Madison Water Utility – Madison, Wisconsin

REQUEST FOR PROPOSALS

Professional Engineering and Hydrogeological Services for Unit Well 15 – Contaminant Source and Casing Extension Assessments

I. INTRODUCTION

Madison Water Utility is requesting proposals for professional services in evaluating two alternatives to treatment of VOCs at its Unit Well 15 site:

- Contaminant (PCE) Source Mitigation – this involves finding and mitigating the source of PCE that is affecting Unit Well 15, either as an alternative to treatment, or to reduce the time that a treatment system is needed.
- Casing Extension – this alternative would extend the casing of Unit Well 15 below the Eau Claire Shale to prevent the PCE contaminated water from entering the well.

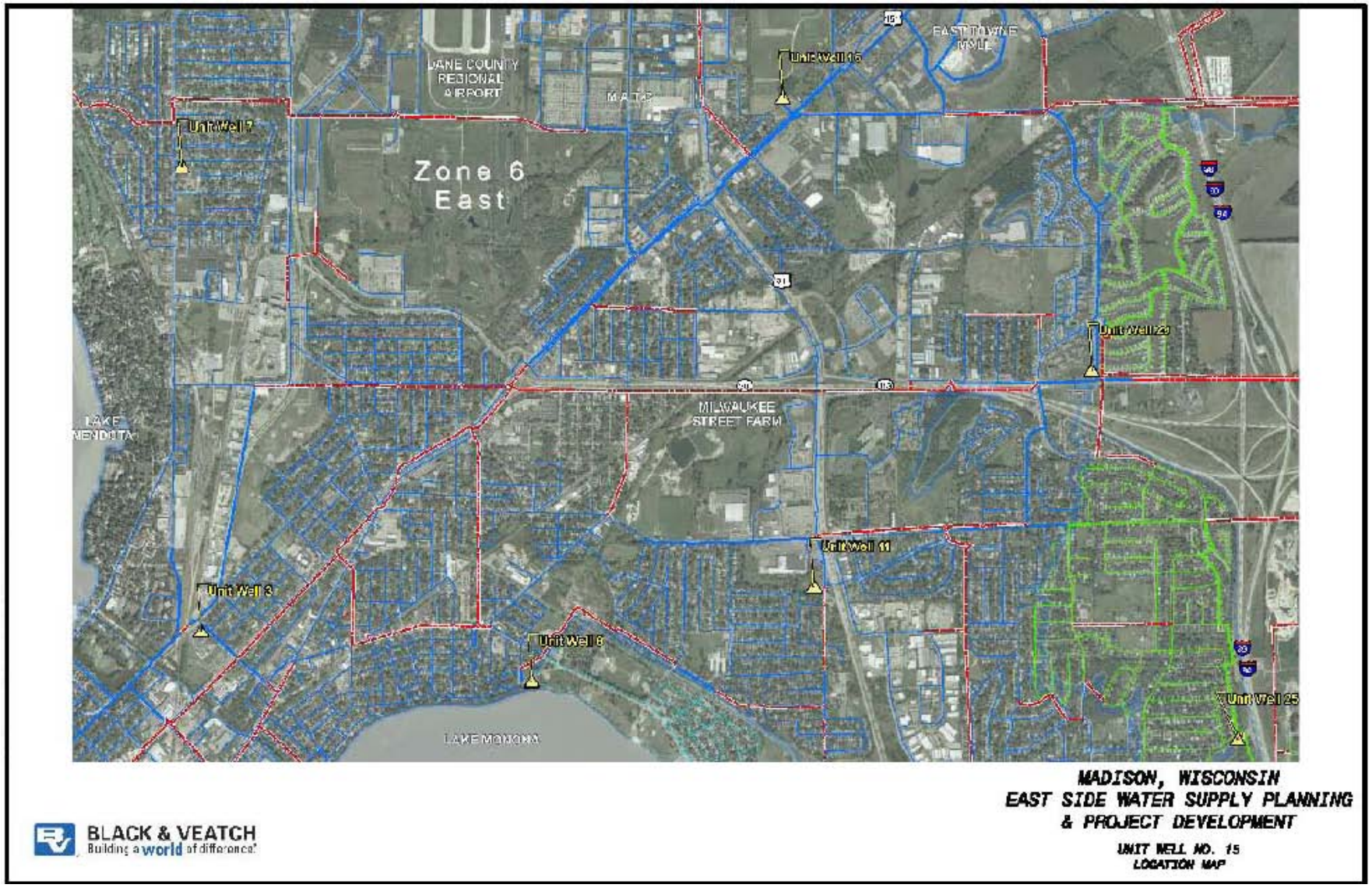
Based on currently available information, both of these alternatives have enough uncertainty associated with them that they cannot yet be considered reliable alternatives or supplements to treatment. The objective of this study is to provide the necessary information to determine if either alternative is viable in eliminating the need for treatment or to limit the duration of treatment.

II. PROJECT BACKGROUND

A. Well Information:

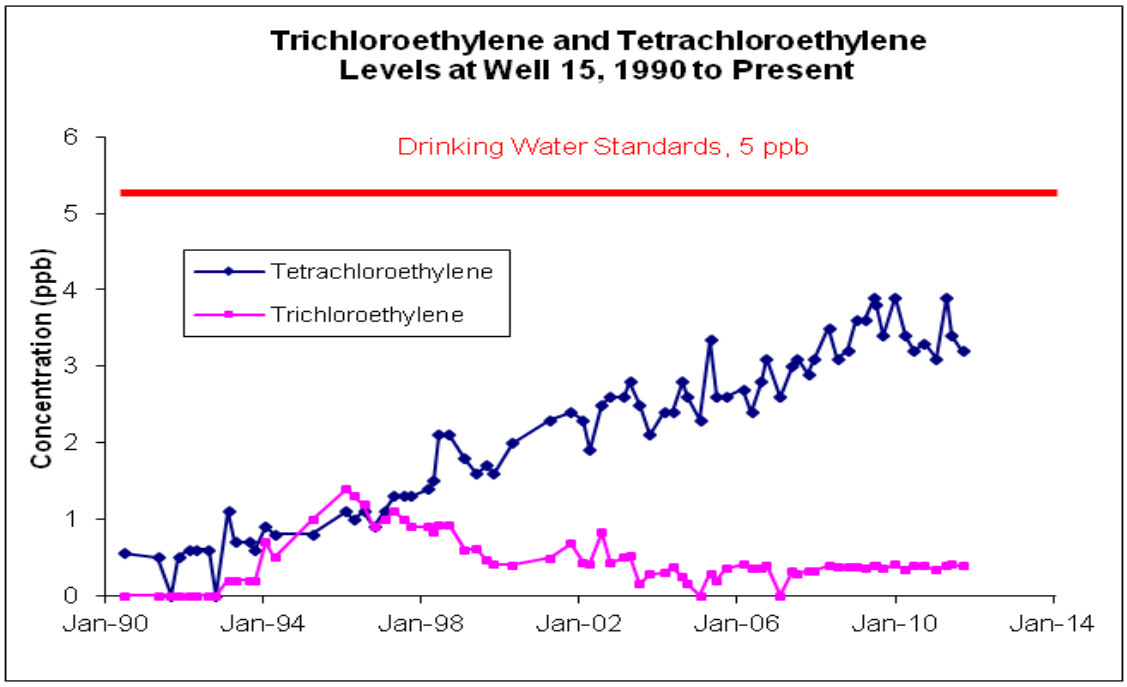
1. Unit Well 15 is located at 3900 E. Washington Avenue. Drilled in 1965, it operates year-round and serves the East Washington corridor including Westchester Gardens, Mayfair Park, Bluff Acres, Carpenter-Ridgeway, Eken Park, and Emerson East neighborhoods. Well 15 also serves the High Crossing area located east of Interstate 90/94. (**Figure 1**)
2. The well is 753' deep and is cased to a depth of 172'. It has a pumping capacity of 2,200 gpm and pumps an average of approximately 2.5 million gallons a day. A detailed description of Well 15 can be found in the Black and Veatch Report referenced below or on the Utility web page.
3. The borehole was recently logged by the WGNHS. Copies of the geophysical log, the revised geological log, and a well construction form are attached. The Eau Claire Formation is located at a depth of 225' to 250' beneath the site with a tight shale layer at 240'. As a result, the well draws water from both the upper (Wonewoc Formation) and the lower (Mt. Simon Formation) aquifers.
4. To investigate the overall water supply needs on the east side of Madison, the Utility hired Black and Veatch Inc. of Kansas City, Missouri to develop a capital improvement plan for the Utility. A recommendation from this plan is the installation of an air stripper at Well 15 to remove the VOCs from the finished water. A copy of the draft Black and Veatch Well 15 report can be found on the Utility's web page at:
   http://www.cityofmadison.com/water/plans/documents/Draft_Tech_Memo_Well_15_VOC.pdf
   The Utility has formed a Citizen's Advisory Panel (CAP) for the project and has been working with the group to move the project forward.

Figure 1


DANE COUNTY REGIONAL AIRPORT
M.A.T.C.
EAST TOWNE MALL
Unit Well 15
Unit Well 7
Zone 6 East
Unit Well 20
MILWAUKEE STREET FARM
LAKE MENDOTA
Unit Well 11
Unit Well 3
Unit Well 8
LAKE MONONA
Unit Well 25
BLACK & VEATCH
Building a world of difference.
MADISON, WISCONSIN
EAST SIDE WATER SUPPLY PLANNING
& PROJECT DEVELOPMENT
UNIT WELL NO. 15
LOCATION MAP

B. Water Quality:

Low level concentrations of both tetrachloroethylene (PCE), and trichloroethylene (TCE) have been detected at this well since the early 1990s. Although TCE concentrations have remained constant over time, PCE levels have been increasing. Currently, these compounds do not violate any state or federal regulations. The Utility, however, is proceeding to design, construct, and implement a remediation system to address the VOCs at this site.



C. Budget:

1. The detailed Scope of Work submitted by the prospective consultant shall take into account a budget for this project.
2. Firms shall develop a budget for the work as a part of the proposal and any budget concerns on the project shall be identified and detailed in the proposal.

D. Public Participation/Public Information Presentations:

1. Public participation and public information will be an important part of the project.
2. The Public Participation process shall conform to the Utility's Standard Operating Procedures for Public Participation. A copy of the SOP can be found on the Utility's web page.
3. Assist the Water Utility with two Citizen's Advisory Panel meetings.
4. Assist the Water Utility with one Water Quality and Technical Advisory Committee meeting.

5. Assist the Water Utility in preparation of exhibits for press releases and for meetings. Exhibits shall convey the scope and intent of the two treatment alternatives.
6. Assist the Utility with managing and implementing web based information design and production. The Utility will use the City web site and has a project dedicated web page.

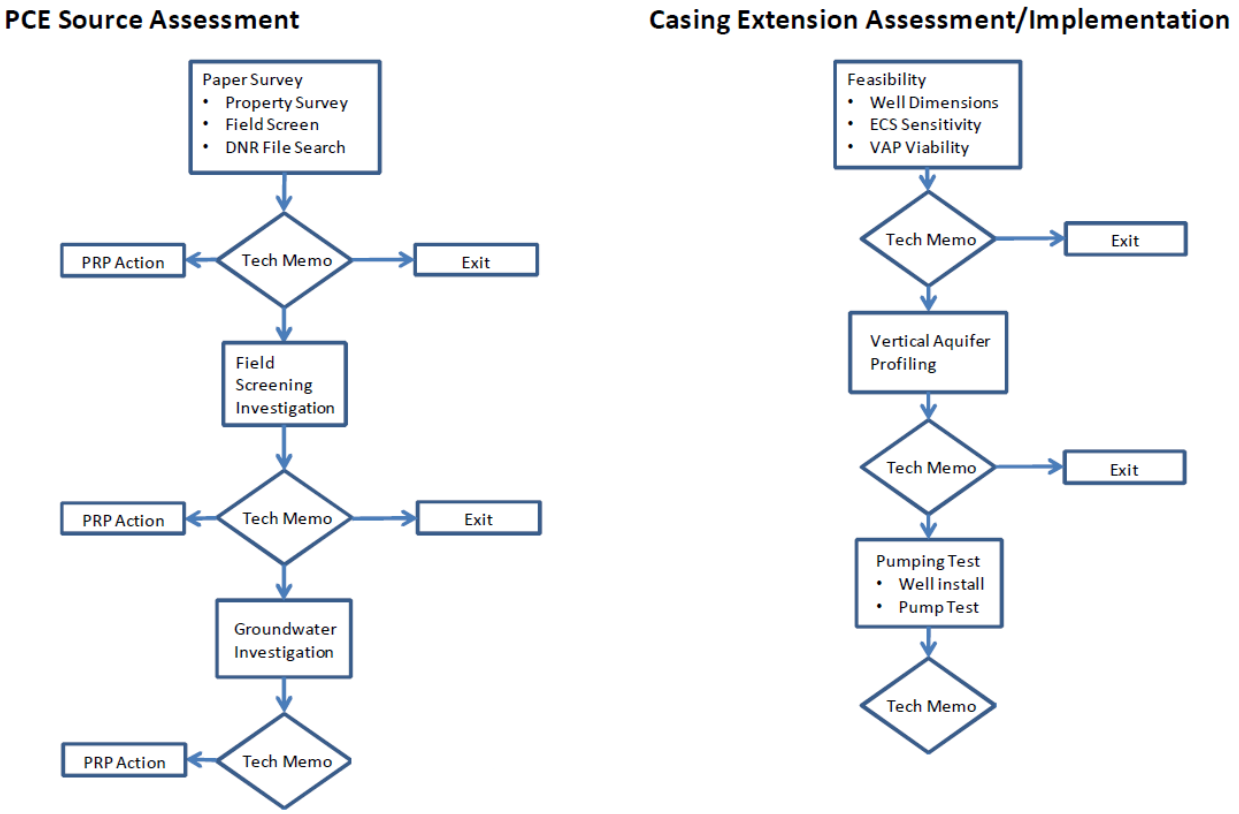
III. SCOPE OF SERVICES

A. General

The evaluation of the two treatment alternatives will be implemented in a phased approach. **Figure 2** illustrates a decision tree depicting several stages in each evaluation process to either exit the process or continue with the evaluation if the data indicate it may be a viable alternative.

The strategy for assessing each alternative is to progress in cost-effective steps to incrementally assess the viability of the alternative. Several decision points are included where the assessment can either be continued to the next step or terminated. The scope of work for this proposal will be implemented incrementally, with a decision by Madison Water Utility after completion of each element described below regarding whether to proceed with the next element of the assessment.

Figure 2:
Incremental process to evaluate the PCE source and casing extension alternatives.



B. PCE Source Area Search

The objective of this Search/Assessment is to determine whether there are potential sources of PCE contamination that can be identified and then remediated to eliminate or reduce the impact of PCE on Unit Well 15.

1. Element 1: Paper Survey
   This element is designed to determine if currently available information can identify likely sources of PCE with enough certainty to warrant the cost of a field investigation to determine whether they are indeed a source of PCE and appraise their potential impact on Unit Well 15.

   a) Task 1: Capture Zone Property Survey
   Review existing data sources to identify potential sources of PCE within the Unit Well 15 capture zone. Conduct a search of property records to identify historic property use that may have included PCE use and, therefore, be a potential source of the contaminants in Unit Well 15. Identify potential sources of PCE (e.g., former dry cleaners, metal degreasing operations, etc.) and produce a map of their locations within the Unit Well 15 capture zone.

   b) Task 2: Field Screening/Interviews
   Conduct interviews with long time residents to identify potential sources of PCE within the Unit Well 15 capture zone. This would include, but not be limited to, City employees and WDNR remediation case managers. These interviews will be conducted concurrently with Task 1, utilizing any data available from the property surveys to help jog memories about activities in the area.

   c) Task 3: DNR File Search
   Review sites where there are, or have been, groundwater investigations or remediation conducted within the Unit Well 15 capture zone to determine whether they could be sources of the PCE in Unit Well 15, or if they can provide information about a potential source of PCE. Identify all possible upgradient sources. It is assumed that the detailed reviewed will be limited to 8 sites.

   d) Task 4: Paper Survey Technical Memorandum
   Prepare a technical memorandum summarizing the results of the PCE source paper survey, presenting the results of the survey primarily as a map of the Unit Well 15 capture zone with both potential sources of PCE and sites where

PCE have been detected in groundwater. This technical memorandum will include recommendations for additional investigation in Element 2 of this scope of work. Meet with the Madison Water Utility to assist in the decision about whether to proceed with Element 2 of the investigation.

2. Element 2: Field Screening Investigation
This element is designed to collect limited field data to confirm the presence/absence of PCE at the potentially contaminated sources/sites identified in the paper survey.

a) Task 1: Soil Gas Survey or MIP Survey
Conduct a limited field screening investigation to collect additional data on whether potential sources identified in the paper survey actually have PCE present at the site and if it is entering the groundwater.

Field Screening methods may include but not be limited to: a soil gas survey or a membrane interface probe (MIP) survey. Methods should provide rapid field data on whether a site may be a source of volatile organic compounds (VOCs) such as PCE. A soil gas survey includes inserting a probe a short distance (e.g., 5 ft.) into the ground and collecting a sample of soil gas for lab analysis. This method can detect releases of VOCs from tens of feet away from a source. Alternatively, an MIP survey uses a probe driven into the soil and/or groundwater that can detect the presence of VOCs.

The budget for this task shall be sufficient to screen up to 3 sites. However, the specific scope of work will depend on the sites identified and the methods to be used. The specific scope will be proposed in the Paper Survey Tech Memo under Element 1.

b) Task 2: Field Screening Technical Memorandum
Prepare a technical memorandum with the results of the field screening and recommendations for whether a groundwater investigation should be conducted. This memorandum will be brief, providing a map showing the locations investigated and a table of results of the field screening. After discussions with the Water Utility, it will be decided whether Element 3 will be implemented.

3. Element 3: Initial Groundwater Investigation
If the field screening survey identifies a potential source of PCE that could contaminate groundwater in the vicinity of Unit Well 15, this

element will determine the concentrations of PCE in groundwater near those sites, as well as the general direction of movement of the PCE-contaminated water. This information will assist in determining the risk these sites pose to Unit Well 15 and the potential effectiveness remediation would have in protecting the well.

a) Task 1: Well Installation and Sampling
This task may be recommended after either the Element 1 paper survey or the Element 2 field screening. Install a series of groundwater monitoring wells and collect groundwater samples for lab analysis to confirm the presence and concentration of PCE in locations identified in the preceding elements of the investigation. The budget for this element of work assumes the installation of 6 groundwater monitoring wells distributed over 2 sites, surveying their elevations and locations, collecting 1 set of groundwater samples, and analyzing the samples for VOCs (including PCE).

b) Task 2: Groundwater Investigation Technical Memorandum
Prepare a technical memorandum summarizing the results of the groundwater investigation, with a map of well locations, a table of analytical results, an opinion of whether locations investigated present a potential source of the PCE in Unit Well 15, and recommendations for future actions. The results will be discussed with Madison Water Utility to assist in determining a course of action. Factors that may contribute to these decisions include whether likely sources have been identified, if there is a viable responsible party, and the feasibility of remediating the source(s).

C. Casing Extension Assessment

The objective of this assessment is to determine whether extending the casing of Unit Well 15 through the Eau Claire Shale is a reliable alternative to treatment for reducing or eliminating the PCE concentrations in Unit Well 15. The evaluation should include, but not be limited to, determining whether the reconfigured well would have sufficient hydraulic capacity, whether a casing extension could keep PCE out of the well, and whether the lower aquifer would have acceptable water quality (especially regarding manganese, iron, and radium).

1. Element 1: Feasibility Check

This element will utilize existing information and a simple field test to determine whether the Vertical Aquifer Profiling, to be used in

Element 2, is viable.

a) Task 1: Well Dimensions & Hydraulics
Preliminary indications are that a liner could be installed at Unit Well 15 to lengthen the casing while allowing use of the existing pump. Confirm through discussions with the WDNR on the allowable casing extension methods and the size of the current pump. If this is not physically viable, identify an alternate pump and determine the maximum flow rate for the pump after casing extension.

b) Task 2: Eau Claire Shale Sensitivity
It is expected that the Eau Claire Shale will provide protection of the lower aquifer from surficial contamination after extending the casing through the shale. Use the Dane County regional groundwater model to evaluate this expectation, modeling the potential flow through the shale to Unit Well 15 under a limited number of scenarios (varying hydraulic conductivities of the shale.)

c) Task 3: Vertical Aquifer Profiling Viability
A key to determining the viability of casing extension is to determine the quality and flow of groundwater from the lower aquifer. Determine whether the Vertical Aquifer Profiling (VAP) tool can be lowered down Unit Well 15 with the pump in place and operating. This will be completed using a surrogate tool provided by the VAP contractor and lowered down the well. Accomplish this in cooperation with Madison Water Utility personnel.

d) Task 4: Feasibility Technical Memorandum
Summarize and present the results of the casing extension feasibility analysis in a technical memorandum including but not limited to, an analysis of the casing/pump dimensions and potential pump capacity, a summary of the Eau Claire shale sensitivity modeling, and the viability of the VAP. Provide recommendations on whether to proceed with the VAP profiling task. Meet with the Madison Water Utility to discuss results and assist in the decision about whether to proceed with the VAP.

2. Element 2: Vertical Aquifer Profiling (VAP)
Utilizing VAP, determine the existing water quality in both the shallow and lower aquifers and flow contribution from both aquifers under existing pumping conditions. Previous wellhead sampling at Unit Well 15 reflects a blend of water from the upper and lower

aquifers. Use VAP to provide a direct indication of the water quality and production rate that could be expected if the casing were extended to pump only from the lower aquifer.

a) Task 1: Vertical Aquifer Profiling
While the well is pumping, lower the VAP tool to the bottom of the well and conduct flow rate measurements at 10 locations from the bottom of the well to the bottom of the casing. Conduct a second VAP to collect water samples at 8 locations selected from the flow VAP. Locations for the flow measurements will be based on the existing video and geophysical log and, in particular, the location of the Eau Claire Shale. The locations for water quality sampling will be based on similar information, as well as the flow VAP. Water quality analytes will include VOCs, manganese, iron, radium, and chloride.

b) Task 2: Technical Memorandum & Recommendations
Prepare a technical memorandum after the VAP and water quality results are obtained describing the existing flow rates and water quality from the shallow and deeper sandstone aquifers. Provide a recommendation about whether to proceed with the next element of the investigation. Meet with Madison Water Utility to discuss this information and assist with the decision about whether to proceed to the pumping test.

3. Element 3: Pumping Test
If the VAP indicates acceptable water quality and well production rate, determine whether the Eau Claire Shale would provide adequate protection of the lower aquifer from the PCE contamination. The VAP will provide important information in this regard (i.e., the lack of PCE in the lower aquifer would be an indication that the Eau Claire Shale is providing significant protection of the lower aquifer). Conduct the Element 3 pumping test outlined below to provide additional reliability in this assessment.

a) Task 1: Monitoring Well Installation
In order to obtain sufficient information during the pumping test to evaluate the potential for PCE to move from the shallow aquifer, through the Eau Claire Shale, into the lower aquifer and Unit Well 15, it will be necessary to install monitoring wells and to measure their water levels during the test. This scope of work includes installation of one well

nest, with one of the wells installed in the upper aquifer above the shale, and one well in the lower aquifer below the shale.

b) Task 2: Pumping Test
Conduct a pumping test on Unit Well 15. The proposed scope and budget shall include: removing the pump, placing a test pump in the well within the lower aquifer, placing a packer at the Eau Claire Shale to isolate the lower aquifer from the upper aquifer, and pumping Unit Well 15 from below the Eau Claire Shale only, for approximately 36 hours. Water levels will be monitored in Unit Well 15, the 2 monitoring wells, and possibly other existing shallow wells, if any are determined to be sufficiently close to Unit Well 15. Discharge water to the sanitary sewer. Replace and disinfect the pump after the test.

c) Task 3: Technical Memorandum
Prepare a technical memorandum after the pumping test summarizing and documenting the results, including the level of protection the Eau Claire Shale provides to the lower aquifer. Meet with Madison Water Utility to interpret and discuss this information and assist with the Utility's decision about whether or not to implement casing extension as an alternative to treatment.

D. <u>Schedule:</u>

1. Tasks and Elements of Alternative 1, PCE source evaluation, will be complete by the following dates:
   a) Paper Survey – March 30, 2012
   b) Field Screening Investigation – May 11, 2012
   c) Groundwater Investigation – July 27, 2012
2. Tasks and Elements of Alternative 2, Casing Extension Assessment, will be complete by the following dates:
   a) Feasibility Evaluation – March 16, 2012
   b) Vertical Aquifer Profiling – June 15, 2012
   c) Pumping Test – September 7, 2012
3. The Consultant shall maintain an updated project schedule throughout the work.

E. <u>Costs:</u>

1. Controlling the total project cost is critical to project success.
2. The consultant is to be keenly aware of project costs, the cost impact of decisions made, and of how to keep project costs within budget.

3. Any change in the project cost estimate shall be promptly communicated to the Water Utility for analysis.
4. The consultant shall remain responsible to maintain the project within the budget.

F. Communications/Meetings:

1. Regular and routine communication between all team members is expected and required throughout the project.
2. Meetings:
   a) A project kickoff meeting will be held prior to starting work.
   b) Regular project meetings of the project team will be held at the Water Utility. Schedule will be established at the kickoff meeting.
   c) Public meetings (Citizen Advisory Panel and Water Quality Technical Advisory Committee) will be scheduled as work is completed.

G. Products:

All products shall be submitted electronically in addition to the paper copies.

IV. WATER UTILITY PROJECT TEAM

Water Utility Project Manager and point of contact:

Joseph L. DeMorett, P.G.
Water Supply Engineer
608-267-4902 (office)
608-658-5374 (cell)
jdemorett@cityofmadison.com

V. PROPOSAL

A. General:

1. The proposal will be limited to no more than **Ten (10) pages**
2. Figures, drawings, schedules and charts plotted on 11x17 paper shall be counted as one page each. Do not provide extensive text and/or narrative on 11x17 paper. Do not print 11x17 paper two sided.
3. Font shall be no smaller than 11 point.
4. Margins should be a minimum 0.75-inches left and right and 0.5-inches top and bottom.
5. Submitted resumes shall not exceed one page in length per team member. Resumes are not counted in the page total.

B. Statement of project understanding:

1. Provide a one page original statement of project understanding for the Unit Well 15 project.
2. Statement shall cover but not be limited to:

a) Understanding of need for the project
b) Project objectives
c) Project challenges
d) Permitting
e) Public participation

C. Public Participation:

1. Provide a one page public participation and communication plan summary for the Unit Well 15 project
2. Document qualifications and experience of the proposed team in public participation

D. Statement of Qualifications and Work History:

To include but not necessarily be limited to:

1. Detailed description of the proposed Project Team
2. Documentation of qualifications of the proposed project team on projects of similar size and complexity.
3. Demonstration of working knowledge of Wisconsin DNR administrative code and permitting requirements.
4. Project History:
   a) List of completed similar projects within the last 5 years. Dates for each project shall be clearly indicated.
   b) Include name of Project Manager for each project.
   c) Client name and phone number.
   d) Project Fee History:
      (1) Initial fee dollar value
      (2) Value of any amendments to the initial fee and justification for the change.
   e) Provide the actual schedule for the project.
   f) Provide any public participation activities with the project
   g) Provide any relevant details, descriptions, or explanations for each project as warranted to allow the City to evaluate the Firms performance history.
5. Include a detailed outline of the Proposed Scope of Work for this project.
6. Proposed Subcontractors with their portion of the work identified and a listing of the appropriate qualifications and references with phone numbers.
7. Project Schedule:
   a) Include a detailed project schedule
   b) Schedule shall be a Gantt chart
   c) Include sufficient detail to demonstrate a thorough understanding of the process to complete the work.
   d) The quality and detail of the submitted project schedule will provide an indication of the firms experience in completing

projects of this type and will be used in the evaluation of the proposal.

8. Quality Assurance/Quality Control:
   a) Include a brief description (1/2 page or less) of your Firms quality control policies and procedures.
   b) Provide a description of the quality control process proposed for this project. Include milestones
   c) Designate the team member on the team description who will be responsible for quality control and provide a listing of the designated individual's qualifications in quality control on similar projects.
9. Provide names and phone numbers of a minimum of three references familiar with the proposed Project Manager and other proposed key team members. Reference should have direct experience with the Project Manager on projects of similar complexity and size.
10. Provide documentation of effective project management, project cost control, and project communications on completed projects of similar nature and scope.
11. Work Samples:
   a) Provide examples of two (2) projects completed by your Firm within the last five (5) years similar in type, size and complexity. Provide a maximum of 3 drawings no larger than 11" x 17" for each project. The purpose of the drawings is to demonstrate the quality of work to be expected from your Firm.
   b) Describe the proposed Project Manager's function and role on each of the two submitted work samples.
   c) The sample drawings shall be from one of the projects listed and documented as noted above.
   d) The sample drawings are not included in the sheet count for the proposal.
12. Projected Hours and Estimated Costs -
   a) Submit a detailed breakdown of the estimated hours for each phase of the work by discipline and firm.
   b) Submit the estimated hours and associated costs in a separate sealed envelope clearly marked **"Projected Hours and Estimated Costs"**.
   c) The hour and cost estimate is not included in the page count for the proposal.
   d) The projected hours and estimated costs will not be used in the initial evaluation of the qualifications of your Firm for this project. The selection committee reserves the right to review the projected hours as a point of additional information if no clear selection can be made based on the proposals.

e) Following selection of the successful Firm, these submitted costs will be used as a starting point to negotiate a Contract for the work.

E. Interview:

1. Madison Water Utility reserves the right to make a selection based solely on the information contained in the submitted proposal. If no clear choice can be made based on the proposals, Madison Water Utility reserves the right to either interview selected Firms or request additional information to help in determining the most qualified Firm.
2. Interview format (if used):
   a) 30 minute presentation
   b) 30 minutes for questions and answers
   c) The proposed Project Manager shall lead the presentation.
   d) Presentation team shall have a maximum of three (3) people.
3. Presentation: The objective of the interview will be to clearly demonstrate the Firms qualifications to complete the project to the satisfaction of Madison Water Utility. The presentation shall be brief and concise and shall include but shall not be limited to:
   a) A presentation of details and special features of previous projects completed by members of the proposed Project Team.
   b) Information should include how the project cited was developed, how the team worked with the Owner, and how the finished product was received.
   c) Cost information should be presented for any project experience used to include fees, amendments and project change orders.
   d) A description of how the PM and the team proposes to work and communicate with the Utility throughout the project.
   e) Outline of the public participation process.
   f) A description on how the team will manage the design and control the costs on this project.
   g) A presentation on how the team will handle quality control and quality assurance for the project.
   h) Following a review of the submittals, the Water Utility reserves the right to establish specific requirements and content for the interview to further aid in the determination of the Firms qualifications.
   i) Questions: The selection team may prepare a list of standard questions for the interview. Additional questions may be developed based on the Firm’s proposal to clarify information submitted.

F. **Submittal:** Submit four (4) copies of the proposal to the following address:

Joseph DeMorett – Water Supply Manager
Madison Water Utility
119 East Olin Avenue
Madison, Wisconsin 53713

The submittal shall be clearly marked:

"Proposal for Engineering & Hydrogeological Services for Unit Well 15 – Contaminant Source and Casing Extension Assessments"

Email or fax submittals are not permitted and will not be accepted.

G. **Due Date and Time:**

1. The submittal is due to the Water Utility no later than **4:00 p.m. Friday January 6, 2012.**
2. The Water Utility is not responsible for late deliveries.
3. Submittals received after the designated time shall be returned unopened.

VI. SELECTION PROCESS

A. **Qualifications:**

The selection will be based on demonstrated qualifications with projects of similar size and complexity, capability of working as a team with Water Utility staff toward the successful completion of the project, and a demonstrated ability to successfully work within the City of Madison contracting process and engage the public in the process.

B. **Selection Committee:**

The Selection Committee shall be made up of 3 or 4 members of the Water Utility staff and potentially an independent outside individual.

C. **Ranking:**

1. Submittals will be ranked based on the following categories:
   a) Project understanding
   b) Experience/Qualifications
   c) Proposed Project Team
   d) Proposed Project Schedule and Scope of Services
   e) Understanding of WDNR administrative code and permitting
   f) Public Participation experience and expertise
   g) Quality of Two Work Samples
   h) Project Management History and Plan
   i) Cost Estimating and Cost Control History

2. Estimated hours and costs
   a) If necessary, after short listing the submittals, the evaluation team will review submitted estimated hours and costs.

b) The detail provided in the estimated hours and costs breakdown will be used to further evaluate the consultant's project understanding and project approach.

3. Interview (If necessary) - Firms will be judged in the interview based on the following:
   a) Project Team Presentation and Organization
   b) Demonstration of Project Understanding and Project approach
   c) Project Management/Cost Control Plan
   d) Completed Projects
   e) Questions and Answers

4. Final Selection:
   a) The Firm judged to be the most qualified based on all of the information presented and evaluated will be selected by the committee.
   b) The selected Firm shall be notified in writing. No other method shall be considered to be official notification of selection by the Water Utility.
   c) The selection of the committee shall be final.

5. Projected Schedule (Subject to change)
   a) January 6, 2012 – submittal due date
   b) January 10, 2012 – selected Firm recommended to the Water Utility Board
   c) January 17, 2012 – Selection confirmed by Common Council and contract awarded
   d) Week of January 23, 2012 – Detailed scope of services and contract finalized and signed
   e) Week of February 6, 2012 – Estimated start work

VII. CONTRACT

A. City Contract:

1. The Firm that is recommended for award of this Contract will be required to negotiate an equitable contract with the Water Utility based on the approved Scope of Work.
2. The selected Firm will then enter into a standard City of Madison Contract for Purchase of Services. A copy of this standard contract is attached for your review.

B. Recommendation and Contract Execution:

1. The selected Firm will be recommended to the Board of Water Commissioners who will recommend the Firm to the Common Council of the City of Madison.

2. Following the approval of the Common Council, a contract will be executed and the successful Firm will receive a Notice to Proceed.

VIII. QUESTIONS

Questions concerning this Request for Proposals should be directed to:

Joseph L. DeMorett, PG
Water Supply Manager
Madison Water Utility
119 East Olin Avenue
Madison, WI 53713
608-267-4902 (office)
608-658-5374 (cell)
jdemorett@cityofmadison.com

IX. ATTACHMENTS

Attachment 1: Unit Well 15 Geologic Log

Attachment 2: Unit Well 15 Construction Report

Attachment 3: Unit Well 15 Geophysical Log

Wisconsin Geological & Natural History Survey
3817 Mineral Point Road, Madison, WI 53705

WG&NHS Log No: DN -930

Title: Geologic Log

Site Name: Madison City Well #15

Owner: City of Madison
Address: 523 E. Main Street
Madison, WI 53703
Driller(s): Milaeger Well & Pump Co., Inc.
Engineer:

Location: SW, NW, NW, SE, SW, SE, SW, Sec. 28, T8N, R10E

Topo Name: Madison East
Sample Nos.: 258090-258179
Perm No.: 77135
WI-Unique ID#: BF515

Samples Rec'd:
9/16/1965 300' to 750'

Studied By:
Janet M. Olmstead 300' to 750'

County: DANE
Completed: 11/2/1965
Field Check: WG&NHS - KMF
6/27/88
Elevation: 886 ±0'
Well Use: municipal
Static Level: 47'

Pump Test:
Pumped at 2400 GPM for 24 hrs. with 94 ft. of drawdown.
On 11/2/1965

Drill Hole Dimensions		
Diameter	From	To
30"	0'	125'
29"	125'	172'
22"	172'	753'

Drilling Method		
Method	From	To

Grout		
Kind	From	To
Cement	0'	172'

Open Interval Characteristics			
Diameter	From	To	Opening Type
22"	172'	753'	bedrock

Casing & Liner Information				
Diameter	From	To	Casing	Weight
24"	+2'	172'	Steel	
30"	0'	125'	Steel	

Types of records available for this site (* indicates indexing term):

Caliper log, Gamma log, Spontaneous potential log, Normal resistivity log, Single-point resistivity log, *geophysical log(s) exist, Well construction report - original, Geologic log, *municipal well, *subsurface boring (non-core) site, Fluid conductivity log, Detailed hour-by-hour pump test data, Fluid temperature log, Drill cuttings available, *lower drillhole samples only

Formations:

Quaternary, Wonewoc Formation, Eau Claire Formation, Mount Simon Formation

Log Comments:

Pumphouse is located about 60 feet west of the former Sunnyside School building.
Test hole (DN-916) for Well #15 was located about 10 feet to the southeast of Well #15.
Pumping test log, alignment test to 329.375', and water quality test available.
Samples 0-300' were destroyed by vandals on the night of 9/8/1965.

This geologic log has undergone basic review. Some information may need to be added or further reviewed. If essential information is missing or incorrect, please contact WG&NHS at rpeters@wisc.edu or (608)-263-7387.

Version tracking:

4/1/1966 Analog version
3/8/2010 Initial digital version

Site Name: Madison City Well #15

Title: Geologic Log

	Depths	Graphic	RockType	Color	Mode	Range	Miscellaneous Characteristics
Quaternary	0-123		NO SAMPLE				Driller reports drift.
Wonewoc Formation	123-225		NO SAMPLE				Driller reports sandstone.

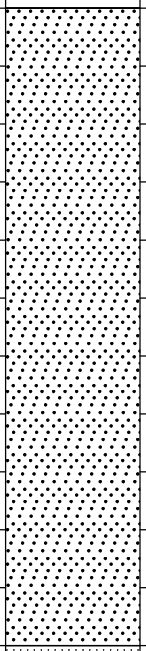
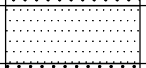
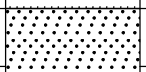
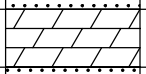
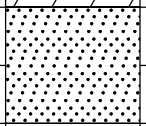
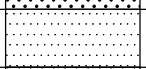
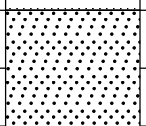
Site Name: Madison City Well #15

Title: Geologic Log

	Depths	Graphic	RockType	Color	Mode	Range	Miscellaneous Characteristics
Wonewoc Formation	123-225		NO SAMPLE				Driller reports sandstone.
Eau Claire Formation	225-250		NO SAMPLE				Driller reports sandstone. Eau Claire Formation boundaries are based on the gamma log run by WG&NHS.
Mount Simon Formation	250-300		NO SAMPLE				Driller reports sandstone.

Site Name: Madison City Well #15

Title: Geologic Log

	Depths	Graphic	RockType	Color	Mode	Range	Miscellaneous Characteristics
	250-300		NO SAMPLE				Driller reports sandstone.
Mount Simon Formation	300-305		sandstone	gray orange	M	Fn/C	Rounded. Fair sorting. Poor dolomite cement and very poor limonite and pyrite cement. Little pink orange dolomite and iron stain. Trace green shale and silt.
	305-310		sandstone	gray orange	M	Fn/C	Rounded. Fair sorting. Poor dolomite cement and very poor limonite and pyrite cement. Little pink orange dolomite and iron stain.
	310-315		sandstone	gray orange	M	Fn/C	Rounded. Fair sorting. Poor dolomite cement and very poor limonite cement. Little pink orange dolomite and iron stain.
	315-320		sandstone	gray orange	M	Fn/VC	Rounded. Fair sorting. Poor dolomite cement and very poor limonite cement. Little pink orange dolomite and iron stain.
	320-325		sandstone	light gray orange	M	Fn/VC	Rounded. Fair sorting. Poor dolomite cement and very poor limonite cement. Little pink orange dolomite and iron stain. Trace green shale.
	325-330		sandstone	light gray orange	M	Fn/VC	Rounded. Fair sorting. Poor dolomite cement and very poor limonite cement. Little pink orange dolomite and iron stain.
	330-335		sandstone	gray orange	M	Fn/VC	Rounded. Fair sorting. Poor dolomite cement and very poor limonite cement. Little pink orange dolomite and iron stain. Trace caved chert.
	335-340		sandstone	gray orange	M	Fn/VC	Rounded. Fair sorting. Poor dolomite cement and very poor limonite cement. Little pink orange dolomite and iron stain.
	340-345		sandstone	very pale yellow orange	M	Fn/VC	Rounded. Fair sorting. Poor dolomite cement and very poor limonite cement. Little pink orange dolomite and iron stain.
	345-350		sandstone	gray orange	M	Fn/VC	Rounded. Fair sorting. Poor dolomite cement and very poor limonite cement. Little pink orange dolomite and iron stain.
	350-355		sandstone	very pale orange	M	Fn/VC	Rounded. Fair sorting. Poor dolomite cement and very poor limonite cement. Trace pink orange dolomite and iron stain.
	355-360		sandstone	very pale orange	Fn	Fn/VC	Rounded. Poor sorting. Trace pink orange dolomite and iron stain.
	360-365		sandstone	pale gray orange	M	Vfn/C	Rounded. Poor sorting. Very dolomitic cementing. Trace iron stain.
	365-370		sandstone	pale gray orange	M	Vfn/C	Rounded. Poor sorting Sandy dolomite aggregates (limonite). Little iron stain and orange dolomite.
	370-375		sandstone	pale gray orange	M	Vfn/C	Rounded. Fair sorting. Sandy dolomite aggregates (limonite). Little iron stain, orange dolomite and very pale green sandy shale.
	375-380		dolomite	pale gray orange	Fn	Fn/C	Rounded. Fair sorting. Sandy dolomite aggregates (limonie). Litle iron stain, very pale green sandy shale.
	380-385		sandstone	pale gray yellow orange	M	Vfn/C	Rounded. Poor sorting. Very poor limonite and silica cementing.
	385-390		sandstone	very pale pink orange	M	Vfn/C	Rounded. Poor sorting. Poor dolomite and silica cement. Little sandy pink orange dolomite.
	390-395		sandstone	very pale pink orange	Fn	Vfn/C	Rounded. Poor sorting. Trace dolomite, green shale and iron staining.
	395-400		sandstone	very pale pink orange	M	Vfn/C	Rounded. Poor sorting. Poor dolomite cementing. Little sandy pink orange dolomite.
	400-405		sandstone	pale gray orange pink	M	Vfn/C	Rounded. Poor sorting. Trace dolomite.
	405-410		sandstone	pale gray orange	M	Vfn/C	Rounded. Poor sorting. Trace dolomite and glauconite.
	410-415		sandstone	pale gray orange	M	Vfn/C	Rounded. Poor sorting. Very poor limonite and poor dolomite cementing. Little sandy dolomite and silt. Trace glaucontie and limonite.
	415-420		sandstone	pale gray orange mot gray orange	M	Vfn/C	Rounded. Poor sorting. Very poor limonite and poor dolomite cementing. Little sandy dolomite and silt. Trace glaucontie and limonite.

Site Name: Madison City Well #15

Title: Geologic Log

	Depths	Graphic	RockType	Color	Mode	Range	Miscellaneous Characteristics
Mount Simon Formation	420-425		sandstone	gray orange	M	Vfn/C	Rounded. Poor sorting. Very poor dolomite and limonite cemet. Much iron stain. Little sandy dolomite. Trace limonite.
	425-430		sandstone	gray orange	M	Fn/VC	Subrounded. Poor sorting. Very poor limonite cementing. Much iron stain. Trace limonite.
	430-435		sandstone	pale gray orange	Fn	Vfn/C	Subrounded. Poor sorting. Very poor limonite cementing. Little iron stain.
	435-440		sandstone	very pale orange	M	Fn/C	Rounded. Poor sorting. Very poor pyrite cementing. Little iron staining. Trace buff dolomite.
	440-445		sandstone	very pale orange	M	Fn/C	Subrounded. Poor sorting. Very poor pyrite cementing. Trace fossils.
	445-450		sandstone	very pale orange	M	Fn/C	Subrounded. Poor sorting. Very poor pyrite cementing. Trace fossils.
	450-455		sandstone	pale gray orange	M	Fn/C	Subrounded. Poor sorting. Very poor limonite cementing. Trace fossils.
	455-460		sandstone	very pale gray orange	M	Fn/C	Subrounded. Poor sorting. Very poor limonite cementing. Trace fossils.
	460-465		sandstone	very pale orange	M	Fn/C	Subrounded. Poor sorting. Very poor limonite cementing. Trace fossils.
	465-470		sandstone	very pale orange	M	Fn/C	Subrounded. Poor sorting. Very poor limonite cementing. Trace fossils.
	470-475		sandstone	very pale orange	Fn/M	Vfn/C	Subrounded. Poor sorting. Very poor limonite cementing.
	475-480		sandstone	very pale yellow orange	Fn/M	Vfn/C	Subrounded. Poor sorting. Very poor limonite cementing.
	480-485		sandstone	very pale orange	M/C	M/C	Subrounded. Poor sorting. Very poor limonite cementing. Trace buff dolomite and glauconite.
	485-490		sandstone	very pale orange	M/C	Fn/C	Subrounded. Poor sorting. Very poor limonite cementing. Trace fossils and glauconite.
	490-495		sandstone	very light gray orange	M	Vfn/C	Subrounded. Poor sorting. Very poor limonite cementing. Trace fossils, glauconite and loose dolomite.
	495-500		sandstone	very light orange pink	M	Vfn/C	Subrounded. Poor sorting. Very poor limonite cementing. Trace fossils, glauconite and loose dolomite.
	500-505		sandstone	very light orange pink	M	Fn/C	Suborunded. Poor sorting. Very poor limonite cementing. Trace pyrite cement, glauconite and fossils.
	505-510		sandstone	very light orange pink	M	Fn/C	Suborunded. Poor sorting. Very poor limonite cementing. Trace fossils.
	510-515		sandstone	very light orange pink	M	Fn/C	Suborunded. Poor sorting. Very poor limonite cementing. Trace fossils.
	515-520		sandstone	very light orange pink	M	Fn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils.
	520-525		sandstone	very light orange pink	Fn/M	Fn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, loose dolomite.
	525-530		sandstone	very light orange pink	Fn/M	Fn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, loose dolomite.
	530-535		sandstone	very light orange pink	Fn/M	Fn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, loose dolomite.
	535-540		sandstone	very light orange pink	Fn/M	Fn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils, loose dolomite.
	540-545		sandstone	very light orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils, loose dolomite.
	545-550		sandstone	very light orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils, loose dolomite.
	550-555		sandstone	very light orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils, loose dolomite.
	555-560		sandstone	very light gray orange	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils, loose dolomite.

Site Name: Madison City Well #15

Title: Geologic Log

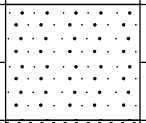
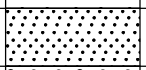
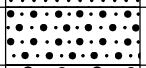
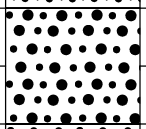
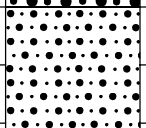
	Depths	Graphic	RockType	Color	Mode	Range	Miscellaneous Characteristics
Mount Simon Formation	560-565		sandstone	light orange	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils, loose dolomite.
	565-570		sandstone	light orange	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils, loose dolomite.
	570-575		sandstone	light orange	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils, loose dolomite.
	575-580		sandstone	pale orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils, loose dolomite.
	580-585		sandstone	pale orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils.
	585-590		sandstone	pale orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils.
	590-595		sandstone	pale orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace chert, fossils.
	595-600		sandstone	pale orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace loose dolomite, chert, fossils.
	600-605		sandstone	pale orange pink	M	M/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace loose dolomite, chert, fossils.
	605-610		sandstone	pale orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace loose dolomite, chert, fossils.
	610-615		sandstone	pale orange pink	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace loose dolomite, chert, fossils.
	615-620		sandstone	light gray orange	Fn	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace loose dolomite, chert, fossils.
	620-625		sandstone	very light gray orange	Fn	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace loose dolomite, chert, fossils.
	625-630		sandstone	very light gray orange	Fn	Vfn/C	Subangular and subrounded. Poor sorting. Very poor limonite cementing. Trace loose dolomite, chert, fossils.
	630-635		sandstone	very light gray orange	Fn	Vfn/C	Subangular and subrounded. Poor sorting. Trace chert fossils.
	635-640		sandstone	very pale red	Fn	Vfn/C	Subangular and subrounded. Poor sorting. Little mixed silty shale. Trace loose dolomite.
	640-645		sandstone	light brown	Fn/M	Vfn/VC	Subangular and subrounded. Poor sorting. Little mixed silty shale. Trace loose dolomite.
	645-650		sandstone	very pale brown	Fn	Vfn/C	Subangular and subrounded. Poor sorting. Trace chert fossils and loose dolomite.
	650-655		sandstone	light gray orange	Fn	Vfn/C	Subangular and subrounded. Poor sorting. Trace chert fossils.
	655-660		sandstone	light gray orange	Fn	Vfn/C	Subangular and subrounded. Poor sorting. Trace chert fossils.
	660-665		sandstone	light gray orange	M	Fn/C	Subangular and subrounded. Poor sorting. Trace chert fossils.
	665-670		sandstone	light gray orange	Fn/M	Vfn/C	Subangular and subrounded. Poor sorting. Trace chert fossils.
	670-675		sandstone	light gray orange	Fn/M	Vfn/VC	Subangular and subrounded. Poor sorting. Trace chert fossils.
	675-680		sandstone	very pale orange	Fn/M	Vfn/VC	Subangular and subrounded. Poor sorting. Trace chert fossils, loose dolomite, silty shale.
	680-685		sandstone	very pale orange	Fn	Vfn/M	Subangular and subrounded. Poor sorting. Trace chert fossils.
	685-690		sandstone	very pale orange	Fn	Vfn/M	Subangular and subrounded. Poor sorting. Trace chert fossils.
	690-695		sandstone	very pale orange	Fn/M	Vfn/VC	Subangular and subrounded. Poor sorting. Trace chert fossils and loose dolomite.
	695-700		sandstone	very pale orange	Fn/M	Vfn/VC	Subangular and subrounded. Poor sorting. Trace chert fossils and loose dolomite.

Wisconsin Geological & Natural History Survey
3817 Mineral Point Road, Madison, WI 53705

WG&NHS Log No: DN -930

Site Name: Madison City Well #15

Title: Geologic Log

	Depths	Graphic	RockType	Color	Mode	Range	Miscellaneous Characteristics
Mount Simon Formation	700-705		sandstone	light gray orange	Fn/M	Vfn/VC	Subangular and subrounded. Poor sorting. Trace glauconite.
	705-710		sandstone	light brown	Fn/M	Vfn/VC	Subangular and subrounded. Poor sorting. Trace quartz gravel (granules), chert, silt and glauconite.
	710-715		sandstone	dark gray orange	M	Vfn/VC	Subangular and subrounded. Poor sorting. Trace quartz gravel (granules), glauconite.
	715-720		sandstone	light red orange	M/C	Vfn/VC	Subangular and subrounded. Poor sorting. Trace quartz gravel (granules), loose dolomite, siltstone, glauconite and calcite.
	720-725		sandstone	light gray orange	C/VC	Fn/VC	Subangular. Poor sorting. Trace quartz gravel (granules).
	725-730		sandstone	light gray orange	C/VC	Fn/VC	Subangular. Poor sorting. Trace quartz gravel (granules).
	730-735		sandstone	brown & mixed	M/C	Fn/VC	Subangular. Poor sorting. Mostly hard siltstone. Trace quartz gravel.
	735-740		sandstone	brown & mixed	M/C	Fn/VC	Subangular. Poor sorting. Mostly hard siltstone and red shale. Trace quartz gravel.
	740-745		sandstone	brown & mixed	M/C	Fn/VC	Subangular. Poor sorting. Mostly hard sitlstone. Trace quartz gravel.
	745-750		sandstone	brown & mixed	M/C	Fn/VC	Subangular. Poor sorting. Mostly hard sitlstone.

Well Construction Report

WISCONSIN UNIQUE WELL NUMBER **BF515**

State of Wi-Private Water Systems-DG/2
Department Of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(Rev 12/00)

Property Owner: MADISON, CITY OF
Telephone Number: 608 – 266 – 4656
Depth: 753 FT

Mailing Address: 523 E MAIN ST

City: MADISON | State: WI | Zip Code: 53703

City of Well Location: 13 DANE | Co Well Permit No W | Well Completion Date: November 2, 1965

Well Constructor: MILAEGER WELL @ | License #: 82 | Facility ID (Public): 113022470

Address: 20950 ENTERPRISE AVE | Public Well Plan Approval#: 65-0114

City: BROOKFIELD | State: WI | Zip Code: 53045 | Date Of Approval: 03/25/1965

Hicap Permanent Well #: 77135 | Common Well #: 015 | Specific Capacity: 25.5 gpm/ft

1. Well Location

C of MADISON — T=Town C=City V=Village | Fire#

Street Address or Road Name and Number: 3900 E WASHINGTON ST #15

Subdivision Name | Lot# | Block #

Gov't Lot | or SE 1/4 of SW 1/4 of Section 28 T 8 N R 10 E

Latitude Deg. Min. Sec.
Longitude Deg Min. Sec.

2. Well Type 1 — 1=New (See item 12 below) | Lat/Long Method

2=Replacement
3=Reconstruction of previous unique well # _____ constructed in 0

Reason for replaced or reconstructed Well?

3. Well Serves # of homes and or (eg: barn, restaurant, church, school, industry, etc.)

M — M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole

High Capacity: Well? Property?

1 — 1=Drilled 2=Driven Point 3=Jetted 4=Other

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties?

Well located in floodplain?

Distance in feet from well to nearest: (including proposed)

1. Landfill
2. Building Overhang
3. 1=Septic 2= Holding Tank
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. 1=Shoreline 2= Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain 1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in . diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft)	To (ft)
30.0	surface	125
29.0	125	172
22.0	172	753

Upper Enlarged Drillhole — Lower Open Bedrock

-- 1. Rotary - Mud Circulation
-- 2. Rotary - Air
-- 3. Rotary - Air and Foam
-- 4. Drill-Through Casing Hammer
-- 5. Reverse Rotary
-- 6. Cable-tool Bit _____ in. dia
-- 7. Temp. Outer Casing _____ in. dia. _____ depth ft. Removed ?

Other

8. Geology

Geology Codes	Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
---	DRIFT	Surface	300
O-N-	SANDSTONE-FRANCONIAN	300	375
-NL-	DOLOMITE-FRANCONIAN	375	380
-N-	SANDSTONE-FRANCONIAN	380	480
O-N-	SANDSTONE-IRONTON	480	490
P-N-	SANDSTONE-GALESVILLE	490	590
-N-	SANDSTONE-EAU CLAIRE	590	715
O-N-	SANDSTONE-MT SIMON	715	730
O-NH	SANDSTONE/SHALE/SILTSTONE-	730	740
-NM	SANDSTONE/SILTSTONE-MT	740	753

6. Casing Liner Screen Material, Weight, Specification

Dia. (in.)	Manufacturer & Method of Assembly	From (ft.)	To (ft.)
		surface	

Dia.(in.)	Screen type, material & slot size	From	To

9. Static Water Level
47.0 feet B ground surface
A=Above B=Below

10. Pump Test
Pumping level 141.0 ft. below surface
Pumping at 2400. GP M 25.0 Hrs

11. Well Is: Grade
0 in. A=Above B=Below
Developed?
Disinfected?
Capped?

7. Grout or Other Sealing Material

Method / Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
	surface		

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?

If no, explain

13. Initials of Well Constructor or Supervisory Driller — Date Signed

Initials of Drill Rig Operator (Mandatory unless same as above) — Date Signed

Additonal Comments?
Owner Sent Label? Y
Variance Issued?
More Geology?

WGNHS Geophysical Logs

WELL ID: *DN-930* **WELL NAME:** *MWU #15*

DATE: **LOCATION:** *Sec28, T8N R10E*

Quarter, Section, Township, Range/ LAT-LONG/ WTM

County: *Dane* **Elevation:** *886 ft*

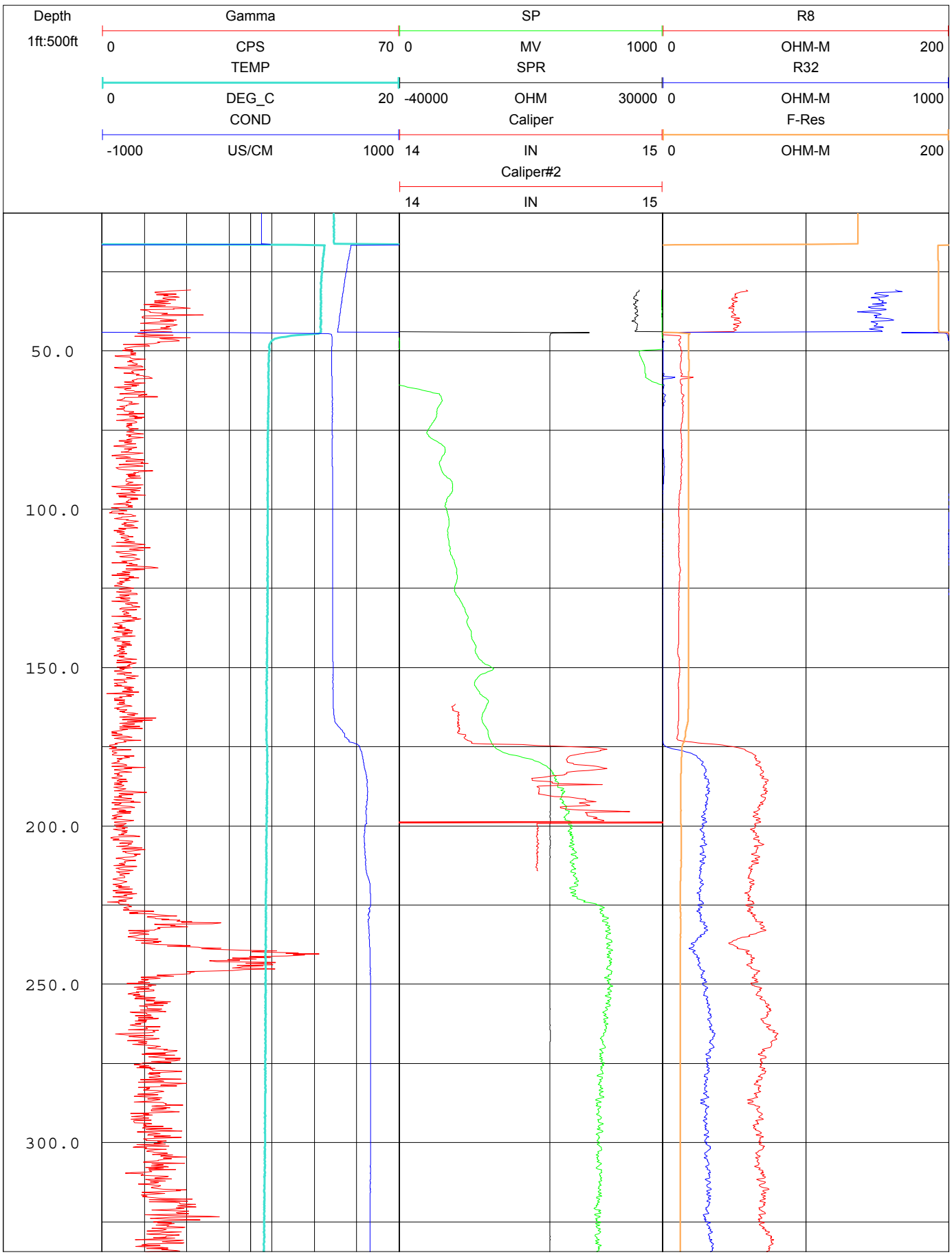
Well Depth (Logger): **Logged by:**

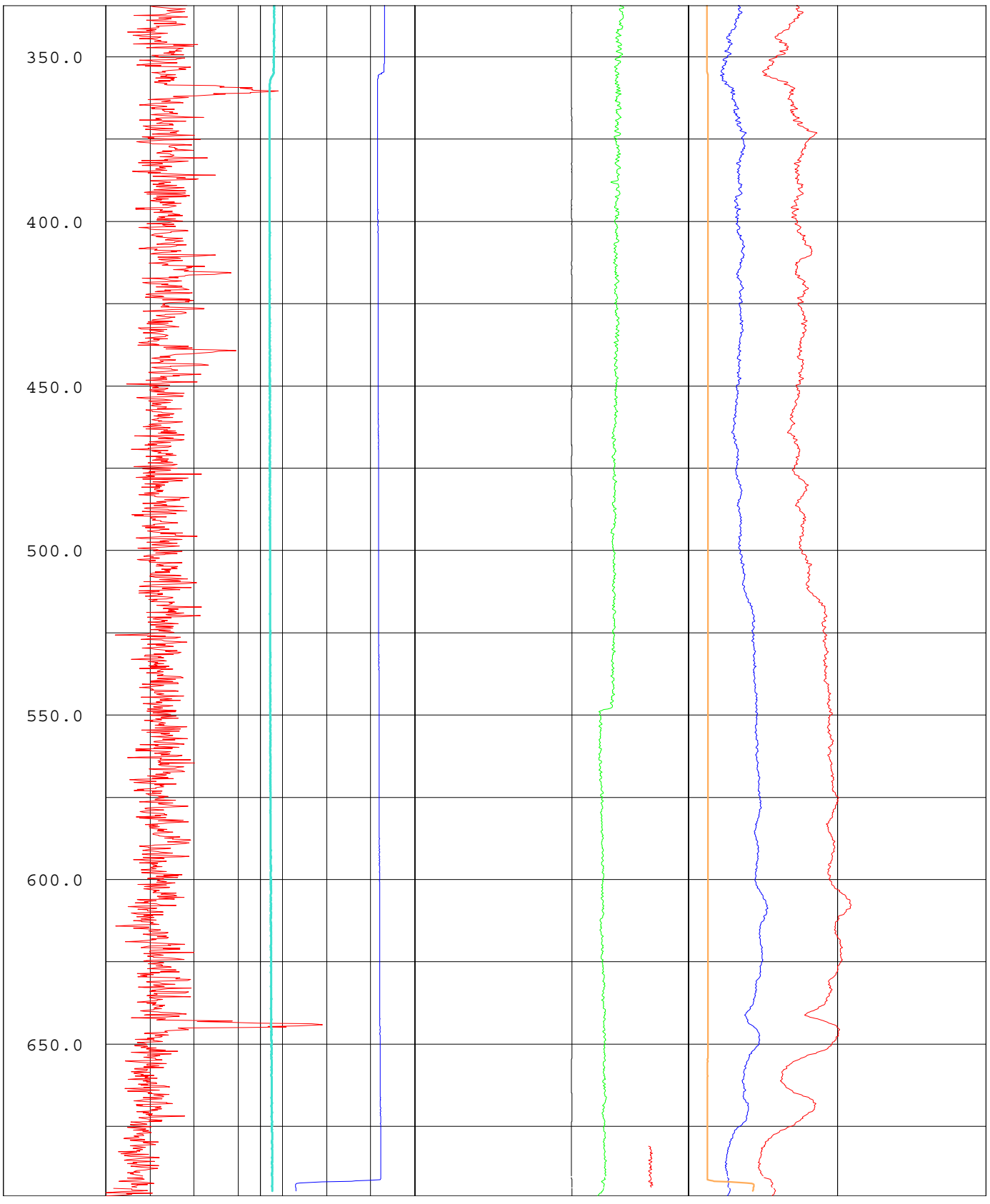
Depth to Water: **Casing Depth:** **Casing Stick-up:**

Comment:

LOGS COLLECTED:

Gamma	X	Fluid Conductivity	X
Caliper	X	Flow Meter- HeatPulse	
Single Point Resistivity	X	Flow Meter- Spinner	
Self Potential	X	Optical Borehole Imager	
Normal Resistivity	X	Acoustic Borehole Imager	
Fluid Temperature	X	OTHER:	




350.0
400.0
450.0
500.0
550.0
600.0
650.0