NORTH AMERICA

FINAL

Surface- and Ground-Water Monitoring and Mitigation Plan
Ruby Mountain and Bighorn Springs Sites
Chaffee County, Colorado

April 29, 2010

Introduction

Subject to the limitations in its permit, Nestlé Waters North America Inc. (NWNA) will divert up to 200 acre-feet of spring water per year from the Ruby Mountain Springs site via RMBH-2 and future borehole RMBH-3. NWNA, based upon extensive hydrogeologic testing performed by its hydrogeological consultant, AECOM, made a commitment on the record that the effects of the Ruby Mountain diversions will be localized, and there will be no detrimental effect to surface water, groundwater, or other users of water.

The objective of the plan is to monitor and evaluate any effects on surface water and ground water resulting from the NWNA withdrawals, provide definition of the indicators used to determine adverse impact, and identify any necessary mitigation steps.

To provide a baseline characterization of hydrogeologic conditions, hydrologic monitoring of the Ruby Mountain and Bighorn Springs sites and the associated Pinedale Outwash Aquifer began at limited locations in January 2007 and was expanded throughout 2007 and 2008 as additional monitoring stations (wells, staff gauges, flumes, and weirs) were installed. During operation, long-term monitoring and reporting will continue under this Surface- and Ground-Water Monitoring and Mitigation Plan ("SGWMMP").

Approved 5/5/10 DR

Background

NWNA began monitoring flows at Ruby Mountain Springs in January 2007. Monitoring of water levels in RMBH-2 and BHBH-2 also began in January, 2007. NWNA installed its broader monitoring well network in 2008, and began collecting data from these wells in April 2008.

Figure 1 is a hydrograph presenting January 2007 through December 2009 water level data collected from RMBH-2, BHBH-2, and the SGWMMP monitoring wells in the up-gradient recharge area. A map of the study area showing well locations is provided in **Figure 2**. The hydrograph shows that under ambient (non-pumping) conditions, the aquifer has relatively large changes in water level throughout the hydrologic year. Depending on location in the aquifer, high water levels have generally occurred in June through October; annual low water levels were observed in April or May. In the northern portions of the study area the water table elevations have been observed to vary by as much as 17 to 18 feet. In the vicinity of the Bighorn Springs site, annual water level fluctuations have been on the order of 7 to 9 feet (e.g., BHBH-2, BHMW-1, and BVMW-10). At the Ruby Mountain Springs site, in the southern portion of the study area, the annual range of ambient water table elevations was in excess of 6 feet (e.g., RMBH-2). Water table fluctuations may vary to greater and lesser extents depending on recharge conditions in any given year. The ambient variability of water levels in the aquifer is further illustrated by the measurements of up to two feet of difference in the low water levels in 2008 and 2009 at some of the network monitoring wells (e.g. BVMW-10).

The magnitude of natural annual variations in water table elevations that have been documented thus far are significantly greater than the drawdown induced in observation wells during the pumping tests that have been conducted on RMBH-2 and BHBH-2 to date. For example, the constant-rate pumping test performed in February 2009 involved the continuous pumping of RMBH-2 (Ruby Mountain Springs site) and BHBH-2 (Bighorn Springs site) simultaneously at respective rates of 169 and 32 gallons per minute (gpm) for a period of 72 hours. This pumping test was performed during the seasonal low-water-level period when effects due to pumping would be most pronounced. After reaching stabilization criteria during the test, the maximum drawdowns measured in observation wells 90 and 196 feet from RMBH-2 were 0.46 and 0.41 feet respectively. This level of pumping-induced drawdown amounts to 7.5 percent or less of the natural water-level fluctuation of more than six feet that occurs annually at the site under near-normal climatic conditions. During this same February 2009 test, no pumping-induced drawdown was measured in BVMW-10, located roughly midway between the two spring sites (approximately 1,350 feet north-northwest of RMBH-2 and 2,000 feet southeast of BHBH-2). Similarly, no pumping-induced drawdown was observed at any other off-site monitoring well locations. In addition, RMBH-2 achieved 95 percent recovery within two hours of pump shutdown.

Proposed Monitoring Program

There are three basic areas that will be subject to monitoring: the Ruby Mountain Springs site; the Bighorn Springs site; and a significant portion of the aquifer up-gradient of the two sites. As described below, the monitoring network will initially consist of eleven wells and boreholes (including the production borehole RMBH-2 and potential future production borehole RMBH-3), and four surface-water stations. Information about these stations and the nature and frequency of automated measurements are provided in **Table 1**.

Ruby Mountain Springs Site

The general layout of the Ruby Mountain Springs site is shown in **Figure 3**. Ground-water monitoring at Ruby Mountain Springs will consist of automated water-level and temperature measurements made in the spring-water production boreholes (RMBH-2 and RMBH-3), and the test borehole RMBH-1 (Table 1). Similarly, automated water level, temperature, and conductivity measurements will be made at BVMW-10, an observation well located between the Ruby Mountain Springs site and Bighorn Springs (Table 1). Also, inorganic and organic constituents will be measured at the production boreholes and BVMW-10 on an annual basis.

The spring-water production boreholes at Ruby Mountain will be instrumented with automatic recording devices (digital flow meter) to measure the rate of withdrawal. Withdrawals will be reported as daily, monthly, and annual totals. In addition, pH and conductivity will be measured in water withdrawn from the wells either in the well house or Truck Loading Facility and recorded on a daily basis.

Surface-water monitoring at the Ruby Mountain Springs site will consist of temperature and flow measurements (automated readings of stage converted to flow from standard equations) at the Downstream Weir, and at a recently installed flume (Upstream Flume) located on the Hagen Trench, a channel upstream of the existing hatchery facilities. The Downstream Weir, located at the outfall of the hatchery, measures much of the combined flow of discharge from the springs, which is channelized by the fish hatchery at the site. The Upstream Flume monitors spring-water discharge that is conveyed to the hatchery area through the Hagen Trench.

Bighorn Springs Site

The site layout at Bighorn Springs is shown in **Figure 4**. BHBH-2, the test borehole located immediately adjacent to the Bighorn Springs and associated wetlands, will be incorporated in the monitoring well network, along with BHMW-1. During the hydrogeologic testing of Bighorn borehole BHBH-2, a direct hydraulic connection to Bighorn Springs 1 and 2 (shown in **Figure 4**) was

demonstrated. In other words, BHBH-2 is completed within the spring-water aquifer providing discharge to the natural springs. It is expected that any water level changes affecting the springs and wetlands, would be reflected in the water-level record from BHBH-2.

Ground-water monitoring at Bighorn Springs will consist of automated water-level, conductivity, and temperature measurements at BHBH-2 and at monitoring well BHMW-1 (Table 1).

Surface-water monitoring at Bighorn Springs will consist of automated flow and temperature measurements at Bighorn Parshall 1 and Bighorn Parshall 3. Parshall 1 is located approximately 50 to 75 feet down gradient of Bighorn Spring 1, representing the uppermost portions of the Bighorn Springs channel. Parshall 3 was installed about 400 feet further downstream along the same spring-water discharge channel and near the confluence of the channel and the Arkansas River.

Up-Gradient Monitoring Wells

NWNA will continue to monitor a series of wells installed in portions of the surficial aquifer located up-gradient of Bighorn Springs and the Ruby Mountain Springs sites to characterize background conditions within the spring aquifer (Well A, BVMW-2, BVMW-5, BVMW-8, and BVMW-9). Water level and temperature in those monitoring wells will be measured automatically (Table 1).

Other Monitoring

NWNA will collect precipitation data from a heated, tipping-bucket rain gauge to be installed at the Ruby Mountain Springs site. NWNA will also report the precipitation data collected by the National Weather Service at the Central Colorado Regional Airport in Buena Vista (approximately 4.5 miles northwest of RMBH-2).

NWNA will report daily and long-term average Arkansas River flow data collected from two gaging stations (the seasonal station near Nathrop operated by the USGS, and the year-round station in Salida operated by the Colorado Division of Water Resources).

NWNA will report annual diversion and water use information compiled by the Colorado Division of Water Resources for the Trout Creek Reservoir, Helena Ditch, Bray Ditch, Trout Creek Ditch, and Trout Creek lateral of the Cottonwood Ditch. The Colorado Division of Water Resources reports this information after the irrigation season and the diversion records are typically completed by the beginning on the next irrigation season. If diversion records are not available at the time of submittal of the annual monitoring report, these records will be

provided to the county as a supplement to the annual report once they become available.

Wetlands Condition Documentation

NWNA will on an annual basis document the condition of the previously delineated wetlands on the Bighorn Springs Parcel, and after habitat reclamation on the Ruby Mountain Springs Parcel. Documentation of wetlands condition will include a descriptive narrative as well as photographs. This annual wetlands documentation, will be provided to the County as part of NWNA's annual report. In addition, copies of the wetlands documentation will be provided to the Colorado Division of Wildlife and Natural Resources Conservation Service for their review and representatives from each organization will be permitted on NWNA's properties to periodically assess wetland and upland habitat conditions.

Data Reporting

Data from the monitoring program described above will initially be distributed to Chaffee County on a quarterly basis (with the exception of Upstream Flume and the Downstream Weir, which are reported to the County monthly, and the diversion records compiled by the Colorado Division of Water Resources, which are published annually). NWNA will assemble the data into an annual report that it will submit to Chaffee County. The period covered under the annual reports will be by water year (e.g. November 1, 2009 through October 31, 2010 for the 2010 Water Year). Submittal of the annual monitoring report will occur on or before January 1, two months following the water year just concluded.

Evaluation of Potential Up-Gradient Propagation of Pumping Influence

The monitoring program and impact avoidance and mitigation plan described herein will provide the data needed to assess the potential for up-gradient propagation of the zone of influence over time. The water-level record from monitoring wells will be examined within the context of the prevailing hydrogeological conditions (weather patterns, irrigation ditch diversion records, surface water monitoring and the water-level response in the more distant, northern parts of the aquifer) to assess any effects that could be attributable to the onset of commercial spring-water withdrawals from the Ruby Mountain Springs site.

Importantly, it is expected any water-level change in the aquifer at Bighorn Springs would be reflected in test borehole BHBH-2 water levels. BHBH-2 has been demonstrated to have a direct connection to the springs that flow through the wetlands at the Bighorn Springs site. Similar to other wells and boreholes throughout the studied aquifer area (**Figure 1**), water levels in BHBH-2 have been

observed to fluctuate significantly on a seasonal and annual basis in response to the timing and volume of the various contributory recharge mechanisms.

The primary indicator of potential negative effects at Bighorn Springs due to pumping at the Ruby Mountain Springs site would be a sustained downward trend in water-level pattern at BHBH-2 that is consistently lower than anticipated when interpreted within the context of irrigation ditch diversions, surface water monitoring and the behavior of more distant monitoring locations and the prevailing hydrogeological conditions. It is expected such a trend would be first observed in monitoring well BVMW-10, roughly midway between Bighorn Springs and the Ruby Mountain Springs site. Monitoring well BHMW-1 would serve as a cross-gradient data point on the Bighorn Springs property.

Another indicator of potential negative effects to the Bighorn Springs would be an observed correlation between change in water level and change in the pumping rate at RMBH-2. The magnitude of any such effects would still need to be derived through a water-level analysis.

As NWNA compiles data over the long-term and as seasonal variations of the aquifer are better understood, modifications to this plan may be made to change the location or number of wells or surface devices monitored, their prescribed measurement frequency, or the schedule for reporting. Such modifications to the monitoring plan will only be made with the approval of the County.

Mitigation Measures

If, at any time, NWNA or the County infers from the monitoring data that the withdrawals from the Ruby Mountain boreholes have detrimentally affected the Bighorn Springs or any surface or groundwater or other upgradient users of water, the parties shall take the following actions:

1. Within 14 days, the County will request a meeting between NWNA (and its representatives and consultants) and the County's hydrogeological consultant to jointly review the available scientific information.

2. If NWNA and the County agree that no significant negative effect has occurred, no further action should be taken.

3. If NWNA and the County do not agree that no significant negative effect has occurred, the dispute should be resolved using the provisions of the 1041 Permit Condition 4.3.

4. If NWNA and the County agree that a significant negative effect has occurred, NWNA shall reduce or suspend withdrawals pending agreed upon mitigation measures for the significant negative effect.

Table 1. Monitoring Network of the Surface- and Ground-Water Monitoring and Mitigation Plan

Monitoring Station	Description	Parameter Measured	Minimum Monitoring Frequency[1]
Ruby Mountain			
RMBH-1	Monitoring Well	Water Level	4 readings/day
RMBH-2	Production Borehole	Water Level	"
RMBH-3[2]	Production Borehole	Water Level	"
BVMW-10	Monitoring Well	Water Level	"
Upstream Flume	Up-gradient spring discharge in Hagen Trench	Stream Stage[3]	"
Downstream Weir	Combined spring discharge at hatchery outfall	Stream Stage[3]	"
Bighorn Springs			
BHBH-2	Monitoring Well	Water Level	4 readings/day
BHMW-1	Monitoring Well	Water Level	"
Bighorn Parshall 1	Up-gradient spring discharge	Stream Stage[3]	"
Bighorn Parshall 3	Combined spring discharge	Stream Stage[3]	"
Up-Gradient Monitoring Wells			
Well A	Monitoring Well	Water Level	4 readings/day
BVMW-2	Monitoring Well	Water Level	"
BVMW-5	Monitoring Well	Water Level	"
BVMW-8	Monitoring Well	Water Level	"
BVMW-9	Monitoring Well	Water Level	"

[1]data loggers will be programmed to record measurements at the indicated frequency or a greater frequency (up to hourly). Reported data will be the daily average of the measurements.

[2]RMBH-3 is a backup source that will be constructed at a later date

[3]stream stage readings are converted into discharge data using standard equations

Figure 1. Buena Vista Monitoring Wells
Water-level change relative to April 24, 2008
Extending through February 23, 2010

AECOM