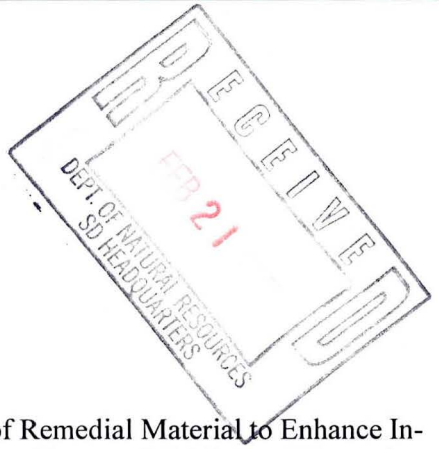
# ARCADIS GERAGHTY & MILLER

ARCADIS Geraghty & Miller, Inc.
126 North Jefferson Street
Suite 400
Milwaukee
Wisconsin 53202
Tel 414 276 7742
Fax 414 276 7603

ENVIRONMENTAL




Michael R. Schmoller
Hydrogeologist
South Central Region Headquarters
Wisconsin Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg, Wisconsin 53711

Subject:
Request for Temporary Exemption for Injection of Remedial Material to Enhance In-Situ Groundwater Remediation Process, Middleton Cleaners, Middleton, Wisconsin.
File Ref: 03-13-096833 Dane County
ARCADIS Geraghty & Miller Project No. WI000811

Milwaukee
20 February 2001

Contact:
Jennine Cota

Extension:
414 276 7742

Dear Mr. Schmoller:

This letter serves to follow-up our recent telephone conversations and our meeting of October 31, 2000 regarding the Middleton Cleaners site in Middleton, Wisconsin. The scope and schedule of the groundwater remediation was discussed at the meeting and subsequently confirmed in a follow-up letter to you, dated November 28, 2000.

The groundwater remediation strategy will include enhancing the anaerobic biodegradation of tetrachloroethene (PCE) in the groundwater at the site. A solution of potable water and food-grade molasses (a source of readily degradable organic carbon) will be injected into the aquifer to promote biological activity and enhance the reductive dechlorination of the PCE and its various degradation products. Because this process involves injecting remedial material into the waters of the state (i.e., groundwater), a temporary exemption under Chapter NR 140.28(5) and a variance from Chapter NR 812.05 of the Wisconsin Administrative Code (WAC) is required from the Wisconsin Department of Natural Resources (WDNR).

ARCADIS Geraghty & Miller, Inc. has prepared this request for a temporary exemption under Chapter NR 140.28(5) and a variance under Chapter NR 812.05 of the WAC. This letter includes a description of the groundwater remediation process and the information necessary to address the exemption prerequisites and criteria listed in Sections NR 140.28(5)(c) and (d) as well as the variance in Section NR 812.05. A Wisconsin Pollutant Discharge Elimination System (WPDES) permit, which is also required for implementation of this remediation technique, has been forwarded to your attention under separate cover.

## Description of Groundwater Remediation Process

As discussed above, the proposed groundwater remedy for the Middleton Cleaners site requires the addition of a readily degradable source of carbon to the impacted groundwater. The addition of readily degradable organic carbon will stimulate

biological activity and promote the enhanced reductive dechlorination of PCE and its various degradation products. A dilute solution of food-grade molasses will be used as the source of readily degradable carbon.

A 25:1 solution of potable water and food-grade molasses (i.e., 25 gallons of water for every 1 gallon of food-grade molasses) will be injected into the impacted aquifer through shallow injection wells. A 20:1 solution will be injected into the impacted aquifer through deep injection wells. Nine injection wells are located across the site in the zone of impacted groundwater. Figure 1 illustrates the approximate locations of the injection wells.

Based on the results of analyses to be performed on groundwater samples collected from existing monitoring well locations, three carbon injections will be completed. These injection events will be completed on a monthly basis. Subsequent injection events may be completed at a subset of the initial well locations. The actual locations for the subsequent injection events will be selected based on the groundwater monitoring results at and downgradient of the site following the initial three injection events.

Injection wells at the site consist of five shallow injection wells advanced to a depth of approximately 55 feet below ground surface (ft bgs) and four deep injection wells advanced to a depth of approximately 85 ft bgs. All injection wells include a 2-inch diameter polyvinyl chloride (PVC) well screen and riser. Approximately 50 gallons of the dilute molasses solution will be injected into each shallow injection well, and 80 gallons into each deep injection well.

Approximately 570 gallons of the dilute molasses solution will be injected into the groundwater treatment zone during each injection. Based on the lateral area of treatment, the vertical extent of impact, and soil porosity, it is estimated that there is approximately 5,800,000 gallons of impacted groundwater that will be targeted during the injections. Thus, the maximum volume of the injected solution would be less than one percent of the total volume of groundwater in the treatment zone. Further, due to the storage capacity of the aquifer, the injected solution would have a negligible effect, if any, on water levels within the plume (i.e., there should be little or no temporary mounding) and would not cause appreciable dilution of contaminant concentrations within the plume.

To verify system performance and evaluate whether a sufficient quantity of carbon (i.e., the dilute molasses solution) is being injected, a groundwater monitoring program will be implemented. Table 1 presents the details of the monitoring program. Groundwater samples will be collected from select existing monitoring wells following the initial three injection events, and then bi-monthly, or at an alternate frequency as agreed to by the WDNR. Baseline sampling will be completed prior to the initial injection events. Samples will be analyzed for volatile organic compounds (VOCs) and dissolved gases to evaluate the performance of the remedial

process. In addition, samples will also be analyzed for total organic carbon. Field instruments will be used to measure other natural attenuation parameters, including dissolved oxygen, pH, and oxidation-reduction potential (ORP). The natural attenuation parameters, particularly ORP and organic carbon, will be used to evaluate biological conditions within the aquifer. The natural attenuation parameters will also be used to evaluate the potential need to modify the proposed injection frequency.

All groundwater sampling will be conducted using low-flow sampling techniques. Based on the bi-monthly monitoring results, modifications to the sampling program (i.e., sampling frequency, number of wells sampled) may be recommended.

This remediation process involves anaerobic reductive dechlorination, which has a potential to create hydrogen sulfide or methane gas. Due to the depth to groundwater (approximately 50 feet), it is not anticipated that any gases will accumulate across the site. However, ARCADIS Geraghty & Miller will implement an air monitoring program at the site as a precaution. Baseline air samples will be collected prior to the initial injection event. Air samples will then be collected following the initial three injection, then on a bi-monthly basis, or at an alternate frequency as agreed to by the WDNR. The air samples will be analyzed for hydrogen sulfide and methane gas.

## Exemption Request

Chapter NR 140.28(5) identifies prerequisites and criteria for granting a temporary exemption where infiltration or injection is utilized for a remedial action. The following sections provide additional information as requested in NR140.28(5)(c) and (d).

### NR140.28(5)(c) - Exemption Prerequisites

This section addresses the exemption prerequisites listed in Paragraphs 1 through 6 of NR140.28(5)(c):

1. Reasonable Period of Time: This prerequisite requires that the remedial action achieve the response objectives of NR140.24(2) (compliance with Preventive Action Limits) or NR140.26(2) (compliance with Enforcement Standards) within a reasonable period of time. The active groundwater treatment should achieve a significant reduction in dissolved hydrocarbon mass. The time frame for active groundwater remediation is anticipated to be approximately 1 to 2 years. This time frame is reasonable based on the experience of ARCADIS Geraghty & Miller at implementing this remedial alternative in similar geologic formations. Further, it is anticipated that the reduction of constituent mass using this method will be achieved faster in comparison to other groundwater remediation technologies such as groundwater extraction or air sparging.

2. Minimization of Injected Remedial Material: Based on groundwater conditions, periodic injections of carbon solution is being proposed. The area of highest PCE concentration is being targeted to minimize the volume of remedial material being injected. Subsequent injection events will be tailored to overlap areas of continuing groundwater impacts, reducing the amount of carbon solution applied during each application. As indicated above, dissolved organic carbon concentrations and ORPs will be periodically measured at existing monitoring well locations after the first three injection events. The monitoring program results will also be used to verify when additional injection events are unnecessary.

3. Impacts to Public Health or Welfare: The remedial material will be prepared from potable water and food-grade molasses, and thus does not represent a threat to public health or welfare. The reductive dechlorination of PCE does form vinyl chloride; however, vinyl chloride in turn degrades to ethene, carbon dioxide, and water. A site health and safety plan will be prepared to address exposure during the implementation process. Air monitoring will be implemented at the site. The air monitoring results will be used to detect hazardous exposure conditions at the site from hydrogen sulfide and/or methane gas.

4. Injection into Areas of Floating Non-Aqueous Liquid: Light non-aqueous phase liquid (LNAPL) was not observed during the investigation. Therefore, this prerequisite is not applicable.

5. Expansion of Groundwater Contamination: The injection process will target the area of impacted groundwater. Injection will only occur in the area of known or suspected groundwater contamination. The proposed injection methodology will introduce small volumes of molasses solution into the impacted area of the aquifer (estimated volume of injection solution to be a maximum of less than one percent of the total volume of groundwater within the targeted treatment zone). During each application, approximately 570 gallons of the dilute molasses solution will be injected.

   Due to the low injection volumes relative to the volume of water being treated and the storage capacity of the aquifer, the remedial process will not create mounding of the groundwater table or otherwise have a significant effect on groundwater flow. Water levels will be measured at the monitoring wells prior to each injection event to evaluate groundwater flow patterns at the site and whether the injection process is affecting groundwater flow.

6. Other Permits and Licenses: It is understood that a variance from the WDNR under Section NR 812.05 is required and is addressed below. In addition, a WPDES permit is required. A WPDES permit application has been submitted to you under separate cover.

**NR140.28(5)(d) - Remedial Action Design, Operation, and Monitoring Criteria**

This section addresses the design, operation and monitoring criteria listed in paragraphs 1 through 5 of NR140.28(5)(d):

1. Procedures for Monitoring Compliance: Procedures will be established to evaluate compliance with this exemption. As indicated earlier, a groundwater monitoring program will be implemented to evaluate the progress of remediation and system parameters. VOC results will provide an indication of the rate of biodegradation, contraction or expansion of the dissolved plume, and constituent concentrations relative to Chapter NR 140 Enforcement Standards. Water level data, collected monthly during the first 6 months of remediation, will be used to evaluate the effect of the remedial process, if any, on groundwater flow. Geochemical data (e.g., ORP, dissolved total organic carbon) will be used to determine the optimal rate and frequency of the carbon (molasses) injection process.

   Reporting of the monitoring results will be conducted in accordance with Chapter NR 724 of the WAC. A completed WDNR Form 4400-194 will be submitted to the WDNR on a semiannual basis.

2. Pre-Treatment of Contaminated Groundwater for Reinfiltration: The remedial system will utilize a solution of potable water and molasses. Groundwater from the site will not be extracted and/or reinjected. Therefore, this criteria is not applicable.

3. Remedial Material Proposed for Injection: A 20:1 solution of potable water and food-grade molasses will be used as the remedial material at the site in four deep injection wells, and a 25:1 solution will be used in five shallow injection wells.

4. Volume and Rate of Injection: Approximately 80 gallons of molasses solution will be injected into each deep injection well, and 50 gallons into each shallow injection well. Approximately 570 gallons of the dilute molasses solution will be injected into the aquifer during each of the three injection events. Additional injections may be necessary based on the groundwater monitoring results. Actual quantities of additional dilute molasses solution to be injected will be adjusted based on total organic carbon (TOC) and ORP measurements taken from the wells on the property. Based on the results of the monitoring program, the volume of solution injected during possible subsequent injection events may be varied.

5. Locations of Injection. Figure 1 illustrates the locations of the injection wells for the groundwater remediation process. It should be noted that the location of the injection wells is based on the results of analyses performed on groundwater samples collected in July 2000.

ARCADIS GERAGHTY & MILLER

## Variance Request

**NR 812.05 - Disposal of Pollutants; Injection Prohibition**

Based on NR812.05, "the use of any well, drillhole or water system for the underground placement of any waste, surface or subsurface water or any substance as defined in s. 160.01 (8), Stats., is prohibited unless the placement is a department-approved activity necessary for the construction, rehabilitation or operation of the well, drillhole or water system or is *a department-approved activity necessary for remediation of contaminated soil, groundwater or an aquifer.*"

Since this injection is a department-approved activity necessary for the remediation of contaminated groundwater, a variance under NR 812.05 is requested for this process.

## Closing

We appreciate your continued assistance with this project. To maintain the project schedule, it is requested that the WDNR issue the requested temporary exemption under NR 140.28(5) and variance under NR 812.05 by March 16, 2001. Should you have any questions or require additional information, please call.

Sincerely,

ARCADIS Geraghty & Miller, Inc.

Jennine L. Cota
Environmental Engineer

James F. Drought, P.H.
Principal Hydrogeologist

Copies:
Dr. Edward Hommel – Northern Properties
Mr. Aubrey R. Fowler, Esq. – Northern Properties
Mr. Donald P. Gallo – Reinhart Boerner et al

Table 1. Groundwater Monitoring Program, Middleton Cleaners, Middleton, Wisconsin.

| Location | Matrix | Sampling Frequency | Type of Analytical or Field Measurement | Comments |
|---|---|---|---|---|
| Site Monitoring Wells | Water | Bi-Monthly* | VOCs (USEPA Method 8260) | To monitor groundwater quality and evaluate the presence of daughter products |
| Site Monitoring Wells | Water | Bi-Monthly* | Volatile organic gases (ethene, ethane, methane)<br>Dissovled gases (oxygen, carbon dioxide, carbon monoxide, nitrogen) | To monitor concentrations of biodegradation end products |
| Site Monitoring Wells | Water | Bi-Monthly* | Water level (field instrument) | To monitor direction of groundwater flow |
| Site Monitoring Wells | Water | Bi-Monthly* | Dissolved oxygen, oxidation/ reduction potential (field instruments) | To monitor changes in natural attenuation indicator parameters and electron acceptor concentrations |
| Site Monitoring Wells | Water | Bi-Monthly* | Organic carbon (USEPA Method 9060) | To monitor changes in electron acceptor and donor concentrations |

* Monitoring will occur bi-monthly after completion of the initial three carbon injections.

DRAFTER: ELS | APPROVED: | CHECKED: DBJT | DRAWING: PROP_WELL4.AI | FILE NO.: GRAPHICS | PN: NORTHPROP\WI0811\MDLTN_INV | DWG DATE: 20FEB01

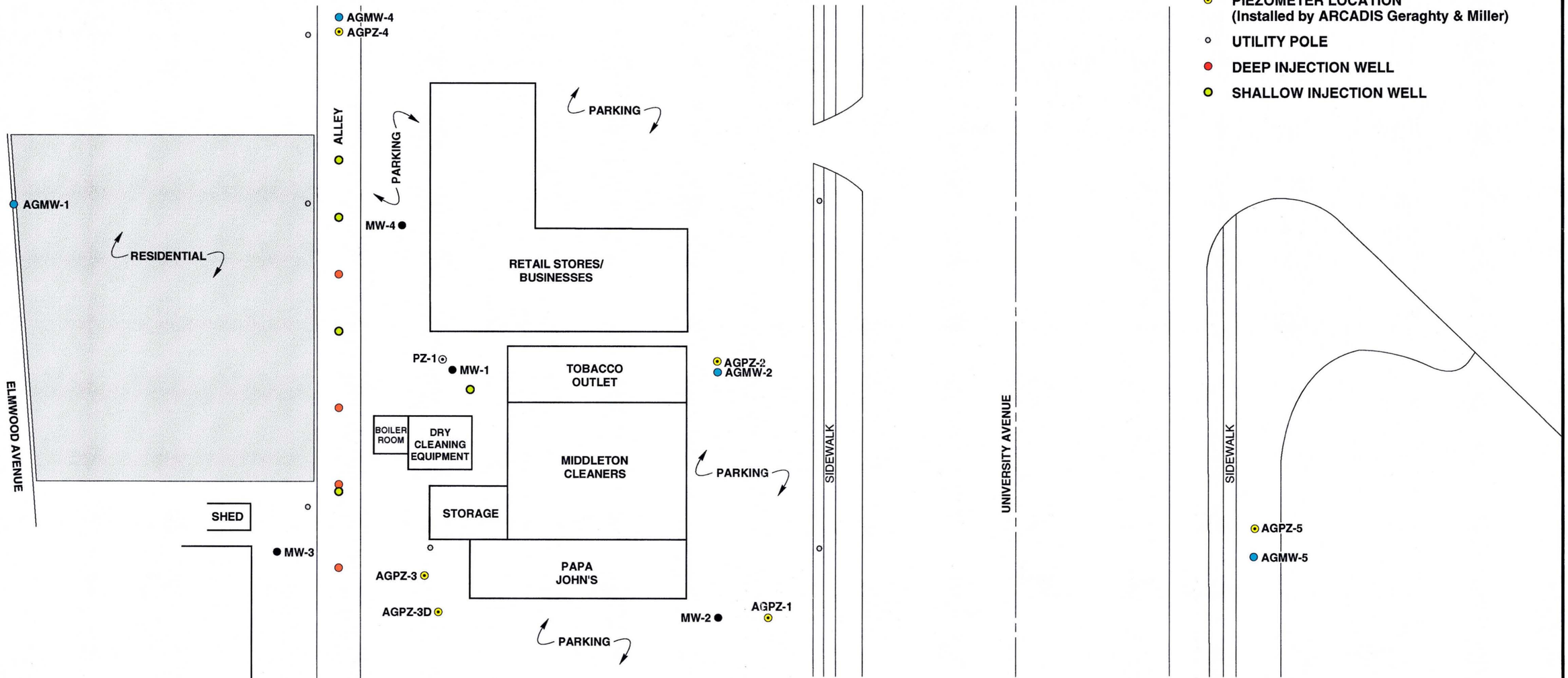
N

0 20 40 80

APPROXIMATE SCALE IN FEET

## LEGEND

- MONITORING WELL LOCATION (Installed by Strand Associates in July 1999)
- PIEZOMETER LOCATION (Installed by Strand Associates in July 1999)
- MONITORING WELL LOCATION (Installed by ARCADIS Geraghty & Miller)
- PIEZOMETER LOCATION (Installed by ARCADIS Geraghty & Miller)
- UTILITY POLE
- DEEP INJECTION WELL
- SHALLOW INJECTION WELL




ARCADIS GERAGHTY & MILLER

# INJECTION WELL LOCATIONS

MIDDLETON CLEANERS
MIDDLETON, WISCONSIN

FIGURE
1

# ARCADIS GERAGHTY & MILLER

ARCADIS Geraghty & Miller, Inc.
126 North Jefferson Street
Suite 400
Milwaukee
Wisconsin 53202
Tel 414 276 7742
Fax 414 276 7603

ENVIRONMENTAL

Dr. Edward R. Hommel
325 Bay Forest Drive #103
Naples, Florida 34110

Aubrey R. Fowler
Fowler & Wiederhoeft
702 North Blackhawk Avenue
Madison, Wisconsin 53705-5326

Subject:
Projected Costs for Completion of Drilling Activities, Middleton Cleaners, Middleton, Wisconsin.

Milwaukee,
2 February 2001

Contact:
Jennine Cota

Extension:
414 277 6203

Dear Dr. Hommel and Mr. Fowler:

This letter serves to follow-up and confirm our recent telephone conversations regarding the projected costs for the completion of the supplemental site investigation at the Middleton Cleaners site located at 6617-6619 University Avenue, in the City of Middleton, Wisconsin.

As you know, the scope of work and estimated costs for the supplemental investigation activities were forwarded to you in the letter dated November 29, 2000. The supplemental drilling activities were initiated at the site in early December 2000. Four shallow injection wells and one deep injection well were installed in the alley south of the Middleton Cleaners building, and one shallow injection well was installed on the Middleton Cleaner's property south of the building. Each of the shallow injection wells was installed to a depth of approximately 55 feet below ground surface (bgs); the deep injection well was installed to a depth of 85 feet bgs. The hollow-stem auger drilling technique used for the installation of the shallow injection wells was not successful in installing the remaining three deep injection wells and the deep piezometer at the site due to difficult drilling conditions and the engineering properties of the subsurface soils.

The monitoring well and piezometer proposed for the north side of University Avenue were also not installed in December due to the discovery that 12 4-inch fiber optic lines are located in the Dane County right-of-way, immediately north of University Avenue. ARCADIS Geraghty & Miller subsequently contacted Mr. Gil Meinen of Wells Fargo and, in a letter dated January 12, 2001, requested access to install the monitoring well and piezometer on the southern edge of the Wells Fargo property. The request for access was approved by Wells Fargo on January 18, 2001. Copies of the correspondence regarding the request and approval of the access agreement are attached.

The remaining drilling activities consisting of the installation of three deep injection wells, two piezometers and one monitoring well were re-bid by ARCADIS Geraghty & Miller in January 2001 using rotosonic drilling. The rotosonic drilling method is successful for the installation of wells at depths up to 150 feet bgs in the sandy geology, which exists at this site. However, there is an additional cost associated with the use of this specialized drill rig. The lowest cost provider, Boart Longyear, Inc., has been selected to complete the drilling activities at the site.

## Estimated Cost

The projected cost for use of the rotosonic rig, the field oversight required to perform the drilling activities, and the preparation of the access agreement with Wells Fargo is estimated at $19,915. This cost estimate, which includes $6,200 for professional services and $13,715 for subcontracted services, is exclusive of the cost estimate presented in our proposal for remediation services dated February 4, 2000. The adjusted total cost estimate for the completion of the supplemental site investigation, therefore, is estimated at $115,840. The costs are anticipated to be eligible for reimbursement under Dry Cleaner Environmental Response Program (DERP).

This project will be performed on a time and materials basis in accordance with the existing Services Agreement between Northern Properties, Inc. and ARCADIS Geraghty & Miller. Subcontractor costs (i.e., drillers, laboratories) will be invoiced according to actual costs incurred. The estimated costs presented herein will not be exceeded without prior authorization from the WDNR in accordance with the DERP.

## Schedule

The drilling activities will be completed February 6-12, 2001. It is anticipated that the soil cuttings generated from the well installation activities will be picked up and disposed of by Waste Management on February 12, 2001. The baseline groundwater sampling and air sampling will be conducted following installation of the monitoring well, piezometers, and injection wells.

ARCADIS Geraghty & Miller is currently preparing the Wisconsin Administrative Code (WAC) NR 140 variance request and Wisconsin Pollution Discharge Elimination System (WPDES) permit request for the injection activities. It is anticipated that following receipt of the NR 140 variance and WPDES permit, the initial injection activities will commence in April 2001.

## Closing

We appreciate the opportunity to be of continued service to Northern Properties, Inc. on this project and trust that this information meets your needs. We are proceeding with the supplemental investigation activities herein based on your verbal authorization. If you have any questions, please do not hesitate to call.

Sincerely,

ARCADIS Geraghty & Miller, Inc.

Jennine L. Cota
Environmental Engineer

for JFD

James F. Drought
Principal Hydrogeologist

Copies:
Michael Schmoller – WDNR
Donald P. Gallo, Esq – Reinhart Boerner et al

# ARCADIS GERAGHTY & MILLER

ARCADIS Geraghty & Miller, Inc.
126 North Jefferson Street
Suite 400
Milwaukee
Wisconsin 53202
Tel 414 276 7742
Fax 414 276 7603

ENVIRONMENTAL

Gil Meinen
Wells Fargo Bank
4015 North Oakland Avenue
Shorewood, Wisconsin 53211

Subject:
Request for Access, Wells Fargo Property, Middleton, Wisconsin.
ARCADIS Geraghty & Miller Project No. WI000811.0002

Milwaukee
12 January 2001

Contact:
Jennine L. Cota

Extension:
414-276-7742

Dear Mr. Meinen:

On behalf of Northern Properties, Inc., ARCADIS Geraghty & Miller, Inc., is performing soil and groundwater investigation and remediation activities at the Middleton Cleaners site located at 6617-6619 University Avenue, Middleton, Wisconsin. As you know, the Middleton Cleaners site is located to the southwest of the Wells Fargo Bank, on the south side of University Avenue. In July 2000, ARCADIS Geraghty & Miller installed a series of wells to monitor groundwater at and around the above-referenced site.

Based on initial site investigation activities, the Wisconsin Department of Natural Resources (WDNR) has requested the completion of additional investigation activities, including the installation of two additional monitoring wells across University Avenue (northeast of the Middleton Cleaners site). Potential locations within the Dane County right-of-way have been exhausted due to a high concentration of utilities in this area. Therefore, ARCADIS Geraghty & Miller is requesting access to install two monitoring wells within the landscaped portion of the Wells Fargo Bank located at 6622 University Avenue, Middleton, Wisconsin, as illustrated on Figure 1.

The installation of these monitoring wells will require approximately 3 to 5 days to complete and will involve the use of a rotosonic drill rig and a support truck. A rotosonic drill rig is a tire-mounted rig approximately 10 feet wide and 30 feet long. The rig is accompanied by a support truck, approximately 10 feet wide and 20 feet long, which is typically oriented end-to-end with the rig itself. An exclusion area is set up to limit access in the immediate area where drilling occurs. A representative from ARCADIS Geraghty & Miller will be on-site to oversee all drilling activities. Precautions will be taken in order to minimize any damage to landscaping. In addition, site conditions (before and after drilling activities) will be documented in a field book and through photographs. Damage to the landscaping, if any, will be repaired to the approval of Wells Fargo.

Each monitoring well will be constructed pursuant to guidelines set forth in the Wisconsin Administrative Code (WAC). The surface manifestation of each well will consist of a protective steel flushmount cover surrounded by a concrete pad. Flushmount dimensions are typically 1 foot in length (extending underground) with a 9-inch diameter cover. The protective well covers will be constructed to grade with the ambient land surface; therefore, they should not interfere with general grounds maintenance.

Following the installation activities, ARCADIS Geraghty & Miller personnel will collect groundwater samples from the monitoring wells. The sampling events are scheduled to occur on a quarterly basis (i.e. every 3 months) and each event will require 1 day to complete. ARCADIS Geraghty & Miller will contact a chosen representative of Wells Fargo prior to each sampling event to prevent interference with Wells Fargo operations. Groundwater samples will be submitted to a state-certified laboratory for analysis of the following parameters: volatile organic compounds (VOCs), methane, ethane, ethene, and total organic carbon (TOC). Upon request, ARCADIS Geraghty & Miller will provide copies of analytical data to Wells Fargo.

Upon completion of field activities associated with the above-referenced site, ARCADIS Geraghty & Miller will abandon the monitoring wells pursuant to the WAC guidelines. During the abandonment process, the well casing near the land surface will be removed and the well will be backfilled with bentonite clay. Finally, the protective flushmount cover will be removed and sod will be replaced to match the existing conditions.

In order to conduct the work requested by WDNR, ARCADIS Geraghty & Miller requests your approval of the scope of work presented herein for the installation of two monitoring wells. As such, please acknowledge receipt and acceptance of the scope of work by signing and returning one copy of this document to the attention of Ms. Jennine Cota at ARCADIS Geraghty & Miller.

Your time and attention to this matter are greatly appreciated. Should you have any questions, please call either of the undersigned.

Sincerely,

ARCADIS Geraghty & Miller, Inc.

Jennine L. Cota
Environmental Engineer

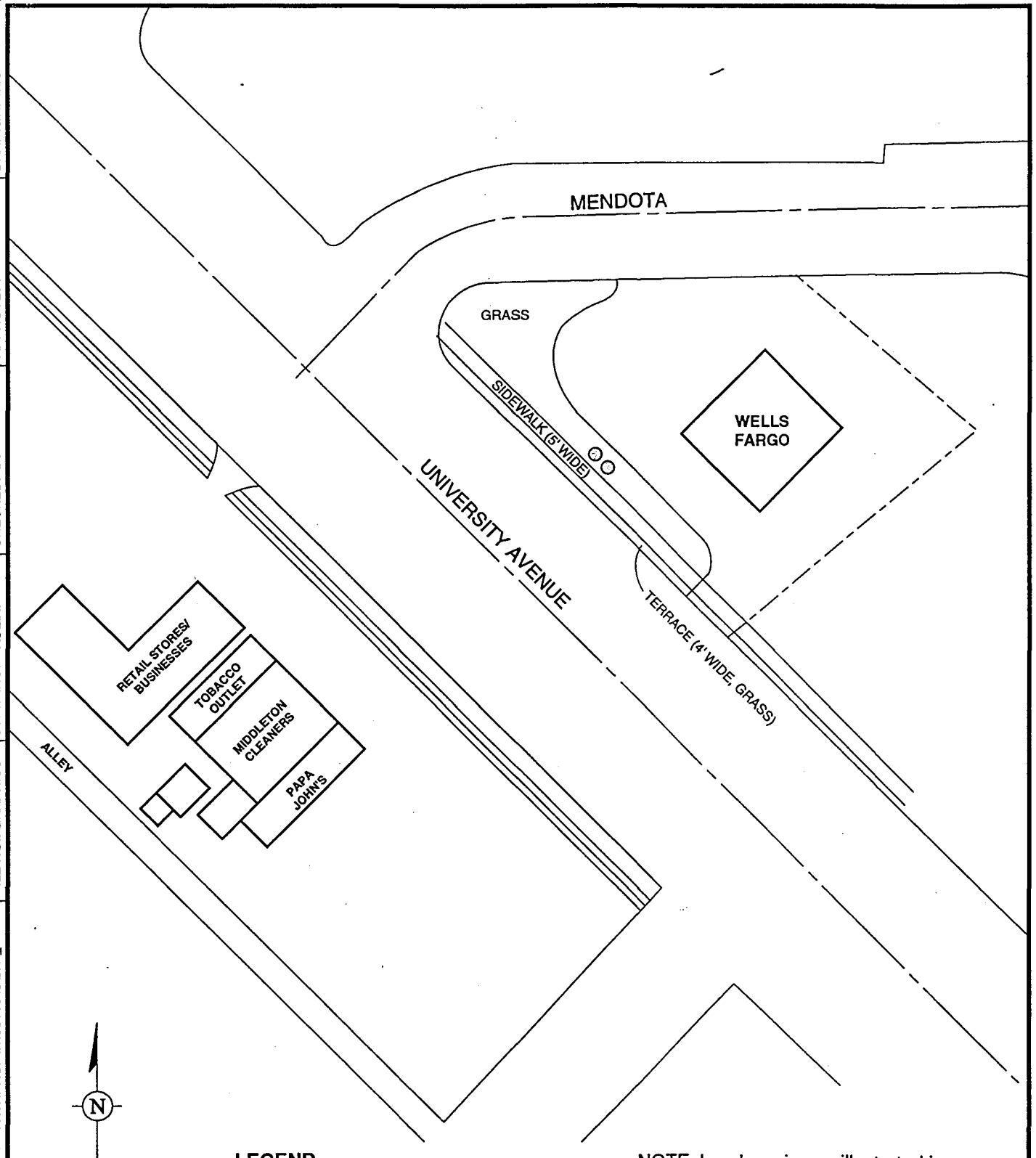
James F. Drought
Principal Hydrogeologist

Attachment

Agreed to and Accepted by:

Date: 1/18/01

Copies:
Ed Hommel – Northern Properties
Aubrey Fowler – Northern Properties
Donald Gallo, Esq. – Reinhart, Boerner, Van Deuren, Norris & Rieselbach, S.C.
Michael Schmoller – WDNR




**LEGEND**

⊙ **PROPOSED WELL LOCATION**

NOT TO SCALE

NOTE: Landscaping as illustrated is approximate. Exact well locations to be determined with Wells Fargo.

DRAFTER: ELS | APPROVED: | CHECKED: DB | DRAWING: BASE.AI | FILE NO.: GRAPHICS | PN: NORTHPROP\WI0811\MDLTN_REM | DWG DATE: 12JAN01

ARCADIS GERAGHTY & MILLER

# PROPOSED WELL LOCATIONS

MIDDLETON CLEANERS
MIDDLETON, WISCONSIN

FIGURE

**1**