

## **PROJECT NARRATIVE**

**Bottled Water Source/Large Groundwater Withdrawal Permit LGWP-2006-0002  
Chamberlain Springs LLC  
166 Old Wolfeboro Road  
Alton, New Hampshire**

### **BACKGROUND**

Chamberlain Springs LLC has submitted documentation to the New Hampshire Department of Environmental Services (DES) requesting approval of bottled water sources and issuance of a large groundwater withdrawal permit for the withdrawal of up to 223,200 gallons per day (gpd) from three bedrock production wells. The three production wells are designated Alton 1, Alton 2, and Alton 4. The requested permitted production volume for: Alton 1 is 57,600 gpd; Alton 2 is 50,400 gpd; and for Alton 4 is 115,200 gpd.

Chamberlain Springs intends to develop a bulk spring water business using spring water that is withdrawn, stored, and transferred to tanker trucks at Chamberlain Springs' property, and subsequently transported off-site to various water bottling facilities. Chamberlain Springs property is located in Alton approximately one mile north of the junction of Route 28 and Route 11, and approximately one quarter mile northeast of the intersection of Route 28 and Old Wolfeboro Road.

The potential impact area associated with Chamberlain Springs' groundwater withdrawal consists of the area between Alton Bay in Lake Winnepesaukee and Merrymeeting Lake. Ground surface elevations in the area range from approximately 500 feet, at Lake Winnepesaukee to approximately 1,400 feet at the summit of Mt. Bet located northeast of the site. The potential impact area includes watersheds that contribute water to Lake Winnepesaukee to the west; Merrymeeting Lake and Marsh Pond to the east; and the Merrymeeting River to the southeast, south, and southwest. In general, surficial deposits which overly bedrock throughout much of the potential impact area are best characterized as a thin veneer of glacial till commonly less than 10 feet thick.

The three bedrock production wells are located on Chamberlain Springs' property next to an area known as Circle Swamp. Circle Swamp is a small pond-wetland complex that is largely fed by numerous springs located north of and within its boundary.

A hydrogeologic investigation conducted at the site included bedrock structure mapping, review of existing geologic and hydrogeologic information, photolineament analysis and fracture fabric analysis, geophysical surveys, water quality testing, test drilling and well installations, and aquifer withdrawal testing. Results of the hydrogeologic investigation formed the basis of the site conceptual model and show that three to five predominant fracture zones generally govern groundwater flow through bedrock at the site and vicinity. These fracture zones act as preferential flow paths for groundwater in the bedrock aquifer and, in some areas, groundwater residing in these fractures is at a higher hydraulic head than the ground elevation. This condition results in the formation of groundwater springs at locations where these fractures intersect the ground surface and; likewise, private water supply bedrock wells located south and west of the site that likely encounter these fractures at depth occasionally exhibit free-flowing artesian conditions.

## **WITHDRAWAL TESTING AND CONCLUSIONS**

A withdrawal test program was conducted by GZA GeoEnvironmental, Inc. (GZA) at the site from June 21, 2005 to July 22, 2005. The pumping phase of the withdrawal test program included pumping of Alton 1, Alton 2, and Alton 4 from June 28, 2005 to July 9, 2005. The purpose of withdrawal testing is to provide data to estimate long-term sustainable water quantity and quality; observe the response of the bedrock aquifer to pumping; evaluate the degree of hydraulic connection between the production wells, private water supply wells, and local springs; and assess the potential for adverse impacts to water resources and users as a result of the proposed withdrawal.

The withdrawal test was comprised of three periods, the antecedent (pre-pumping) period, the pumping period, and the recovery period. Water level measurements were collected during the test program at on-site locations consisting of bedrock monitoring wells, overburden monitoring wells, shallow overburden well points, surface water staff gages, v-notched stream weirs and pipes used to channelize flow at numerous spring locations, as well as off-site residential bedrock wells. Each of the proposed source wells were metered to maintain a constant rate during the withdrawal test and three water quality samples were collected from each production well during the pumping period. Additional sampling of spring water in the Circle Swamp area was conducted at the end of the pumping period to support a spring water designation for the project.

Withdrawal test results presented in the final report indicate that the proposed production wells (Alton 1, Alton 2 and Alton 4) can sustain a cumulative withdrawal rate of 155 gallons per minute (gpm) or 223,200 gpd. This proposed production volume was reduced from the proposed permitted production volume of 250,000 gpd included in the project's preliminary application in order to limit the potential for drawdown of groundwater levels at some of the off-site residential bedrock wells. Hydraulic and water quality data demonstrate that the production wells (Alton 1, Alton 2 and Alton 4) intersect fractures that are connected to the springs that feed and exist in Circle Swamp area. This is evidenced through a similar water quality "signature" in the production well water and spring water, as well as a slight reduction in flow discharging from Circle Swamp while pumping. In addition, five of the sixteen residential bedrock wells monitored throughout the pumping test program experienced drawdown ranging from about 8 to 34 feet.

Water quality testing results indicated that several parameters were detected in water samples collected from the production wells above state and federal drinking water quality standards including arsenic, iron, lead, uranium, radon 222 and total phenolics. Specifically, arsenic was detected in excess of the 10 parts per billion (ppb) maximum contaminant level (MCL) in groundwater collected from Alton 2 and Alton 4 at concentrations ranging from 14 to 21 ppb. Iron was detected in groundwater collected from Alton 1 between 60 ppb and 500 ppb, occasionally exceeding the secondary MCL of 300 ppb; and uranium was detected in groundwater collected from Alton 2 at a concentration of 31 ppb, in excess of its MCL of 30 ppb. The concentration of lead detected in water quality samples collected during the withdrawal testing varied widely from less than 1 ppb (detection limit) to as high as 220 ppb in a sample collected from Alton 1. Lead concentrations observed in subsequent samples collected during a prolonged withdrawal test [see below] decreased in each production well. Total phenolics was also detected in samples collected from Alton 1 and Alton 2 at concentrations of 1.1 and 1.2 ppb, just higher than the analytical detection limit of 1 ppb. In the final report, it was stated that the

range of concentrations detected for the inorganic parameters listed above are generally consistent with a naturally occurring bedrock source.

DES, however, questioned whether elevated concentrations of lead detected in water produced during the withdrawal test (in excess of the federal action level of 15 ppb) were representative of background concentrations attributable to natural sources (bedrock) at the site and vicinity. DES reviewed available in-house results of lead analysis from both community and private water supplies within Alton and neighboring towns and did not find data that supported the assumption of natural sources of lead. Subsequently, DES requested additional information be provided to confirm the hypothesis that elevated lead concentrations in bedrock groundwater within the site vicinity and geologic formation encountered are naturally occurring, as stated in the final report, prior to issuance of a large groundwater withdrawal permit.

A lead source evaluation was conducted by GZA primarily to assess whether elevated lead concentrations detected in water obtained from the production well samples were naturally occurring within bedrock at the site and vicinity. A secondary objective of this evaluation was to further assess issues related to sustainable yield and effects of withdrawals on local groundwater levels. The evaluation conducted by GZA included collection of a series of water quality samples from on-site bedrock wells and selected off-site residential bedrock wells before and during a 23-day pumping test conducted at the revised total withdrawal rate of 223,220 gpd from January 26, 2006 to February 17, 2006.

Results of the lead source evaluation reported by GZA demonstrate that lead concentrations observed in water obtained from the production wells and residential bedrock wells in the area are likely due to natural sources. The range in lead concentrations detected water collected from the site and area wells appears generally elevated above federal action levels. Additionally, the results of successive water quality samples collected for total and dissolved lead from wells that are both influenced and non-influenced by the withdrawal show that lead concentrations are not related to the withdrawal from the site production wells, rather, they are likely the result of the migration of fine particulate matter into individual boreholes.

In addition to GZA's sampling program, DES collected water quality samples from 14 off-site residential bedrock water supply wells to address concerns regarding elevated lead concentrations in drinking water. Water quality samples were analyzed for lead at the DES analytical laboratory and results indicated that drinking water from 5 of the 14 off-site locations sampled exceeded the action level for lead of 0.015 mg/L. As a result, DES Environmental Health Risk Management group provided follow-up with private residents and the Town of Alton Health Officer regarding the health related concerns with lead in drinking water.

## **PUBLIC INVOLVEMENT**

Pursuant to RSA 485-C:21, materials submitted in support of the large volume groundwater withdrawal permit (the preliminary permit application, the final report, the lead source evaluation, and supplemental submittals) and DES comments and responses were sent to the municipalities and public water suppliers in the potential impact area. The entities that were sent copies of the above-referenced materials (via certified mail) included the Town of Alton, the Town of New Durham and Alton Water Works.

In a letter dated November 29, 2004, the Town of Alton requested a public hearing following submittal of the preliminary permit application, and DES subsequently held a public hearing at the Alton Town Hall on January 5, 2005. At the hearing, a project summary was presented, oral testimony was recorded and a question and answer session was held. In a letter dated December 27, 2004, owners of the Merrymeeting River Mobile Home Park provided comments on the preliminary application regarding the impact of the proposed withdrawal on water resources, local development and potential contaminant sources; and questions about the mechanism used to assess for adverse impacts during operation of the withdrawal and ability to reduce withdrawals based on those observations. In a letter dated February 2, 2005 (within the 45-day written comment period following the public hearing), the Town of Alton's consultant provided technical comments on the preliminary permit application to DES. The comments presented by the Town's consultant were consistent with those previously submitted to the applicant in a preliminary application response letter prepared by DES. Oral and written testimony were incorporated into DES' review of the preliminary application and used to modify the proposed withdrawal test program.

In a letter dated September 20, 2005, the Town of Alton requested a public hearing following submittal of the final report, and DES subsequently held a public hearing at the Alton Town Hall on October 17, 2005. At the hearing, results of the withdrawal testing were reviewed, oral testimony was recorded and a question and answer session was held. No technical comments were provided during the testimony at the hearing and no written comments were received by DES within the 45-day written comment period following the public hearing.

Following submittal of the lead source evaluation report by the applicant in April 2006, DES contacted the municipalities and public water supplier in the potential impact area to determine if they had any questions or further input to the evaluation. None of the entities responded with comments (verbal or written) regarding the evaluation or its conclusions.

No other public meetings were requested or held regarding the application for the large groundwater withdrawal permit.

### **LARGE GROUNDWATER WITHDRAWAL PERMIT MONITORING, REPORTING AND WITHDRAWAL REQUIREMENTS**

The large groundwater withdrawal permit requires the permittee conduct a water level and water quality monitoring program that includes monitoring of off-site residential bedrock wells, off-site bedrock monitoring wells, on-site bedrock monitoring wells, on-site overburden monitoring wells, on-site surface water level monitoring points, on-site stream flow gaging stations and wetlands monitoring. General monitoring requirements are summarized below.

- Existing Bedrock Well Users - The permit requires that a network of 14 off-site bedrock wells (12 of which are residential water supply wells) and six on-site bedrock wells are monitored to assess the potential for and/or detect the occurrence of adverse impacts.
- Overburden and Surface Water - The permit requires that ten on-site overburden wells, nine surface water gages, three well points are monitored to assess the potential for and/or detect the occurrence of adverse impacts.

- Wetlands - The permit requires the permittee to establish a wetland monitoring and reporting program to assess the potential for and/or detect the occurrence of adverse impacts surrounding Circle Swamp via the observation of three wetland plots and three vernal pool sites.

The large groundwater withdrawal permit requires reduction in withdrawal rates if:

- Trigger water levels are observed in residential bedrock wells monitored in the vicinity of the site; or
- Annual wetland plot monitoring indicates a change in the function and values of wetlands proximate to Circle Swamp due to the effect of the withdrawal; or
- The US Drought Monitor declares a drought condition of moderate or greater.
- The withdrawal is determined by DES to be unsustainable.

An impact mitigation program would be implemented in accordance with the large volume groundwater withdrawal permit rules once an adverse impact is verified. The program would implement actions necessary to mitigate impacts and include reduction in withdrawal volumes [see above] including cessation of withdrawal, replacement of impacted sources with an alternative water supply at no initial capital cost to the user, and increasing monitoring frequency to assess performance of the mitigation program.

An annual report shall be prepared in a hard copy format and submitted to DES by November 30 of each year as specified in the permit. The annual report shall include an assessment of the potential impacts associated with the withdrawal, a summary of trends and variability observed in the site monitoring network, and all other monitoring data and records required by the permit. This annual report will be made available to the public for review.

A complete description of monitoring and reporting requirements is presented in more detail in the attached large groundwater withdrawal permit under condition No. 5.