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1.0 Introduction

Ground water quantity, quality, and water rights in the vicinity of the South Heart Liginite Mine (SHLM) will be protected, in part, through a well and developed-spring survey. The well/spring survey was developed by South Heart Coal, LLC (SHC), in conjunction with the North Dakota Public Service Commission (PSC), as part of the environmental baseline studies conducted to support the mine permit application. According to section 69-05.2-17-02 of North Dakota Administrative Code (NDAC), all structures including pipes, cables, transmission lines, and wells and other water systems must be assessed to document any preblasting conditions and other physical factors that could reasonably be affected by blasting. Additionally, NDAC 69-05.2-08-06 states that all known uses of ground water and the location of all water wells within the permit and adjacent areas must be described. Existing wells and developed springs within approximately two miles of the Permit Boundary have been identified for inclusion in the survey. The survey is intended to document: 1) the condition of wells/springs and other ground water systems used for human, animal, or agricultural purposes; 2) the quantity and quality of water where readily available, prior to mining activities (NDAC 69-05.2-17); and 3) the known ground water uses and location of all water wells within the Permit and adjacent areas (NDAC 69-05.2-08-06). However, the survey is limited to the determination of surface conditions when other data are not readily available.

2.0 Identification of Wells and Developed Springs

Wells and developed springs within two miles of the Permit Area were identified through: 1) a search of the North Dakota State Water Commission (SWC) databases available online (SWC 2008), 2) certified mailings to all property owners within the survey area, and 3) follow up phone calls. The elements of the program are described below.

2.1 State Water Commission Databases Search

Wells within two miles of the Permit Area were initially identified through a search of the North Dakota SWC online databases (SWC 2008). The SWC manages water resources-related information in multiple databases and are available for public access via the internet. The SWC databases that were searched for the certification survey included: 1) groundwater/surface water; 2) private contractor logs; and 3) water permits. The databases included well records for United States Geological Survey (USGS) wells, some of which may have been turned over to property owners in

the vicinity of the SHLM for water supply use. Available information from the databases varied from well to well but generally included some or all of the following:

- Limited well completion information;
- Approximate well location;
- Borehole log;
- Well owner at the time of well installation; and
- Driller/well installer.

No information on developed springs was available in the databases. Database queries were performed in February 2008 (SWC 2008). Monitoring or observation wells were not included as part of the well certification program because they are not used for water supply purposes..

2.2 Certified Letter Mailings

All land owners within two miles of the Permit Area were identified and contacted about the program. While some well owner information is provided in the SWC databases, the accuracy of this information is uncertain given that property ownership may have changed. As such, a title search was performed by a local land lease acquisition and brokerage company to identify all property owners near the Permit Area. Letters were sent via certified mail to all property owners to notify them of the well/spring certification survey beginning in October 2007. These letters included questionnaires asking the property owners if any wells or developed springs exist on their property. In cases where the SWC databases indicated a well on a specific property, the questionnaire included the SWC information and asked the potential well owner to verify the accuracy of the information. Telephone numbers were also provided on the letters for the potential owners to call for assistance in completing the questionnaires. The letters also requested that either the completed questionnaires be returned to the sender or that the sender be contacted at the provided telephone number to relay information directly to a certification survey coordinator. The list of property owners who received letters is provided in Table 2.5-8-1. Copies of a typical letter and questionnaire are presented in Appendix A.

2.3 Follow-Up Telephone Calls

After sending the certified letter, follow-up telephone calls were made to all of the letter recipients who had not yet responded to confirm that the letter was received and reviewed, and to see if there were any questions or concerns. In some cases, the recipients went through the questionnaires during the telephone conversation and the responses were documented by the certification coordinator on a duplicate form. The telephone interview served as the sole source of documentation when no wells or developed springs existed, were abandoned, or the owner did not want to include them in the certification survey. Some of the letter recipients could not be reached by telephone or did not answer the calls. Whenever possible, messages were left when the recipient did not answer the phone, requesting that the owner provide either a written or verbal (returned telephone call) response to the letter.

Additional telephone calls were made to all letter recipients to schedule field surveys for those that had responded and to follow-up with the letter recipients who had not responded. Several calls were necessary in some cases to speak with an individual. Messages were left, if possible, when the recipient did not answer the phone. Some recipients could not be reached and messages could not be left. A record of communications with each property owner is provided in Table 2.5-8-1.

3.0 Field Surveys

Following identification of wells and developed springs through the certified mailing program, owners are contacted to perform a field survey. Field surveys are conducted on all active, non-monitoring wells where the well is accessible and the owner chooses to participate in the program at this level. The purpose of the field certification is to:

- Document the location, condition, and construction of the well/spring including pump and plumbing details;
- Document the type and frequency of use;
- Measure water levels or flow, if possible;
- Perform limited pumping tests on wells to document well yields and pumping capacities; and
- Collect ground water samples for water quality analysis.

The first part of the field survey includes documentation of the following well/developed spring information:

- Name and address of owner;
- Location (coordinates, legal, and relative to landmarks);
- Use (domestic, stock, industrial, irrigation, monitoring, etc.);
- Construction;
- Photographs or sketches of the wells/developed springs and their piping/delivery systems; and
- Any other information the well/developed spring owner could provide.

For some wells, the above information from initial field surveys and owner interviews is the extent of the data due to various obstacles that prevent collection of additional information. These obstacles are discussed in the Challenges to Program section below.

Where possible, the next step of the field survey consists of collecting physical data from the well (e.g., pumping tests, water quality samples). To date, the measurement of water levels has not been possible at any of the wells in the survey area (see Challenges to Program below). If the well output is readily accessible to document the production capability of the well, a limited pumping test is performed. The pumping test consists of turning the pump on and taking flow measurements for approximately 30 minutes.

During the pumping test, field water quality parameters, including pH, conductivity, temperature and appearance, are recorded. Upon completion of the pump test, water quality samples are collected and analyzed for:

- Total Dissolved Solids
- Hardness
- Sodium
- Iron

- Bicarbonate
- Nitrate/nitrite
- Sulfate
- Chloride
- pH
- Sodium Adsorption Ratio (SAR) [including calcium, magnesium, and sodium cations]
- Electrical Conductivity
- Tannins and lignins
- Total coliform

4.0 Documentation

Following completion of the field survey or when no further progress can be made to complete other elements of the program, all readily available information collected on the well or developed spring is compiled in a packet. Packets for each well/developed spring included in the program are sent to each owner. The completed packets included in the program are provided in Appendix B. A map of existing wells certified to date is presented as Figure 2.5-8-1.

5.0 Challenges to the Program

The well certification program was designed to document the condition of wells and developed springs using readily available information on each well included in the program. While this goal is being met, some field information is not available for all wells and developed springs. The program is challenged by limited access to some locations and the request by some owners that a field certification not be performed. However, the challenges in completing all elements of the program for all wells/developed springs do not reduce the value of the survey in protecting ground water quantity, quality, and water rights.

Limited access has precluded detailed documentation of some of the wells. Most of the field certified wells are active, in use, wells with equipment such as pitless units or drop pipe and submersible pumps hung from well caps and plumbed to water delivery systems. In these cases, access to the interior of the well casing would require disassembly and altering the plumbing of the system. Furthermore, the well caps and plumbing on many of the well systems were corroded. Disassembly of the pitless unit, lifting of the drop-pipe and pump, alteration of the plumbing, or other actions that change the configuration of a privately owned well were considered inappropriate due to the risk of damaging the well or the plumbing system and were therefore not attempted. Additionally, some wells are located below grade in pits that may not be suitable for human entry without proper precautions. The limited access precluded measurements of water levels to date in all wells, and in some case, precluded pumping tests and water quality sampling.

Some owners have requested that a field certification not be performed on their wells. These owners decided not to participate in the program and therefore no field information was collected.

The limited well access and lack of participation in the program does not reduce the value of the survey to assist with protecting ground water quantity, quality, and water rights. The information collected from the wells and developed springs included in the program documents the condition of the wells/developed springs as best as possible. This documentation, in conjunction with data from the ground water baseline study and the ground water monitoring program described in the mine permit, can supplement the baseline conditions of the wells and developed springs (e.g., water levels) and provide a means to assess if and when impacts to ground water resources may occur.

6.0 Summary and Conclusions

As stated previously, the well and developed spring certification survey is intended to assist with protecting ground water quantity, quality and water rights in the vicinity of the SHLM. The program is designed to document the current condition and use of wells and developed springs utilizing readily available information. Documentation of pre-mining conditions of wells and developed springs provides a baseline from which to assess if and when impacts occur.

The certification survey is an ongoing process with the purpose of documenting wells and developed springs in the vicinity of the SHLM. Wells and developed springs in and adjacent to the permit area have been identified through a search of the SWC databases and written and oral communications with potential well owners. Wells and developed springs will continue to be field surveyed for

owners who request to be included in the program. Although field data such as water levels have not been measured to date due to limited well access, the program documents the condition of wells using readily available information and field data. This information, in conjunction with the data from the ground water baseline study and the ground water monitoring plan, provide a means to assess if and when impacts to ground water resources may occur.

TABLES

FIGURES

APPENDIX A

TYPICAL LETTER AND WELL/SPRING QUESTIONNAIRE

APPENDIX B

COMPLETED WELL SURVEY PACKETS