



July 13, 2011

Mr. Lawrence Lynch
Wisconsin Department of Natural Resources
PO Box 7921
Madison WI 53707-7921

RE: Proposed High Capacity Well
Long Property
Town of Utica, Wisconsin

Dear Mr. Lynch:

At the request of members of Save Copper Creek, RJN Environmental Services, LLC ("RJN") has reviewed the draft Environmental Assessment ("EA") and comment summary and response, prepared by you, as well as the high capacity well application and other available information on the hydrogeology in the vicinity of the proposed well location, shown on Figure 1. Additionally, this summary is enhanced by a visit to the site, several years ago.

Environmental Assessment

The EA completed by the WDNR is a statutory requirement for proposed wells located in a Groundwater Protection Area ("GPA"). In this case, the GPA is defined by any site within 1,200 feet of the trout stream. The WDNR has a great deal of authority with respect to high capacity wells in GPAs, ranging from establishing approved pumping rates to the ability to outright decline to issue an approval.

The EA for the Long application appears to have relied mainly on two considerations:

1. The calculated reduction in base flow for the stream; and
2. The presence of shale aquitards, protecting surface water and shallow groundwater from adverse impacts caused by pumping at depth.

Base Flow

The calculation in the loss of base flow to the creek is a very simple mass balance equation. Essentially, a measurement of stream flow was taken, and the proposed pumping rate was deleted from that, and a percentage of base flow reduction was calculated. However, in the case of the Long application, only a single stream flow measurement was taken, whereas there would be a large variation in flows due to the small size of the basins, in which case there could be times when the fishery is very sensitive to reductions of flow. Additionally, this is a gross estimate. The pumping will be centered on a small portion of the stream. This would likely

result in an area where the groundwater discharge to the stream is greatly reduced, resulting in a significant increase in stream bed temperature, potentially causing damage to trout redd beds.

Because of the risk to a healthy, vital habitat, it would be expected that a cold water fisheries biologist would have contributed significantly to that portion of the EA; however, there was no indication of any substantive input from a person with such qualifications.

Hydrostratigraphy

As indicated above, the WDNR appears to have based much of their conclusions on the presence of aquitards, mainly in the form of shale layers. An aquitard is a layer of very low permeability. As such, pumping groundwater from below an aquitard can result in minimal impacts to shallow groundwater and surface water resources above it. The assumption by the WDNR is that the springs at the Long property are seepage springs, meaning that the groundwater is flowing laterally along the upper surface of an aquitard, and discharging out the side of the hill.

However, it was RJN's observation during the site visit that upwelling springs were present on the property near the stream, rather than along the slopes of the hills. This indicates that they are not likely seepage springs, and that there is an upward groundwater gradient in this area.

Another concern is the WDNR's understanding of the stratigraphic sequence at the Long site, relative to the strata indicated in well construction logs. As indicated in the EA, the logs show an irregular stratigraphic sequence that includes layers of shale. However, a variable topography is absent from that analysis. It is very difficult to locate wells precisely from construction logs, as they only give locations in terms of quarter-quarter sections. Even with aerial photographs, locating the exact sites is difficult. However, based on a review of the available aerial photos and topographic map, it appears that most development is on the ridges, rather than in valleys.

Figure 2 shows a very generalized conceptualization of the area. After reviewing the quarter-quarter sections that contain wells, it was found that most of the well locations could be at least 250 feet higher in elevation than the location where Mr. Long proposes to construct his well. It is therefore likely that most of the shale layers shown on well construction logs are actually at higher elevations than the topographic elevation of the Long site, and therefore will not indicated strata that would provide protection from deeper drilling. Related to this, there is no documentation or study to support a conclusion that the depth of the well will result in a reduced impact to surface waters.

Finally, the presence of shale does not necessarily indicate an aquitard. Wells were found that were actually finished in shale, meaning that the shale is transmitting water. The following wells, all located within approximately 2 miles of the Long property, are completed fully within shale units:



- TU728
- UF139
- CX664
- TZ437
- KB517
- MK780
- RV314
- WL413
- SH450
- UD423
- UZ220

Clearly, the shale units in this area are capable of transmitting water.

Public Trust Doctrine

As I am sure you are aware, the Wisconsin Supreme Court recently ruled on a case relating to high capacity well approvals. The ruling effectively applies the Public Trust Doctrine to the high capacity well approval process when surface waters of the State could be impacted.

Wisconsin lakes and rivers are public resources, owned in common by all Wisconsin citizens under the state's Public Trust Doctrine. Based on the state constitution, this doctrine has been further defined by case law and statute. It declares that all navigable waters are "common highways and forever free", and held in trust by the Department of Natural Resources. The WDNR's website contains a page about the Public Trust Doctrine, emphasizing the WDNR's responsibility to protect Wisconsin's surface waters. In my opinion, therefore, the court ruling, and the WDNR's own claims of responsibility, clearly applies to the Long application.

Conclusions

It is RJN's conclusion that the findings in the EA prepared by the WDNR are based on insufficient and potentially faulty analyses, in terms of effects on base flow, impacts to fisheries and hydrostratigraphy. Additionally, the well being located in a Groundwater Protection Area, combined with the application of the Public Trust Doctrine to groundwater withdrawals, certainly calls for a higher level of scrutiny.

Because of the insufficient and potentially faulty analyses, it is scientifically impossible to conclude that the well will not have an adverse impact on the surface waters and the biological communities that they support, meaning that the conclusions of the Environmental Assessment are presented without scientific merit. Consequently, this high capacity well application should not be approved with the information currently available.



Finally, the restrictions proposed on the pumping include groundwater level monitoring. A direct comparison of water levels to groundwater discharge into the stream, and the impacts to streambed temperature and stream chemistry is not possible. Consequently, the proposed monitoring will not address the potential adverse impacts.

Recommendations


Any further consideration of this high capacity well application should be based, at a minimum, on the following:

Aquifer performance test (APT). To establish appropriate pumping limitations, an APT (i.e., pumping test) should be conducted. The test should be conducted at the depth, location and pumping rate of the proposed high capacity well. Because of the complexity of the hydrogeology, the test duration should be a minimum of 5 days. During the test, shallow and deep groundwater levels should be monitored in at least one location. Stream flows in the tributary to Copper Creek, as well as on Copper Creek should be monitored, as well as stream bed temperature in both streams.

Groundwater model. Based on the data obtained from the APT, a three-dimensional numerical groundwater flow model should be constructed and calibrated. This model should be constructed using the USGS's MODFLOW, and surface waters should be simulating using MODFLOW's Stream module. After calibration, the model should be run simulating the proposed pumping, at the average daily rate.

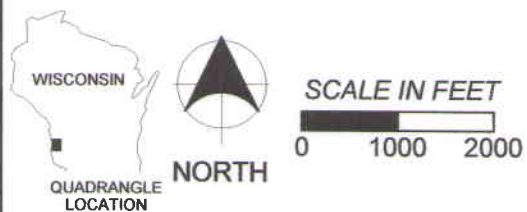
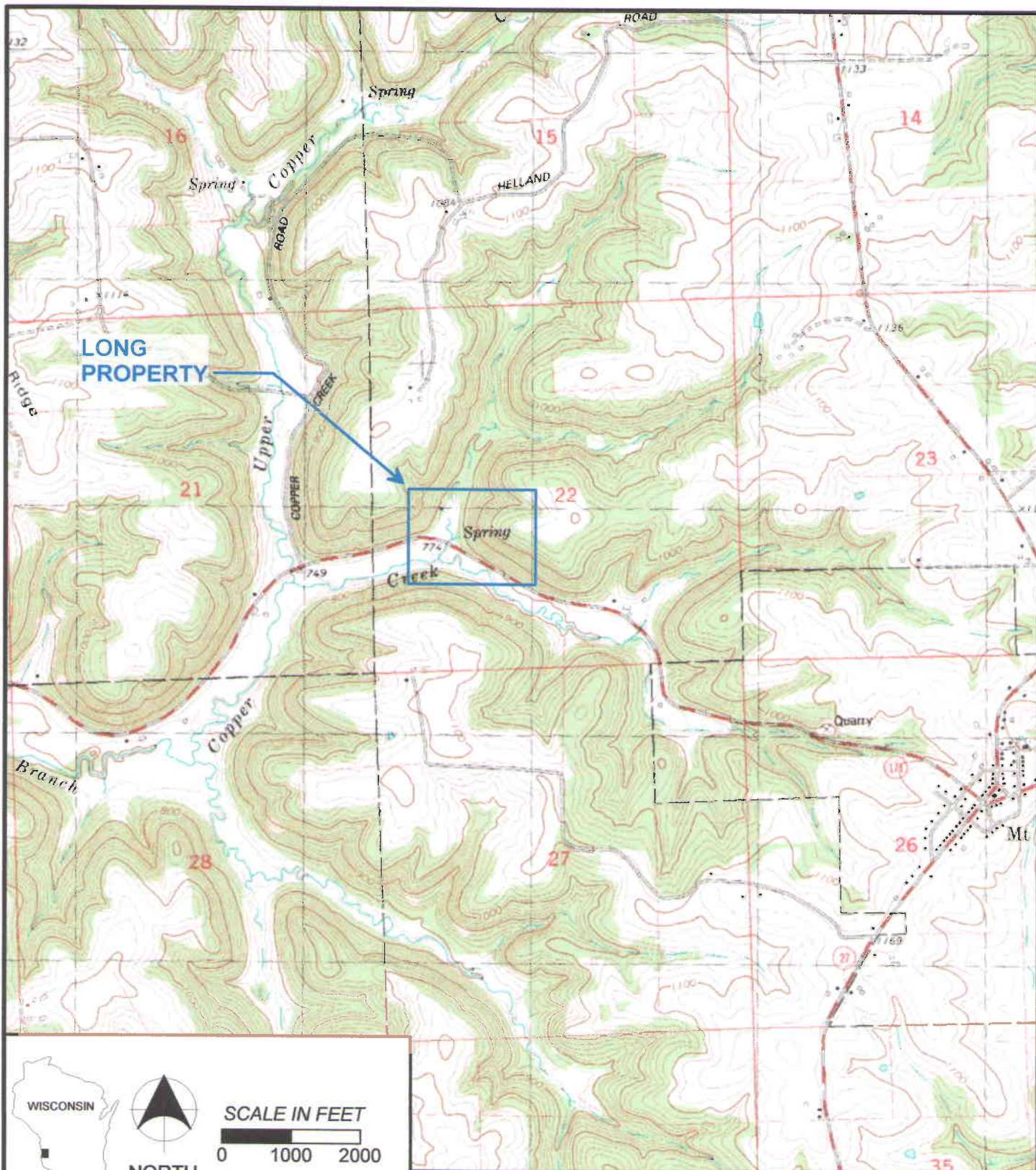
Review. The results of the APT should be reviewed by a qualified cold water fisheries biologist (from outside the WDNR) for an opinion on the potential threat to the aquatic habitat. The results of the APT and model should be reviewed by a qualified hydrogeologist (again, outside the WDNR) for accuracy in analyses, model construction and calibration. The opinions of both the biologist and hydrogeologist should then be included as part of the WDNR's well application file.

Sincerely,
RJN ENVIRONMENTAL SERVICES, LLC

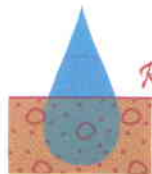

Robert J. Nauta, P.G.
Hydrogeologist

Encl.: Robert Nauta curriculum vitae
cc: Mr. Bob Van Hoesen





MAP SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, MOUNT STERLING, WISCONSIN, 1983.



R/N Environmental Services, LLC

Surface Water Studies
Groundwater Studies
Site Investigations

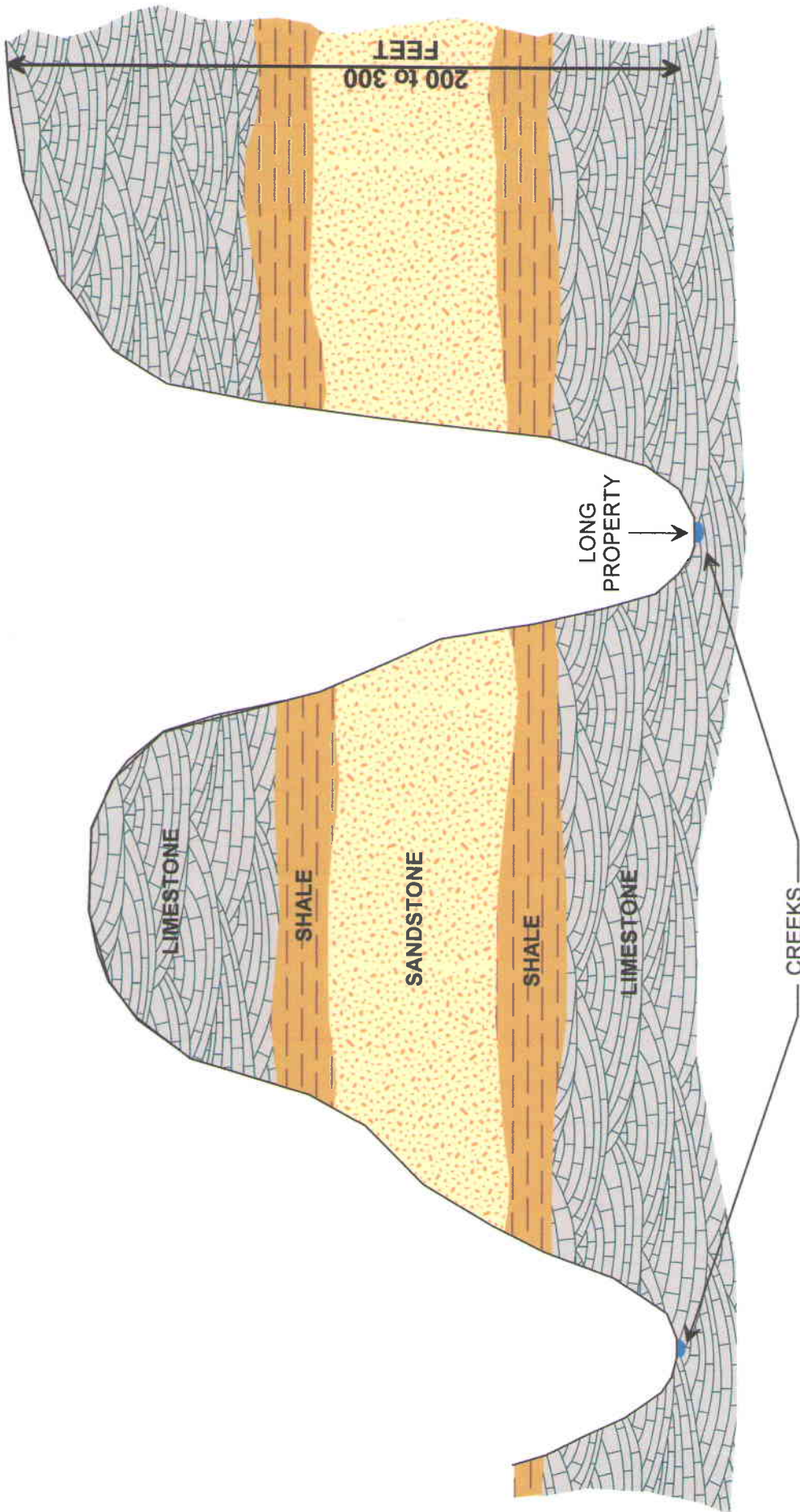
4631 COUNTY ROAD A OREGON, WISCONSIN 53575 (608) 576-3001

TOWN OF UTICA
CRAWFORD COUNTY, WISCONSIN
SITE LOCATION MAP

FIGURE

1

DRAWN BY	PROJ. No.	DATE	FILE NAME
RN	11-201	13 JUN 11	SITE LOC



NOTE: THIS IS A GENERALIZED CROSS SECTION, BASED ON A REVIEW OF GEOLOGIC LOGS IN THE AREA OF THE SUBJECT PROPERTY.

RIN Environmental Services, LLC
 Surface Water Studies
 Groundwater Studies
 Site Investigations

4631 COUNTY ROAD A, OREGON, WISCONSIN 53575 (608) 576-3001

TOWN OF UTICA
 CRAWFORD COUNTY, WISCONSIN
 GENERALIZED CROSS SECTION

DRAWN BY RN **PROJ. No.** 11-201 **DATE** 13 JUN 11

FIGURE 2

FILE X SECTION

ROBERT J. NAUTA, P.G.

*Hydrogeologist
Owner, RJN Environmental Services,
LLC*

EDUCATION

B.S. Geology, University of Wisconsin –
Madison, 1985

M.S. Hydrogeology, University of
Wisconsin – Madison, 1987

**PROFESSIONAL
AFFILIATIONS/REGISTRATIONS**

Professional Geologist – Wisconsin (35)
National Water Well Association

FIELDS OF SPECIALIZATION

- Groundwater Flow and Transport Modeling
- Groundwater Resource Evaluation & Wellhead Protection
- Soil & Groundwater Remediation
- Groundwater contamination Assessment
- Surface water/groundwater interaction

PROFESSIONAL EXPERIENCE

Mr. Nauta has nearly 25 years of professional experience in groundwater investigations, remediation and resource development. His background ranges from classical site investigations to advanced numerical analyses. His primary expertise includes extensive use of numerical and analytical applications for groundwater flow and contaminant transport simulations for remedial purposes and groundwater resource development and protection.

KEY PROJECTS

Groundwater Resource Evaluation & High Capacity Wells

- Project Manager and principal modeler for a high capacity well for springwater for major international water bottling firm. Work included oversight of staff for wetland, aquatics and groundwater studies, as well as construction of a three-dimensional model of a spring aquifer.
- Project Hydrogeologist to complete an analytical groundwater model to obtain high capacity well permit for Wisconsin Power & Light, Company, Madison, Wisconsin.
- Project Hydrogeologist to construct a three-dimensional groundwater flow model for consumptive use permit for a 45 million gallon per day groundwater withdrawal permit for Florida Power Corporation, Polk County, Florida.
- Project Manager for the construction of a three-dimensional groundwater flow model to evaluate the feasibility of rehabilitating an out-of service municipal well. Included assessment of well with respect to the proposed Wisconsin wellhead protection plan. Work completed for the Beloit Water System, Beloit, Wisconsin.
- Senior Hydrogeologist for the construction of two groundwater flow and particle tracking models for the development of a wellhead protection program for the Water and

Rivers Commission of Western Australia.

- Project manager for wellhead protection programs for two Wisconsin cities. These projects included construction of three-dimensional groundwater flow and particle tracking models to delineate wellhead protection zones, and the development of plans and strategies for the future supply needs.
- Project Manager for the construction of a groundwater flow model of Hollywood Basin (Florida), for consumptive use permit for Broward County Office of Environmental Services. Project included saltwater intrusion and wellhead protection evaluation.
- Project Manager for the construction of a groundwater flow model for consumptive use permitting and wellhead protection of a 25 million gallon per day regional wellfield for Broward County Office of Environmental Services.
- Routine wellhead protection services for the Palm Beach County Water Utilities District, West Palm Beach, Florida.
- Associate Hydrogeologist for the completion of a groundwater resource supply study for Lee County, Florida.

Modeling Related to Contaminant Studies

- Project Hydrogeologist for the construction and calibration of a

three-dimensional flow model of an industrial facility in Marinette, Wisconsin. This model was used to evaluate options for the remediation of contaminated sediments in a boat slip and turning basin of the Menominee River, as well as impacted soil and groundwater on-shore. The model was also utilized to evaluate risks associated with various options.

- Project Hydrogeologist for completion of a groundwater model to size and locate groundwater extraction and injection wells for groundwater treatment at Superfund site, for a confidential client in Clare, Michigan.
- Project Hydrogeologist to construct a three-dimensional groundwater flow and advective transport model for design of a remediation system for TCE contaminated groundwater for a Superfund project in Buena Borough, New Jersey.
- Project Hydrogeologist for the construction of a groundwater flow and transport model to evaluate contaminant migration from a landfill in Eau Claire, Wisconsin.
- Project Manager for the construction of a groundwater flow model for the design of a groundwater remediation system for a landfill for Dane County, Wisconsin.
- Project Hydrogeologist for the construction of a groundwater flow and particle tracking model for the evaluation of contaminant migration at a landfill site in Tomah, Wisconsin.

- Groundwater modeling and expert witness testimony provided pertaining to a lawsuit involving the impact of agricultural contaminants to the City of Chippewa Falls, Wisconsin municipal wellfield.

Surface Water/Groundwater Studies

- Project manager for the Lake Beulah Management District in its opposition to a shallow municipal well near the lake shore and for the development of a lake management plan
- Assist a lake management district in eastern Wisconsin in evaluating potential environmental threats to the lake's water quantity and quality
- Preparation of lake management plans for lake management districts in southeastern and eastern Wisconsin
- Project manager assisting a northern Wisconsin township in its opposition to a confined animal feeding operation

Miscellaneous Groundwater Studies

- Staff Hydrogeologist for completion of a Work Plan for RCRA facility investigation for extensive subsurface creosote contamination for a confidential client, Reed City, Michigan.
- Project Hydrogeologist for a hydrogeologic investigation at three facilities in Massachusetts for Abrasive Industries, Clearwater, Florida.

- Project Manager for an investigation and remediation of chromium contaminated soils for GB Electrical, Inc., Matthews, North Carolina.
- Staff Hydrogeologist for contamination investigation at former coal gasification site for Madison Gas & Electric Company, Madison, Wisconsin.
- Project Manager for a contamination assessment and remediation feasibility study at the site of a fuel oil spill for Oscar Mayer Foods Corporation, Madison, Wisconsin.
- Project Hydrogeologist for the completion of a current assessment summary of the hydrogeologic conditions and proposal to USEPA for continued hydrogeologic investigation methods for RCRA facility for a confidential client in Windsor Locks, Connecticut.
- Project Manager for the soil and groundwater investigation of TCE and TCA contamination from multiple, unknown sources. Project includes source identification, delineation from chlorinated compound plume from an adjacent site, and remediation system design. Work completed for a confidential PRP group in Edgerton, Wisconsin. Project included expert witness testimony.
- Project Manager for the evaluation of the impacts of a quartzite quarry on an adjacent wetland. Project included consideration of vertical and horizontal groundwater flow and tritium dating to identify source of water in wetland area for a

confidential client, Milwaukee, Wisconsin.

- Provided expert testimony at trial for contamination caused by releases associated with agricultural activities in central Wisconsin.
- Project Manager for the investigation and remediation (as necessary) of dozens of underground storage tank projects.
- Project Manager for the completion of a mechanical integrity test of injection well for a private water utility in Venice, Florida.
- Associated Hydrogeologist for the investigation of EDB Contamination of Soils and Groundwater.
- Groundwater contamination from row crop application of EDB near small town in northern Florida. At this site, Mr. Nauta analyzed travel directions and velocities of EDB in groundwater. Mr. Nauta also reviewed and analyzed groundwater treatment options and natural degradation rates of EDB. Project also included an assessment of the potential effects on municipal wells.
- Mr. Nauta investigated soil and groundwater contamination of EDB resulting from turf application and from citrus grove application. For this project, Mr. Nauta has conducted a review of past research on EDB fate and transport in soils and groundwater, and investigation of groundwater flow and contaminant transport rates and directions, a review and critique of groundwater treatment options and of

groundwater transport modeling completed for each site, the projection of future groundwater contamination levels and expert witness testimony.

Miscellaneous positions

Mr. Nauta was appointed by the President of the Wisconsin Senate to be a member of the Groundwater Advisory Committee, which developed the guidelines and strategies to implement Wisconsin Act 310, which will re-vamp Wisconsin's high capacity well regulations, as well as address issues relating to areas of extreme stress to the groundwater system in the State.

Mr. Nauta is also a member of the Board of Visitors of the University of Wisconsin-Madison Department of Geology & Geophysics. This board advises and supports faculty and students, and members are elected to the board by the faculty.