 monitoring wells, 14 residential wells and 2 surface wells will be sampled. The proposed residential wells to be sampled are subject to landowner approval. The Contractor is responsible for contacting the landowners prior to each sampling event so the landowner knows when and who will be on their property. Access to individual monitoring wells and/or residential tap water sources shall be agreed upon fully with the landowners and all tenants. **All residential wells will be sampled from an exterior spigot that is not connected to a water treatment system** (i.e. water softener). The names and addresses of the residents or a contact that is able to provide access to the residential wells will be provided to the contractor.

Three (3) monitoring wells with locking caps will be installed specifically for this project. Two (2) of the wells have 2 inch diameter flush jointed PVC casing. The remaining well has a 2 inch diameter stainless steel casing. The monitoring wells are anticipated to be approximately 30 feet deep. Information on the well depths and water levels can be obtained from Mr. Grant Riddick 651-290-5599 when they are available.

4. COLLECTION OF, AND NUMBER OF SAMPLES

Ground water and surface water samples will be collected by the contractor. Sampling is anticipated to begin in the spring of 2003. Sampling is anticipated to consist of pre-project, project and post project sample rounds. The anticipated sample collection schedule will be according to Tables 1 and 2.

The contractor will provide all suitable sample containers, equipment and technicians to collect the samples. In addition, sampling equipment shall be rinsed with distilled-deionized water before each new well is sampled. Sampling will be accomplished following the attached sampling protocol. Any deviations from the protocol must be identified and approved by the Corps prior to contract award.

All groundwater **monitoring well samples** will be collected according to the procedures in the attached monitoring well sampling protocol using positive displacement submersible bladder, Grunfos, or similar pump(s). These protocols were derived from the 1995 "Minnesota Pollution Control Agency Ground water Sampling Guidance: Development of Sampling Plans, Protocols and Reports". These procedures include removing a minimum of 3 well volumes prior to sample collection. The pH, specific conductance, temperature, DO, and turbidity will be recorded for each well. Sampling will be conducted after 3 well volumes have been purged and the in situ parameters have stabilized according to the attached monitoring protocol. Purging and sampling rates shall not exceed 0.5 gallons per minute. **Both filtered and unfiltered samples** will be collected at each well during each sampling trip. The unfiltered (whole water) samples will be placed in cold storage until project completion or as directed by the Corps.

Analysis of the filtered samples will be conducted for the monitoring well samples. All filtrations will use positive pressure through a 0.45 micron filter. Unfiltered (whole) water samples will be placed in cold storage until project completion or until directed by the Corps.

Residential well samples will be collected according to the monitoring well sampling protocol with the following modifications.

- a. **Unfiltered (whole water) samples** will be collected and analyzed.
- b. Residential samples will be obtained from outdoor taps. Water shall be run long enough to ensure that "old" water residing in the system (pipes, well, storage tank) is completely purged prior to sampling. Stabilization of in situ parameters is required.
- c. Pumping volumes and times for residential wells must be recorded.
- d. Inspect taps to ensure there is no aerator attached.
- e. Samples will be obtained directly from the tap or connected flow cell for residential wells. Care will be taken to collect samples with **minimal disturbance** to the sample (minimal turbulence and aeration, low discharge rate).

Surface water samples will be obtained from the Mississippi River just upstream of the dredging activity and the ponding area in the disposal area. The Mississippi River sample obtained upstream of the disposal site shall be representative of the water to be utilized as dredge material carriage water before mixing with the sediments and collected only during phase 2 of the project. Ponding area samples shall be obtained at the outlet weir when outflow is present. If there is no outflow from the ponding area a sample is not required. In situ measurements of DO, pH, specific conductance, and water temperature will be obtained during sample collection. Standard sampling and laboratory protocol is required for the surface water samples. Surface water samples will be analyzed as whole water samples (no filtration).

During the first sampling trip the monitoring well depths will be measured to verify the integrity of the wells.

Depth to water level shall be measured at each **monitoring well** during each sampling trip. Water levels are not required for the residential wells. Water depth shall be measured accurately to the nearest 0.1 foot prior to purging the well according to the procedure outlined in the sampling protocol. The measurement shall be taken from the top of the 2-inch riser pipe to the water surface. Figure 2 describes the monitoring wells in more detail.

5. REQUIREMENTS – Parameters, Methods, and Detection Limits

The contractor will analyze each sample according to Tables 1 and 2 as soon as possible after collection and within the recommended holding times for the parameters analyzed. Methods listed in Table 1 will be used. Alternative procedures must be identified and justified in the offeror's proposal and approved by the Corps prior to contract award. Sample analyses between the laboratories practical quantitation limit (PQL) but above the method detection limit (MDL) will be reported and qualified as "estimated". All supporting QA/QC documentation shall be included with the test results. Detection limits listed in Table 1 shall be obtained. Specific description of the analytical methods used and the detection limits attained for each parameter shall be reported with the analytical results.

The Contractor shall provide chain of custody sheets to be filled out by the sample collection teams and laboratory personnel. At a minimum, the custody sheets shall indicate project name, sample location, field observations, type of sampler used, field id number, date and time of sample, sample depth, sampling team, lab number, date received by the lab, date analyzed by the lab, and the parameters to be analyzed with their measurement units.

6. QUALITY ASSURANCE/CONTROL PROTOCOL

General

Any laboratory performing analytical work must be state certified (Minnesota certification or reciprocity with the Minnesota certification program) for the parameters to be analyzed. Potential Contractors may be subject to a Corps laboratory audit if one has not been completed in the last 2 years. Potential Contractors that would do any of the analytical work will be required to have a comprehensive quality assurance/quality control program, including documentation following the procedures of EPA (1979). Normal chain of custody and other quality control procedures will be followed by the Contractor. These procedures are outlined in the sampling protocol. The procedures will conduct standard quality control procedures and report all quality control measures with the analytical results. The Corps of Engineers requires that a single parameter or group of parameters for all of the samples will be analyzed by the Contractor in a single analytical session. The quality assurance program and any analysis associated with it are considered part of the of the normal procedures and is not an extra cost of the contract.

Project Specific – Sample Collection

The Contractor shall provide a quality assurance/quality control protocol for sample collection similar to that provided in the Sampling Protocol. It shall describe sampling procedures and sampling equipment including pumps, bailers, and sample containers. The protocol shall also describe well purging procedures which will be done for each sampling event. Specific procedures to be used for sampling the private wells shall also be described.

Project Specific – Analytical Work

The Contractor's quality assurance plan must include, as a minimum, the following elements:

- a. **SAMPLE HANDLING, CUSTODY, PRESERVATION, AND HOLDING TME** – The lab shall immediately notify the Government representative of any problems concerning the sample handling, preservation, or holding times for any of the samples received. The Government representative will then make a determination to continue/discontinue analysis of the parameter and sample in question. Any samples not previously arranged for in the schedule or by the Government representative shall be coordinated with the Government representative to determine a course of action.
- b. **CALIBRATION** – USACE requires reported analytes to be bracketed by an established calibration curve. Any analytes reported below the established calibration curve and above the minimum

detection limit listed in Table 2 is required to be flagged as estimated. To avoid qualifications based on this requirement, the laboratory shall be required to analyze an additional low level standard at or near the minimum required detection limit or project PQL. Low level calibration points above the minimum required detection limits listed in Table 2 must be approved by the Government representative prior to contract award. In addition, target analytes detected above the upper calibration standard shall be diluted and run again. If for some reason this is not possible the original value shall be reported as estimated. Problems concerning achieving the PQL shall be immediately reported to the Corps representative.

- c. **PRECISION – Replicate Samples** – The Contractor shall conduct replicate analyses on each parameter for a minimum of 10% of the water samples analyzed. The contractor will compute the relative percent difference (RPD) using equation 1 and report it with the data. If sufficient replicates are taken from a particular matrix (minimum of 8) precision may be estimated as the relative standard deviation (RSD) or Coefficient of variation (CV). Samples selected for replicate analysis will be distributed equally among the different types of samples encountered.

Equation 1 $RPD = [(|X1-X2|)/((X1+X2)/2)]*100$

- d. **REAGENT OR METHOD BLANKS** – The Contractor shall run a minimum of one reagent blank every time samples are analyzed. The reagent blank is to be interspersed with the regular samples; it is not to be analyzed separately. Data for each reagent blank will be reported along with other quality control data for any given analysis.
- e. **SPIKED SAMPLES** – For each parameter possible, at least one sample will be spiked with a known concentration and analyzed during normal analytical procedure. Percent recovery will then be computed and reported with the rest of the data.
- f. **BLIND SAMPLES** – The contractor may be required to analyze a blind sample for each parameter using normal analytical procedures and shall report the results for evaluation. Blind samples will constitute less than 10% of the total sample analysis.
- g. **UNINTERRUPTED PARAMETER ANALYSIS** – The Corps requires that a single parameter or set of parameters for a group of samples be analyzed by the Contractor during the same analytical session. All analyses for parameters in samples, reagent blanks, and blind samples will be conducted during the same analytical session. To clarify: once the instrument or procedure is set and running for a given parameter or set of parameters, all samples and their associated controls will be run. The instrument or procedure will not be stopped, except for an emergency, until all analyses for that parameter are completed on all samples. If the analytical sequence is interrupted or delayed, upon resumption all blanks, spiked samples, and the remaining unknowns will be run.
- h. **SAMPLE STORAGE** – The Contractor must state the maximum storage time that will occur between sample collection and analysis.
- i. **PERFORMANCE CRITERIA** – The Corps expects the following performance for QA/QC.

Replicate samples using the relative percent difference (RPD)

Plus/minus 10% for values >5 X detection limit (DL)

Plus/Minus DL for values < 5 X DL

Method Blanks

The concentration of all target analytes in the blank shall be below the method detection limit (MDL) or less than 5% of the measured concentration in the sample. If the blank does not meet the acceptance criteria, the source of contamination shall be investigated and appropriate corrective action

taken and documented. Investigation includes an evaluation of the data to determine the effect and extent of the contamination on the sample results. Corrective actions may include reanalysis of the blank and/or reparation of the blank and all associated samples at no expense to the Government. Sample results shall not be corrected for blank contamination.

Spiked Samples

Acceptable accuracy on spiked sample analyses is +/- 2 standard deviations of the mean value. If more than 5% of the of spiked sample analyses exceed +/- 2 standard deviations of the mean value, the Corps may request that quality control be checked or may order another laboratory inspection. In addition, if spiked sample analyses exceed +/- 3 standard deviations, the data for the particular set of samples will be rejected by the Corps. The Contractor will be required to identify and correct the analytical problem and rerun the analysis, including sample digestion, at the Contractor's expense. The Corps expects the coefficient of variation on replicate analyses to be less than 10% for most parameters.

Blind Samples

Blind sample results will be compared to the certified known value. If the contractor's performance is unsatisfactory, the Corps will not accept the analytical data until the contractor demonstrates acceptable performance. Acceptable performance on blind samples follows the limits stated for drinking water analysis in the SDWA.

The cost of these QA/QC procedures will be included in the per samples bid price (the replicate, spike, and blank samples will not be a separate payment item).

7. PRODUCTS

The Contractor will provide a final written report (Sampling and Analysis report) including the analytical results, specific description of analytical methods, description of field and laboratory quality control and quality assurance measures, description of any unusual observations about the tests, and any other relevant information. The Contractor shall also provide the analytical results and notes on unusual observations on a 3.5-inch diskette using an EXCEL spreadsheet. The Contractor shall retain any remaining samples until the products have been approved by the Corps in case additional analyses are requested.

Minimum data reporting elements include the following:

- a. field sample identification number,
- b. laboratory sample number,
- c. date of sample(s) collection,
- d. date of sample(s) extraction/digestion/analysis,
- e. batch number(s),
- f. dilution factors,
- g. analysis parameter(s),
- h. analytical method,
- i. parameter value or result,
- j. concentration units,
- k. reporting and minimum detection limits,
- l. all data qualifiers assigned and any special problems associated with an analysis,
- m. sample description including preservation,
- n. final chain of custody sheets,
- o. and all supporting QA/QC data.**

** QA/QC data shall include calibration data including initial calibration curve data and continuing calibration verification data including standards and blanks and acceptance ranges. All method blanks, laboratory control samples, duplicates, spikes, and other method specific QC samples which may have been run, even on samples other than this project, which were run. Data must clearly indicate which batch data refers to it.

8. COMPLETION AND DELIVERY

The Contractor shall complete the analyses and deliver the results for each sampling trip to the Corps of Engineers within 30 working days after the samples are collected by the Contractor on-site. The results of in situ measurements made at the wells (pH, water temperature, water level, specific conductance) shall be provided by mail or fax to Mr. Jim Noren of the Corps of Engineers within 30 days of sample collection. Mailing address, fax, and phone number for Mr. Noren are as follows:

Corps of Engineers – St. Paul District
190 East 5th Street
St. Paul, Mn. 55101-1638
Attn: ED-H Jim Noren

Fax 651-290-5841

Phone 651-290-5626

The final (Sampling and Analysis) report will be delivered to the above address 50 days after the final post project sample has been collected.

TABLE 1 – WATER ANALYSIS

WATER QUALITY TESTING AND REPORTING PROTOCOL				
PARAMETER	TESTING METHOD	CITATION	TESTING METHOD OR PROJECT PQL*	APPROX. NUMBER OF SAMPLES
Fecal Coliform	Membrane filtration (MF) SM Method 9222	APHA 1995		81
Alkalinity	EPA 310.1 or 310.2		10 mg/l as CaCO ₃	117
Hardness	EPA 130.1 or 130.2		10 mg/l as CaCO ₃	117
Nitrate+Nitrite Nitrogen	EPA 353.1 or 353.3	EPA 1983	0.1 mg/l	117
Nitrite Nitrogen	EPA 354.1	EPA 1983	0.1 mg/l	117
Nitrate Nitrogen	CALC.		1 ug/l	117
Arsenic	EPA 206.2	EPA 1986	0.1 ug/l	117
Cadmium	EPA 213.2	EPA 1986	1 ug/l	117
Chromium	EPA 218.2	EPA 1986	1 ug/l	117
Copper	EPA 220.2	EPA 1986	1 ug/l	117
Lead	EPA 239.2	EPA 1986	1 ug/l	117
Nickel	EPA 249.2	EPA 1986	1 ug/l	117
Zinc	EPA 289.2	EPA 1986	1 ug/l	117
Iron	EPA 236.2		1 ug/l	117
Manganese	EPA 243.2		1 ug/l	117
PCB's and CHLORINATED PESTICIDES**				
Total PCB's (Arochlors 1016, 1221, 1232, 1242, 1248, 1254, 1260)	SW-846 3520/8080	EPA 1986	2 ug/l	12
Aldrin	SW-846 3520/8080	EPA 1986	0.04 ug/l	12
Alpha BHC	SW-846 3520/8080	EPA 1986	0.03 ug/l	12
Beta BHC	SW-846 3520/8080	EPA 1986	0.06 ug/l	12
Delta BHC	SW-846 3520/8080	EPA 1986	0.09 ug/l	12
Gamma BHC (Lindane)	SW-846 3520/8080	EPA 1986	0.04 ug/l	12
Heptachlor	SW-846 3520/8080	EPA 1986	0.03 ug/l	12
Heptachlor Epoxide	SW-846 3520/8080	EPA 1986	0.83 ug/l	12
4,4 DDD	SW-846 3520/8080	EPA 1986	0.11 ug/l	12
4,4 DDE	SW-846 3520/8080	EPA 1986	0.04 ug/l	12
4,4 DDT	SW-846 3520/8080	EPA 1986	0.12 ug/l	12
Dieldrin	SW-846 3520/8080	EPA 1986	0.02 ug/l	12

Endrin	SW-846 3520/8080	EPA 1986	0.06 ug/l	12
Chlordane	SW-846 3520/8080	EPA 1986	0.14 ug/l	12
Methoxychlor	SW-846 3520/8080	EPA 1986	0.5 ug/l	12
Endosulfan I	SW-846 3520/8080	EPA 1986	0.14 ug/l	12
Endosulfan II	SW-846 3520/8080	EPA 1986	0.04 ug/l	12
Endosulfan sulfate	SW-846 3520/8080	EPA 1986	0.66 ug/l	12
Endrin Aldehyde	SW-846 3520/8080	EPA 1986	0.23 ug/l	12
Toxaphene	SW-846 3520/8080	EPA 1986	2 ug/l	12
FIELD MEASUREMENTS				
PH	EPA 150.1	EPA 1983	0.1 st. units	Site dependent
Temperature	EPA 170.1	EPA 1983	0.1 deg. C	Site dependent
Specific Conductance	EPA 120.1	EPA 1983	1 us/cm	Site dependent
Dissolved Oxygen	EPA 360.1	EPA 1983	0.1 mg/l	Site dependent
Turbidity	EPA 180.1	EPA 1983	1 ntu	Site dependent

* Detection limits refer to final analyte concentrations, including back calculations, and do not refer to the basic instrument detection limits. All detection limits are minimum acceptable levels.

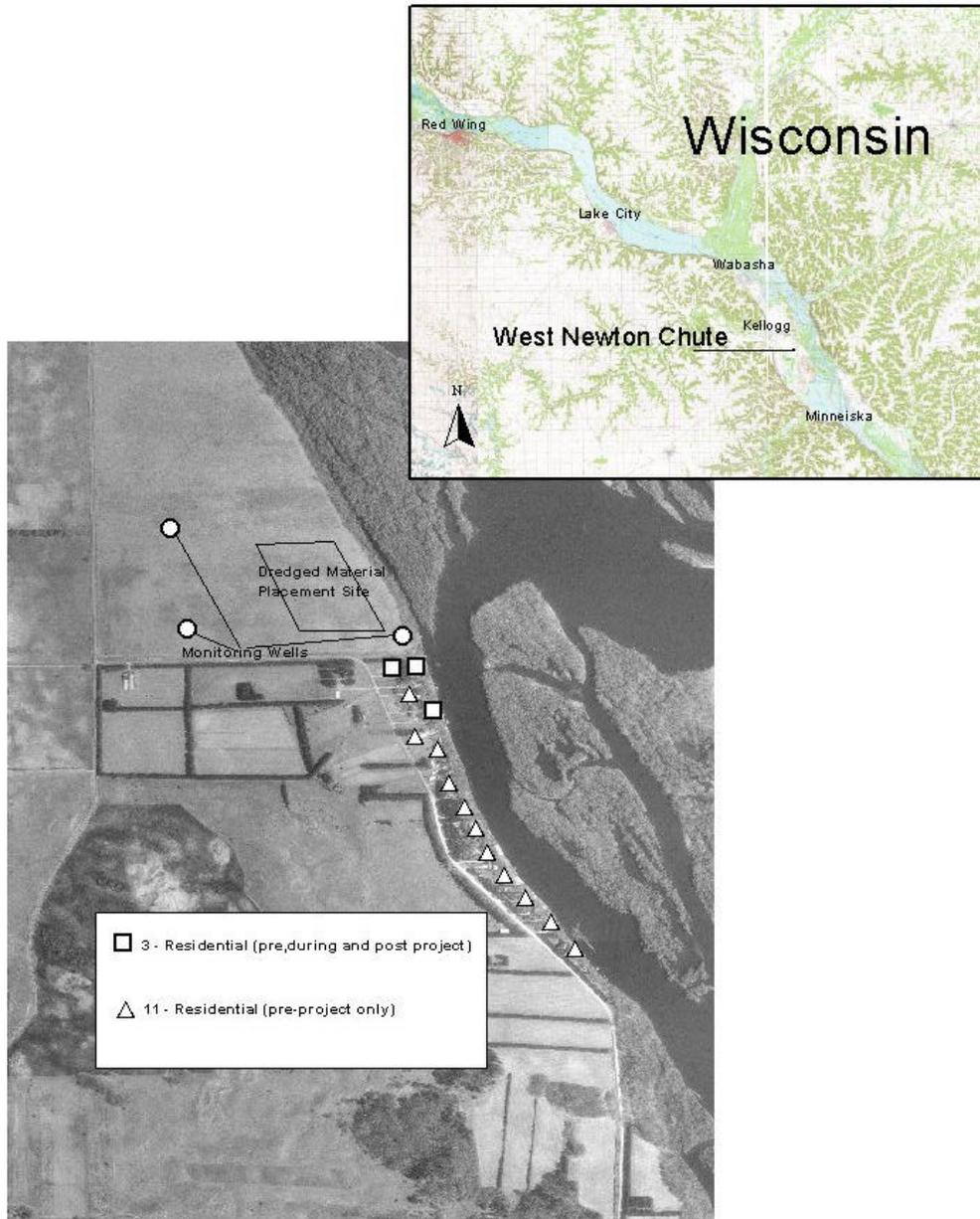
** Florosil column cleanup, method 3620, followed by sulfur cleanup, method 3660, may be required to remove interferences.

Table 2. Sampling Schedule

SCHEDULE	Phase 1 Pre-Project			Phase 2 (Time from onset of dredging in days)						Phase 3 (after completion of dredging-days)		
	1	2	3	3	17	31	45	59	73	30	60	90
MONITORING WELLS (2)												
Basic Parameters ¹	X	X	X	X	X	X	X	X	X	X	X	X
Nit., Alk., Hardness	X	X	X	X	X	X	X	X	X	X	X	X
Metals	X	X	X	X	X	X	X	X	X	X	X	X
Fecal Coliform												
PCB's, Pesticides												
STAINLESS STEEL WELL (1)												
Basic Parameters ¹	X	X	X	X	X	X	X	X	X	X	X	X
Nit., Alk., Hardness	X	X	X	X	X	X	X	X	X	X	X	X
Metals	X	X	X	X	X	X	X	X	X	X	X	X
Fecal Coliform	X	X	X	X	X	X	X	X	X	X	X	X
PCB's, Pesticides	X	X	X	X	X	X	X	X	X	X	X	X
RESIDENTIAL WELLS (11)												
Basic Parameters ¹	X	X	X									
Nit., Alk., Hardness	X	X	X									
Metals	X	X	X									
Fecal Coliform	X	X	X									
PCB's, Pesticides												
RESIDENTIAL WELLS (3)												
Basic Parameters ¹	X	X	X	X	X	X	X	X	X	X	X	X
Nit., Alk., Hardness	X	X	X	X	X	X	X	X	X	X	X	X
Metals	X	X	X	X	X	X	X	X	X	X	X	X
Fecal Coliform	X	X	X	X	X	X	X	X	X	X	X	X
PCB's, Pesticides												
RIVER AND CARRIAGE WATER												
Basic Parameters ¹				X	X	X	X	X	X			
Nit., Alk., Hardness				X	X	X	X	X	X			
Metals				X	X	X	X	X	X			
Fecal Coliform												
PCB's, Pesticides												

¹ – Basic parameters are water temperature, specific conductance, pH, dissolved oxygen, and turbidity.

Figure 1. Map of approximate locations of residential and monitoring wells



9. Literature Cited

American Public Health Association. 1995. *Standard Methods for the Examination of Water and Wastewater*, 19th ed. American Public Health Association, Washington DC.

Environmental Protection Agency. 1983. *Methods for Chemical Analysis of Water and Wastes*. EPA-600/4-79-020. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

Filename: DACW37-03-T-0007 Addendum I SOW West Newton Chute Water
Sampling.doc
Directory: F:\2003 CONTRACTS\West Newton Chute
Template: C:\Documents and Settings\Eddie.T.Shaw\Application
Data\Microsoft\Templates\Normal.dot
Title: Scope of Work for the Collection and Analysis of Ground-water
Samples for the CAMAS gravel pit Dredged Material Rehandling Project
Subject:
Author: USACE
Keywords:
Comments:
Creation Date: 8/29/2002 10:17 AM
Change Number: 8
Last Saved On: 10/7/2002 11:39 AM
Last Saved By: Jim Noren
Total Editing Time: 198 Minutes
Last Printed On: 12/16/2002 3:29 PM
As of Last Complete Printing
Number of Pages: 12
Number of Words: 3,407 (approx.)
Number of Characters: 19,423 (approx.)