BENNINGTON WATER SYSTEM (PWS 6040006)
SOURCE WATER ASSESSMENT FINAL REPORT

September 20, 2002

State of Idaho
Department of Environmental Quality

Disclaimer: This publication has been developed as part of an informational service for the source water assessments of public water systems in Idaho and is based on data available at the time and the professional judgement of the staff. Although reasonable efforts have been made to present accurate information, no guarantees, including expressed or implied warranties of any kind, are made with respect to this publication by the State of Idaho or any of its agencies, employees, or agents, who also assume no legal responsibility for the accuracy of presentations, comments, or other information in this publication. The assessment is subject to modification if new data is produced.

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and springs and aquifer characteristics.

This report, *Source Water Assessment for Bennington Water System, Bennington, Idaho*, describes the public water system (PWS), the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The Bennington Water System (PWS# 6040006) consists of two springs (New Spring and Old Spring) and two wells (Well #1 and CRI well). The springs are located east of Bennington. The Old Spring is the system's primary source of water. Well #1 is the primary source of water after the Old Spring. The CRI Well serves as a backup to Well #1 and the Old Spring. The New Spring is currently disconnected from the system. The water system serves approximately 250 persons through 79 connections with an average of 43,200 gallons per day.

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with mostly urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories: inorganic chemical (IOC, i.e. nitrates, arsenic) contaminants, volatile organic chemical (VOC, i.e. petroleum products) contaminants, synthetic organic chemical (SOC, i.e. pesticides) contaminants, and microbials (i.e. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

For the CRI Well, the potential contaminant sources within the delineation capture zones include Highway 30. If an accidental spill occurred along Highway 30, IOCs, VOCs, SOCs, or microbial contaminants could be added to the aquifer system. There were no potential contaminant sources identified within the delineation capture zones for Well #1, the New Spring, and the Old Spring. In addition, the capture zones for the wells intersect a priority area for the IOC, nitrate. The nitrate priority area is where greater than 25% of the wells show nitrate concentrations greater than 5.0 milligrams per liter (mg/L).

For the assessment, a review of laboratory tests was conducted using the Idaho Drinking Water Information Management System (DWIMS) and the State Drinking Water Information System (SDWIS). No VOCs or SOCs have been detected in the drinking water. The IOCs barium and fluoride have been detected in the water, but at levels below the maximum contaminant level (MCL) for each chemical. Well #1 has measured nitrate at up to 7.68 mg/L and the CRI Well has measured nitrate at up to 7.93 mg/L. The MCL for nitrate is 10 mg/L. Natural radiation has also been detected in Well #1 water. Total coliform bacteria were detected in the distribution system in November 2001, September 1999, August 1999, December 1997, and October 1992 through March 1993. In June 1995, both total coliform and E. coli bacteria were detected in the distribution system.

In terms of total susceptibility, Well #1 rated high for IOCs and microbials and moderate for VOCs and SOCs. The system construction score and hydrologic sensitivity score were high, mainly due to a lack of well log information, but also from the well drained soils and the shallow depth of the well. Potential contaminant inventory and land use scores were moderate for IOCs, and low for VOCs, SOCs, and microbials, due to lack of potential contaminant sites except for agricultural land uses (Table 1).

In terms of total susceptibility, the CRI Well rated high for IOCs and microbials and moderate for VOCs and SOCs. The system construction score was moderate and the hydrologic sensitivity score was high, mainly due to a lack of well log information, but also from the well drained soils and the shallow depth of the well. Potential contaminant inventory and land use scores were moderate for IOCs and low for VOCs, SOCs, and microbials, due to lack of potential contaminant sites except for Highway 30 and agricultural land uses (Table 1).

In terms of total susceptibility, the New Spring rated moderate for IOCs and microbials and low for VOCs and SOCs (Table 2). The system construction score rated moderate. Potential contaminant inventory and land use scores were moderate for IOCs and low for VOCs, SOCs, and microbials. The moderate IOC score is due to the predominantly agricultural nature of the land within the delineated area.

In terms of total susceptibility, the Old Spring rated moderate for IOCs and rated low for VOCs, SOCs, and microbials (Table 2). The system construction score rated low. Potential contaminant inventory and land use scores were moderate for IOCs and low for VOCs, SOCs, and microbials. The moderate IOC score is due to the predominantly agricultural nature of the land within the delineated area.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Bennington Water System, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (inspections conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Also, disinfection practices should be implemented if microbial contamination becomes a problem. No chemicals should be stored or applied within 50 feet of the wellheads. As land uses within most of the source water assessment areas are outside the direct jurisdiction of Bennington Water System, collaboration and partnerships with state and local agencies and industry groups should be established and are critical to success.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There is a transportation corridor near the delineations (Highway 30), therefore the Department of Transportation should be involved in protection activities. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Bear Lake County Soil Conservation and Water District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR BENNINGTON WATER SYSTEM, BENNINGTON, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is included.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells/springs, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Bennington Water System (PWS# 6040006) consists of two springs (New Spring and Old Spring) and two wells (Well #1 and CRI well). The springs are located east of Bennington. The Old Spring is the system's primary source of water. Well #1 is the primary source of water after the Old Spring. The CRI Well serves as a backup to Well #1 and the Old Spring. The New Spring is currently disconnected from the system. The water system serves approximately 250 persons through 79 connections with an average of 43,200 gallons per day.

No volatile organic chemicals (VOCs) or synthetic organic chemicals (SOCs) have been detected in the water. The inorganic chemicals (IOCs) barium and fluoride have been detected in the drinking water. Well #1 has measured nitrate at up to 7.68 milligrams per liter (mg/L) and the CRI Well has measured nitrate at up to 7.93 mg/L. The maximum contaminant level (MCL) for nitrate is 10 mg/L. Natural radiation has been detected in Well #1 water. Total coliform bacteria were detected in the distribution system in November 2001, September 1999, August 1999, December 1997, and October 1992 through March 1993. In June 1995, both total coliform and E. coli bacteria were detected in the distribution system.

Defining the Zones of Contribution – Delineation

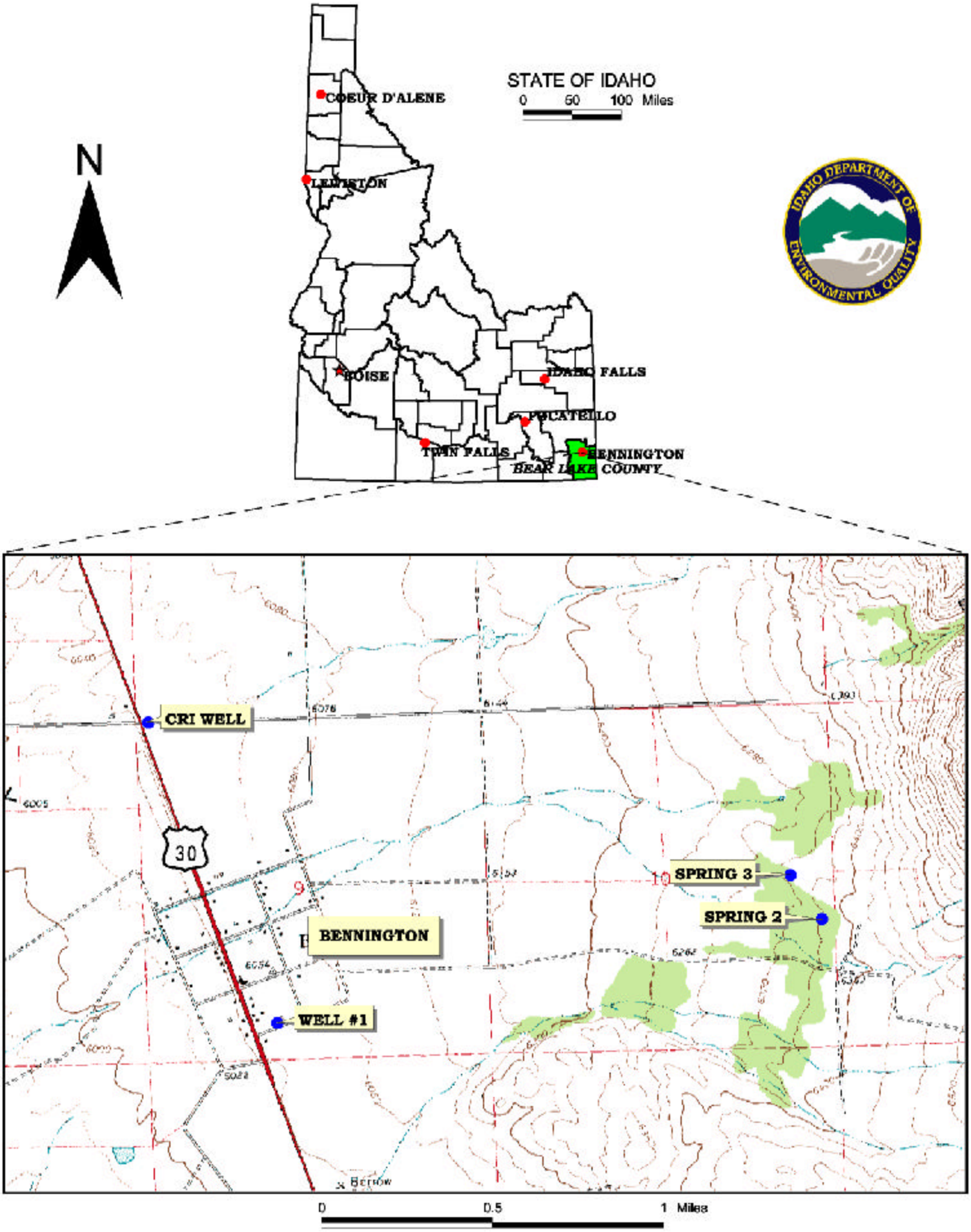
The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a pumping well) for water in the aquifer. Washington Group International (WGI) was contracted by DEQ to define the public water system's zones of contribution. WGI used a conceptual computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Bear River – Dingle Swamp hydrologic province in the vicinity of the Bennington Water System. The computer model used site specific data, assimilated by WGI from a variety of sources including operator records, well logs (when available) and hydrogeologic reports. A summary of the hydrogeologic information from the WGI is provided below.

Hydrogeologic Conceptual Model

The Bear River originates in the Uinta Mountains of northern Utah and winds its way through over 500 miles of Wyoming, Idaho, and Utah to terminate in a freshwater bay of the Great Salt Lake just 90 miles west of its source (Dion, 1969, p. 6). The Bear River enters Idaho near Border, Wyoming and flows along the north edge of the Bear River Plateau. Flowing north through the Bear River – Dingle Swamp hydrologic province, it passes into the Soda Springs hydrologic province east of the Bear River Range. Upon entering the Gem Valley – Gentile Valley hydrologic province, it swings south. Now west of the Bear River Range, the river passes through the Oneida Narrows into the Cache Valley hydrologic province. Over most of its course through Idaho, the Bear River is gaining and in direct hydraulic communication with the major aquifer systems of the four hydrologic provinces. The exception is a small reach between the cities of Alexander and Grace where it is generally losing and is perched over the regional fractured basalt aquifer (Dion, 1969, p. 30).

Ground water in the Bear River Basin is found in Holocene alluvium, Pleistocene basalt, and rocks of the "Pliocene (?)" [sic] Salt Lake Formation, pre-Tertiary undifferentiated bedrock, and possibly the "Eocene (?)" [sic] Wasatch Formation (Dion, 1969, pp. 15 and 16). Rocks of the Salt Lake Formation, which include freshwater limestone, tuffaceous sandstone, rhyolite tuff and poorly-consolidated conglomerate, outcrop along the major valley margins and may underlie the valley-fill alluvium (Dion, 1969, pp. 16 and 17). Many of the wells drilled into this formation do not yield water. The few wells that do produce water yield as much as 1,800 gal/min from beds of sandstone and conglomerate.

FIGURE 1. Geographic Location of Bennington Water System



The Wasatch Formation is restricted to the Bear Lake Plateau and small areas northwest of Bear Lake (Dion, 1969, p. 17). The formation is composed largely of tightly cemented conglomerate and sandstone with smaller amounts of shale, limestone, and tuff. The primary pore space is typically impermeable. Water movement may occur through joints and fractures or more permeable zones that are thought to exist along the relatively flat-lying formation (Dion, 1969, p. 17). Springs occur at the margins of the formation.

Precipitation in the basin ranges from 10 in./year on the floor of Bear Lake Valley to over 45 in./yr on the Bear River Range (Dion, 1969, pp. VII and 11). Applied over the entire basin, precipitation amounts to approximately 2.3 million acre-feet annually. Precipitation is also the principal source of recharge to the basin's aquifers in conjunction with spring snowmelt and runoff, irrigation seepage, and canal losses.

Natural ground water discharge is by flow to the Bear River, springs, seeps along riverbanks, and evapotranspiration in large marshy areas (Dion, 1969, p. VIII). Some discharge may also occur by way of underflow to the Portneuf River drainage through basalt flows at Tenmile pass and near Soda Point.

Ground water is obtained from both springs and wells in the Bear River Basin. Hundreds of springs issue primarily from fractures and solution openings in the bedrock on the margins of the basin (Dion, 1969, p. 47). Water production from wells in the four hydrologic provinces is primarily from alluvial and basalt aquifers; however, some wells tap conglomerate, sandstone, limestone and shale aquifers of the Salt Lake and possibly the Wasatch formations (Dion, 1969, p. VII).

Bear River – Dingle Swamp

The Bear River – Dingle Swamp hydrologic province occupies approximately 280 square miles in the southeast corner of Idaho. The Basin and Range physiographic province is north to south trending and is bounded on the east by the Bear Lake Plateau and on the west by the Bear River Range. These mountains are composed of pre-Tertiary undifferentiated quartzite and sedimentary rocks (Dion, 1969, p. 18).

The Bear Lake Valley is filled with alternating layers of Quaternary clay, silt, sand, and gravel. The maximum thickness is unknown, yet it may be as great as several thousand feet (Dion, 1969, p.15). The sand and gravel layers are the principal water-producing units. The valley floor ranges in elevation from 5,923 feet above mean sea level (msl) at Bear Lake to 5,914 feet-msl at a gauging station on the Bear River near Bennington. The southern end of the valley is almost completely filled by Bear Lake and Dingle Swamp leaving little room for development. Annual precipitation at Montpelier averaged 14 inches from 1922 to 1966 and averages over 45 in./year on the Bear River Range (Dion, 1969, pp. 10-11).

The primary source of recharge to the valley-fill aquifer is from stream flow over alluvium near the valley margins (Dion, 1969, p. 18). Water issuing from older sedimentary rock at the bedrock/valley-fill contact also provides significant recharge to the valley fill. Precipitation on the valley floor, canal leakage, and applied irrigation water are other sources of aquifer recharge.

Natural discharge of ground water occurs as river gains along the Bear River and as evapotranspiration from Dingle Swamp where the water table is at land surface.

Ground water flow direction is to the Bear River (Dion, 1969, Figure 7). The valley-fill aquifer is generally unconfined, although perched and artesian conditions are known to occur. The alluvial aquifer is hydraulically connected to the Bear River over most of its length in the valley (Dion, 1969, p. 25).

Estimates of hydraulic conductivity are based on analysis of specific capacity data presented by Dion (1969, Table 7) and in PWS well driller's logs. Estimates range from 13 to 373 ft/day, with a geometric mean of 115 ft/day.

Capture Zone Modeling Method

Model boundaries consist of a constant-head line sink representing the Bear River and a constant-flux line sink backed by a no-flow boundary placed east of the PWS wells to represent aquifer recharge along the eastern margin of the valley. The Bear River line sink was separated into five segments to provide necessary definition to the hydraulic head distribution. Constant heads ranged from 5,935 to 5,960 feet-msl in the base case model. The constant-flux line sink was separated into three segments to allow for spatially varying aquifer recharge along the bedrock/valley-fill contact.

The areal recharge of 0.0001 feet/day is equivalent to 3 percent of the average annual precipitation on the valley floor. The base case hydraulic conductivity is the geometric mean of estimates based on analysis of specific capacity data (115 ft/day). The effective porosity is 0.3, which is the default value presented in Table F-3 of the Idaho Wellhead Protection Plan for unconsolidated alluvium (IDEQ, 1997, p. F-6). Base elevation of the aquifer was set at the elevation of the bottom of the well screen in Well #3 (5,495 feet-msl). The aquifer thickness (100 feet) is the average saturated open interval for 15 monitoring wells in the Bennington/Montpelier area (Dion, 1969, Table 7).

The two Bennington PWS wells have a combined average pumping rate of 37,500 gal/day for the calibration scenario. The pumping rate was estimated by taking half of the average daily consumption of 75,000 gal/day for the PWS (State of Idaho Public Water Supply Inventory Form).

Delineation of the wellhead protection area for the springs involved special consideration. Hydrogeologic setting is foremost among the factors that control the shape and extent of the capture zone. A spring resulting from the presence of a high permeability fracture extending to great depth will have a much different capture zone than a depression spring formed where the ground surface intersects the water table in a unconsolidated aquifer. The latter can be reasonably modeled as either a well or an internal constant head boundary. In many cases, however, the methods commonly used to delineate protection areas for water-supply wells are not applicable (Jensen et al., 1997). Application of the refined method using WhAEM (Kraemer et al., 2000), for instance, may not be appropriate for a fracture or tubular spring producing from an aquifer that displays a high degree of heterogeneity and anisotropy. Techniques that are most applicable to the springs within the scope of this report are the topographic, refined, and calculated fixed-radius methods. Hydrogeologic mapping

techniques have been useful in characterizing the hydrogeologic setting and the zone of contribution to springs (Jensen et al., 1997, pp. 6-7). Other techniques such as tracer and isotope studies, potentiometric surface mapping, geochemical characterization, and geophysical survey interpretation require data that are not available without additional fieldwork.

The fixed radii for the 3-, 6-, and 10-year capture zones were calculated using equations presented by Keely and Tsang (1983) for the velocity distribution surrounding a pumping well. This method was selected because the ground water flow systems in the mountains of southeast Idaho are typically very complex and poorly characterized. Ground water infiltrating into folded, faulted, and fractured bedrock formations may recharge shallow localized systems with short flow paths and residence times or it may enter deeper intermediate or regional systems with longer flow paths and residence times.

Unfortunately, there generally are no water level data with which to determine the flow direction and hydraulic gradient in the different aquifers. In the absence of water level data, the ground water flow direction and hydraulic gradient may differ greatly from one flow system to another, because of the existence of structural controls and heterogeneity.

Final Capture Zones

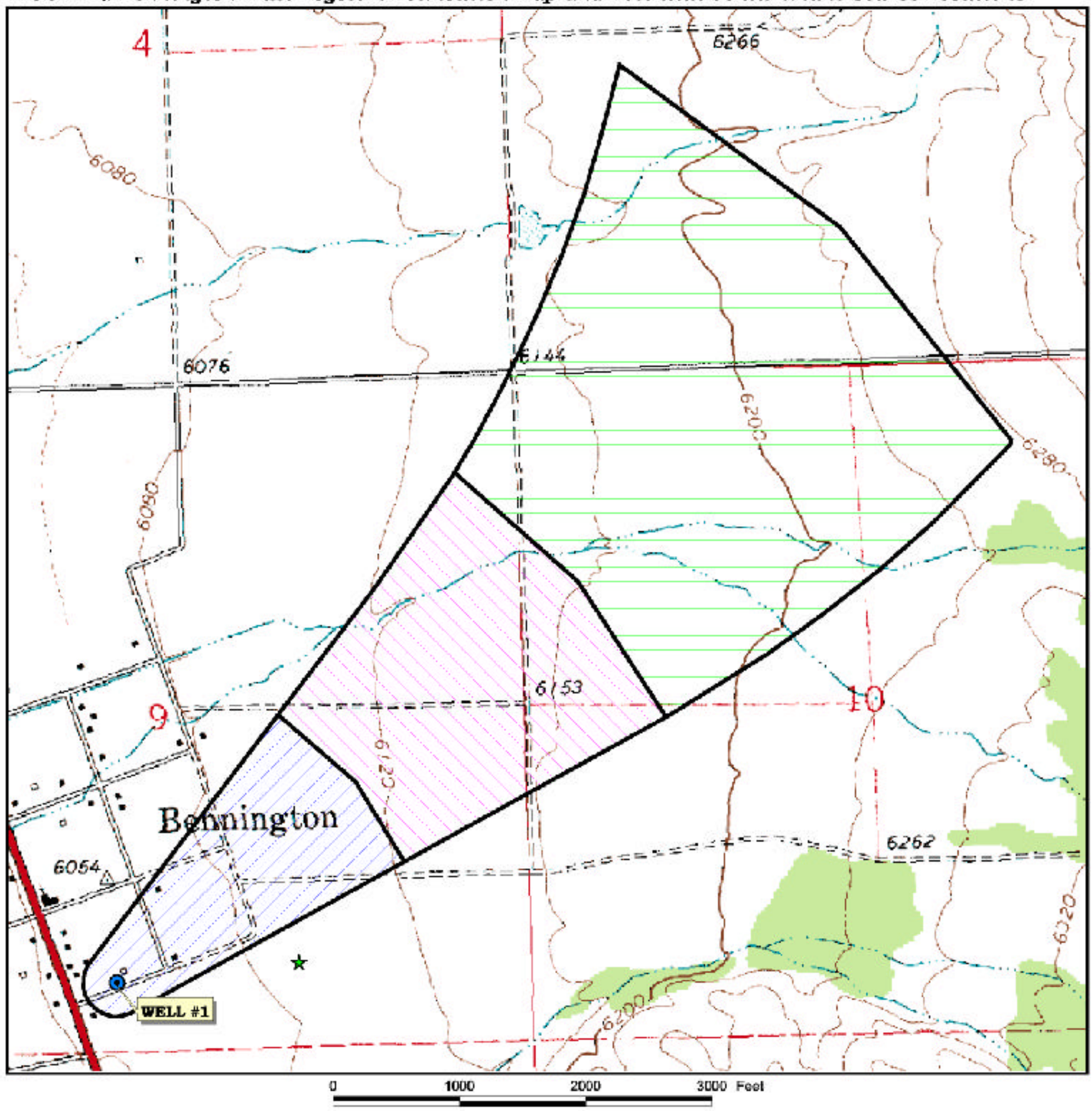
Hybrid capture zones were truncated based on topographic relief and the location of the bedrock/alluvium contact as defined by Johnson and Raines (1996). The capture zone for the Bennington Water System Well #1 and CRI Well terminates at the 6,280-foot contour based on a USGS 1:24000 topographic map (Figures 2 and 3). The total area of the capture zones for both of the City of Bennington wells average 455 acres.

The delineated source water assessment area for the springs can best be described as three concentric circles 500 feet, 750 feet, and 1,000 feet in diameter for the 0-3 year, 3-6 year, and 6-10 year time of travel zones, respectfully (Figures 4 and 5). The actual data used by WGI in determining the source water assessment delineation area is available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act. Furthermore, these sources have a sufficient likelihood of releasing such contaminants into the environment at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Field surveys conducted by DEQ and reviews of available databases identified potential contaminant sources within the delineation areas. The prominent land use in the area of the delineations is agriculture, with the Well #1 delineation also including urban land uses.

FIGURE 2. Bennington Water System Delineation Map and Potential Contaminant Source Locations



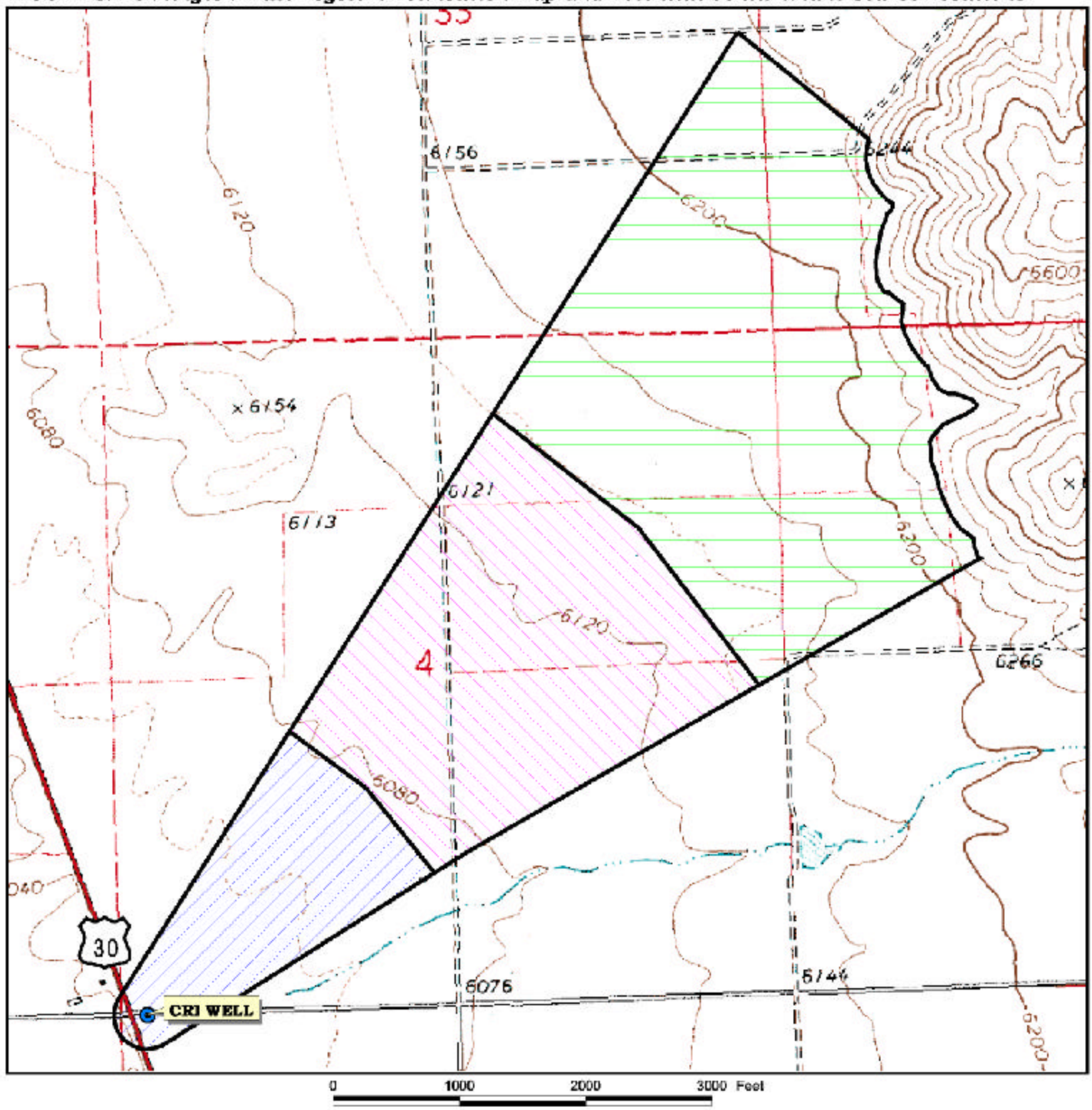
LEGEND

Time of Travel Zones
- 1B (3 yr TOT)
- 2 (6 yr TOT)
- 3 (10 yr TOT)
- Wellhead
- Enhanced Inventory
- CERCLIS Site
- RICRIS Site
- Dairy
- LUST Site
- Closed UST Site
- Open UST Site
- Business Mailing List
- NPDES Site
- Mine
- AST
- Toxic Release Inventory
- SARA Title III Site (EPCRA)
- Recharge Point
- Injection Well
- Group1 Site
- Cyanide Site
- Landfill
- Wastewater Land App Site

N

PWS# 6040006
WELL #1

FIGURE 3. Bennington Water System Delineation Map and Potential Contaminant Source Locations



LEGEND

Time of Travel Zones
- 1B (3 yr TOT)
- 2 (6 yr TOT)
- 3 (10 yr TOT)
- Wellhead
- Enhanced Inventory
- CERCLIS Site
- RICRIS Site
- Dairy
- LUST Site
- Closed UST Site
- Open UST Site
- Business Mailing List
- NPDES Site
- Mine
- AST
- Toxic Release Inventory
- SARA Title III Site (EPCRA)
- Recharge Point
- Injection Well
- Group1 Site
- Cyanide Site
- Landfill
- Wastewater Land App Site

N

PWS# 6040006
CRI WELL

FIGURE 4. Bennington Water System Delineation Map and Potential Contaminant Source Locations

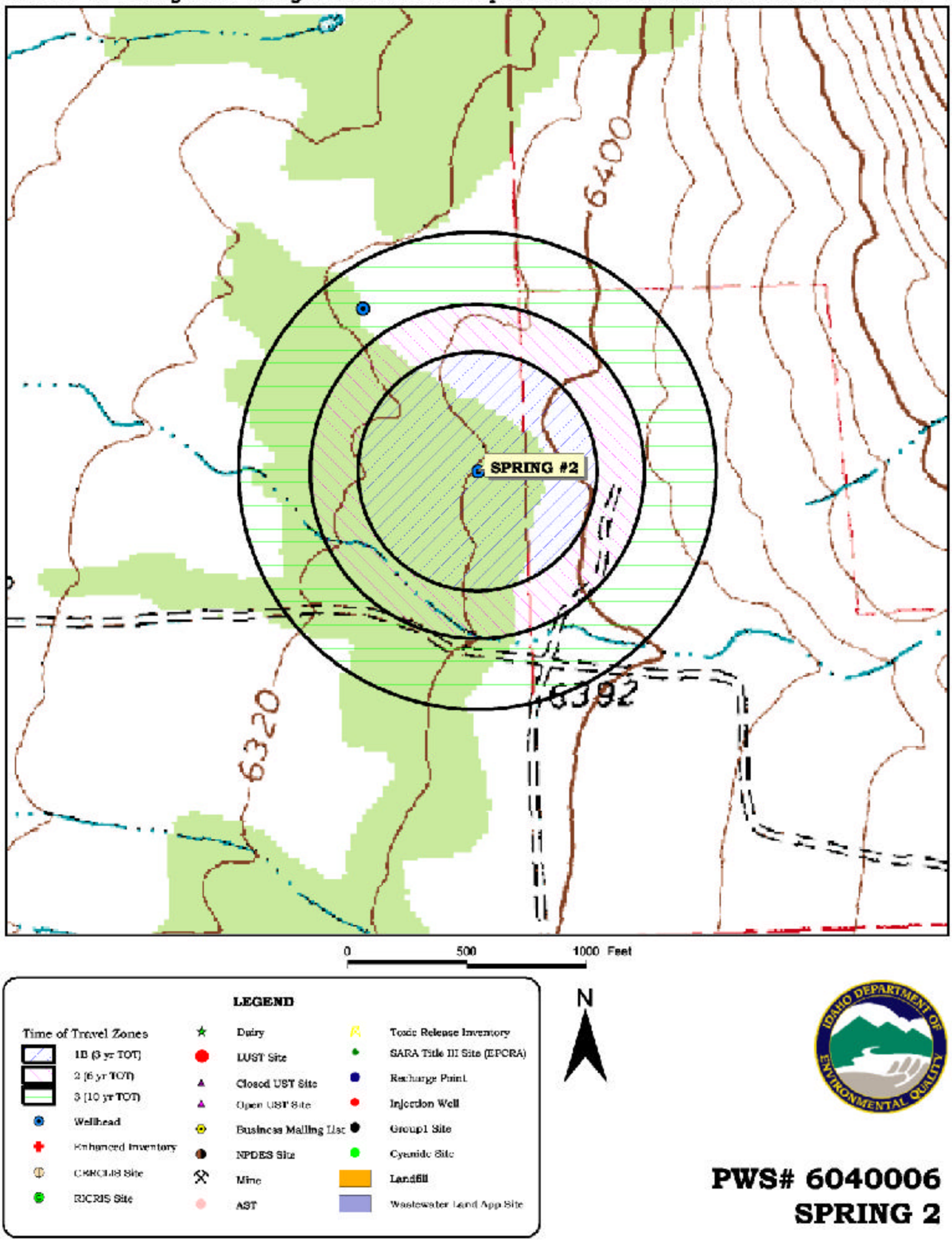
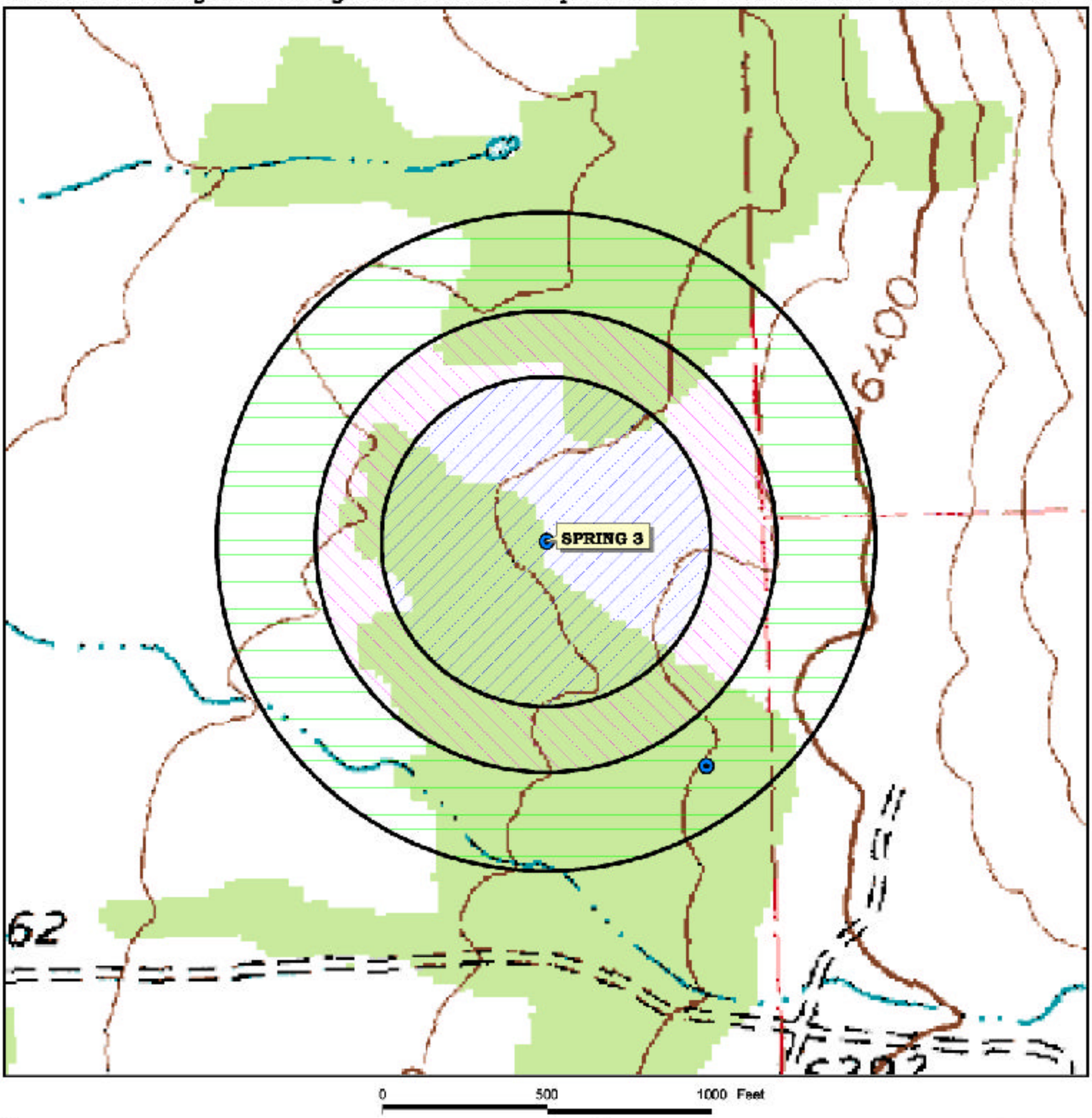


FIGURE 5. Bennington Water System Delineation Map and Potential Contaminant Source Locations



LEGEND

Time of Travel Zones
- 1B (3 yr TOT)
- 2 (6 yr TOT)
- 3 (10 yr TOT)
- Wellhead
- Enhanced Inventory
- CERCLIS Site
- RICRIS Site
- Dairy
- LUST Site
- Closed UST Site
- Open UST Site
- Business Mailing List
- NPDES Site
- Mine
- AST
- Toxic Release Inventory
- SARA Title III Site (EPCRA)
- Recharge Point
- Injection Well
- Group1 Site
- Cyanide Site
- Landfill
- Wastewater Land App Site

PWS# 6040006
SPRING 3

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in May 2002. The first phase involved identifying and documenting potential contaminant sources within the Bennington Water System source water assessment areas through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the delineated areas. This task was undertaken with the assistance of Mr. Robert Holjeson. Maps with well and spring locations, delineated areas, and potential contaminant sources are provided with this report (Figure 2 - Figure 5). Highway 30 was identified as a potential contaminant source in the capture zone of the CRI Well.

Section 3. Susceptibility Analyses

Each well's susceptibility to contamination were ranked as high, moderate, or low susceptibility according to the following considerations: hydrologic characteristics, physical integrity of the wells, land use characteristics, and potentially significant contaminant sources. The susceptibility of the springs was ranked as high, moderate, or low susceptibility according to the system construction around the source, the land use characteristics, and the potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well and spring is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Well Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: These factors are surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination. As the majority of this information is obtained from well log information, springs are not evaluated for hydrologic sensitivity because collection of well log information is not standard practice for a spring.

Both Well #1 and the CRI Well rated high for hydrologic sensitivity (Table 1). Within the delineated areas, soils are moderate to well-drained (as defined by the National Resource Conservation Service (NRCS)). The depth to first water is less than 300 feet (61 feet for Well #1 and less than 145 feet for the CRI Well). Well logs were unavailable, so no assessment could be made of the presence of an aquitard or the composition of the vadose zone. Without well logs, scores regarding the missing information defaulted to the most conservative rating.

Well System Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding (i.e. casing height) and is outside the 100-year floodplain, then contamination from surface events is reduced.

Well #1 rated high for system construction. Well #1 was completed to a depth of 180 feet and cased with a 6-inch diameter steel pipe to 105 feet below ground surface (bgs). Perforated casing was installed from 105 to 150 feet bgs. This well is the primary source after the Old Spring. Based on the 2001 sanitary survey (conducted by DEQ), the wellhead and surface seal are maintained to standard, and the wellhead is not in the 100-year floodplain. The score was increased because there was no vent on the well (DEQ, 2001). The purpose of the vent is to vent the space between the casing and the column, which prevents a vacuum from forming when the well turns on and draws down the water table. A vacuum could draw in contamination through joints or leaks in the casing or cause the well to slough.

We were unable to assess whether the casing and annular seal extended into a low permeable unit, such as clay, or whether the highest water production for the well is 100 feet below the static water level. If the casing and annular seal extend into a fine-grained medium, this may reduce the chances of laterally migrating contamination into the well.

Well #2 rated moderate for system construction. Well #2 is formerly an irrigation well that was revamped to drinking water standards in 1997. The well is cased with a 12-inch diameter steel pipe to 150 feet bgs. A submersible pump is set at 145 feet bgs. According to the 2001 sanitary survey, the wellhead and sanitary seal are maintained and the wellhead is not in the 100-year floodplain. Due to the lack of well log information, it is unknown if the casing and annular seal extend into units of low permeability.

The Idaho Department of Water Resources (IDWR) *Well Construction Standards Rules (1993)* require all public water systems to follow DEQ standards. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works (1997)* during construction. Under current standards, all PWS wells are required to have a 50-foot buffer around the wellhead and if the well is designed to yield greater than 50 gallons per minute (gpm) a minimum of a 6-hour pump test is required. These standards are used to rate the system construction for the well by evaluating items such as condition of wellhead and surface seal, whether the casing and annular space is within consolidated material or 18 feet below the surface, the thickness of the casing, etc. If all criteria are not met, the public water source does not meet the IDWR Well Construction Standards. In this case, there was insufficient information available to determine if either well met all the criteria outlined in the IDWR Well Construction Standards.

Spring System Construction

Spring construction directly affects the ability of the intake to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the spring's water. Lower scores imply a system is less vulnerable to contamination. For example, if the intake structure of the surface water system is properly located and constructed to minimize impacts from potential contaminant sources, then the possibility of contamination is reduced and the system construction score goes down. If the system was constructed in a way that the infiltration gallery is separated from any surface water, so as to provide some kind of natural filtration, the water quality is more protected and the system score is reduced.

The Old Spring rated low and the New Spring rated moderate for system construction (Table 2). The area surrounding both springs is fenced, and both the collection areas and collection lines are kept free of brush. The Old Spring was constructed around 1975. The spring is captured about 15 feet below the ground surface. Average daily usage is about 43,200 gallons. The New Spring was constructed in 1990. The spring is not used because it is believed to be under the influence of surface water. The New Spring was also the source of the bacteria problems in the past.

Potential Contaminant Source and Land Use

The potential contaminant sources and land use within the delineated zones of water contribution are assessed to determine the wells' and springs'susceptibility. When agriculture is the predominant land use in the area, this may increase the likelihood of agricultural wastewater infiltrating the ground water system. Agricultural land is counted as a source of leachable contaminants and points are assigned to this rating based on the percentage of agricultural land. The predominant land use within the delineated capture zones is agricultural land.

In terms of potential contaminant inventory and land use scores the springs rated moderate for IOCs (i.e. nitrates, arsenic) and low for VOCs (i.e. petroleum products), SOCs (i.e. pesticides), and microbial contaminants (i.e. bacteria). Well #1 rated moderate for IOC and low for VOC, SOC, and microbial contaminants. The CRI Well rated moderate for IOC, VOC, SOC and low for microbial contaminants. The percentage of agriculture land within the delineations contributed the most points to the scores.

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, potential contaminant sources within 50 feet of a wellhead will automatically lead to a high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time of travel zone (Zone 1B) contribute greatly to the overall ranking.

Table 1. Summary of the Bennington Water System Well Susceptibility Evaluation

Drinking Water Source	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Potential Contaminant Inventory and Land Use				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	**H**	**M**	**L**	**L**	**L**	**H**	**H**	**M**	**M**	**H**
CRI Well	**H**	**M**	**M**	**M**	**L**	**M**	**H**	**M**	**M**	**H**

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 2. Summary of Bennington Water System Spring Susceptibility Evaluation

Drinking Water Source	Susceptibility Scores[1]								
	Potential Contaminant Inventory and Land Use				System Construction	Final Susceptibility Ranking			
	IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
New Spring	M	L	L	L	M	M	L	L	M
Old Spring	M	L	L	L	L	M	L	L	L

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

In terms of total susceptibility, Well #1 rated high for IOCs and microbials and moderate for VOCs and SOCs. The system construction score and hydrologic sensitivity score were high, mainly due to a lack of well log information, but also from the well drained soils and the shallow depth of the well. Land use scores were moderate for IOCs, and low for VOCs, SOCs, and microbials, due to lack of potential contaminant sites except for agricultural land uses.

In terms of total susceptibility, the CRI Well rated high for IOCs and microbials and moderate for VOCs and SOCs. The system construction score was moderate and hydrologic sensitivity score was high, mainly due to a lack of lack of well log information, but also from the well drained soils and the shallow depth of the well. Land use scores were moderate for IOCs and low for VOCs, SOCs, and microbials, due to lack of potential contaminant sites except for Highway 30 and agricultural land uses.

In terms of total susceptibility, the New Spring rated moderate for IOCs and microbials and low for VOCs and, SOCs. The spring also rated moderate for system construction.

In terms of total susceptibility, the Old Spring rated moderate for IOCs and low for VOCs, SOCs, and microbials. The Old Spring rated low for system construction. Both springs rated moderate land use for IOCs and low land use for VOCs, SOCs, and microbials. The moderate IOC score is due to the predominantly agricultural nature of the land within the delineated area.

No VOCs or SOCs have been detected in the drinking water. The IOCs barium and fluoride have been detected in the water, but at levels below their MCLs. Well #1 has measured nitrate at up to 7.68 mg/L and the CRI Well has measured nitrate at up to 7.93 mg/L. The MCL for nitrate is 10 mg/L. Natural radiation has also been detected in Well #1 water. Total coliform bacteria were detected in the distribution system in November 2001, September 1999, August 1999, December 1997, and October 1992 through March 1993. In June 1995, both total coliform and E. coli bacteria were detected in the distribution system.

Section 4. Options for Drinking Water Protection

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed source water protection program will incorporate many strategies. For the Bennington Water System, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey, including protection of the wells from surface flooding. Also, disinfection practices should be implemented if microbial contamination becomes a problem. No chemicals should be stored or applied within 50 feet of the wellheads. As land uses within most of the source water assessment areas are outside the direct jurisdiction of Bennington Water System, collaboration and partnerships with state and local agencies and industry groups should be established and are critical to success.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture and the Bear Lake County Soil and Water Conversation District. As a major transportation corridor intersects the CRI Well delineation (Highway 30), the Idaho Department of Transportation should be involved in protection efforts.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Pocatello Regional DEQ Office	(208) 236-6160
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper (208) 343-7001 or email her at mlharper@idahoruralwater.com, Idaho Rural Water Association, for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRA – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

References Cited

Dion, N.P., 1969, Hydrologic Reconnaissance of the Bear River in Southeastern Idaho, U.S. Geological Survey and Idaho Department of Reclamation, Water Information Bulletin No. 13, 66 p.

Drinking Water Information Management System (DWIMS). Idaho Department of Environmental Quality.

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environment Managers, 1997. "Recommended Standards for Water Works."

Idaho Division of Environmental Quality, 1997, Idaho Wellhead Protection Plan, Idaho Wellhead Protection Work Group, February.

Idaho Division of Environmental Quality Ground Water Program, October 1999. Idaho Source Water Assessment Plan.

Idaho Department of Environmental Quality. 2000. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Environmental Quality. 2001. Sanitary Survey of Bennington Water System: PWS #6040006.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Jensen, M.E., M. Lowe, and M. Wireman, 1997, Investigation of Hydrogeologic Mapping to Delineate Protection Zones around Springs, Report of Two Case Studies, National Risk Management Research Laboratory, U.S. Environmental Protection Agency, EPA/600/R-97/023, 60 p.

Johnson, B.R. and G.L. Raines, 1996, Digital Representation of the Idaho State Geologic Map: A contribution to the Interior Columbia Basin Ecosystem Management Project, U.S. Geological Survey, Open File Report 95-690, 22 p.

Keely, J.F., C.F. Tsang, 1983, Velocity Plots and Capture Zones of Pumping Centers for Ground-Water Investigations, Ground Water, Vol. 21, No. 6, pp. 701-714.

Kraemer, S.R., H.M. Haitjema, and V.A. Kelson, 2000, Working with WhAEM2000, Source Water Assessment for a Glacial Outwash Wellfield, Vincennes, Indiana, National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, EPA/600/R-00/022, April, 50 p.

Safe Drinking Water Information System (SDWIS). Idaho Department of Environmental Quality.

Washington Group International, Inc, January 2002. Source Area Delineation Report for the Bear

River Basin.

Washington Group International, Inc, March 2002. Source Area Delineation Report for the “None” Hydrologic Province and Southeast Idaho Springs.

Attachment A

Bennington Water System Susceptibility Analysis Worksheets

Well Formula

The final well scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Spring Formula

The final spring scores for the susceptibility analysis were determined using the following formula:

1) IOC/VOC/SOC Final Score = (Potential Contaminant/Land Use X 0.6) + System Construction Score.

2) Microbial Final Score = (Potential Contaminant/Land Use x 1.125) + System Construction Score.

Final Susceptibility Scoring:

0 - 7 Low Susceptibility

8 - 15 Moderate Susceptibility

≥ 16 High Susceptibility

Ground Water Susceptibility Report Public Water System Name: BENNINGTON WATER SYSTEM WELL #1
Public Water System Number 6040006 07/30/2002 2:00:06 PM

1. System Construction		SCORE
Drill Date	01/01/1990	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	YES	2001
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	NO	1
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		5

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		6

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or	YES	2	0	0	
4 Points Maximum		2	0	0	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Between 25% and 50% Irrigated Agricultural Land	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		6	2	2	2
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		3	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		2	1	1	0

Cumulative Potential Contaminant / Land Use Score	13	7	7	4
4. Final Susceptibility Source Score	13	12	12	13
5. Final Well Ranking	High	Moderate	Moderate	High

Ground Water Susceptibility Report Public Water System Name: BENNINGTON WATER SYSTEM CRI WELL
Public Water System Number 6040006 07/30/2002 2:00:19 PM

1. System Construction		SCORE
Drill Date	01/01/1997	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	YES	2001
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		4

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		6

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	1	1	1	1
(Score = # Sources X 2) 8 Points Maximum		2	2	2	2
Sources of Class II or III leacheable contaminants or	YES	5	1	1	
4 Points Maximum		4	1	1	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		12	7	7	6
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		3	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		2	1	1	0

Cumulative Potential Contaminant / Land Use Score	19	12	12	8
4. Final Susceptibility Source Score	14	12	12	13
5. Final Well Ranking	High	Moderate	Moderate	High

Spring Susceptibility Report Public Water System Name : BENNINGTON WATER SYSTEM New Spring
Public Water System Number 6040006 07/30/2002 2:00:30 PM

1. System Construction		SCORE
Intake structure properly constructed	YES	0
Is the water first collected from an underground source? (i.e. Yes = spring developed with casing to collect water from beneath the ground; lower score. No = water collected after water contacts atmosphere; higher score.)	NO	2
Total System Construction Score		2

2. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or	YES	4	0	0	
4 Points Maximum		4	0	0	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		10	4	4	4
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		3	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		2	1	1	0
Cumulative Potential Contaminant / Land Use Score		17	9	9	6
4. Final Susceptibility Source Score		12	7	7	9
5. Final Spring Ranking		Moderate	Low	Low	Moderate

Surface Water Susceptibility Report Public Water System Name: BENNINGTON WATER SYSTEM Old Spring
Public Water System Number 6040006 07/30/2002 2:00:39 PM

1. System Construction		SCORE
Intake structure properly constructed	YES	0
Is the water first collected from an underground source? (i.e. Yes = spring developed with casing to collect water from beneath the ground; lower score. No = water collected after water contacts atmosphere; higher score.)	YES	0
	Total System Construction Score	0

2. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or	YES	4	0	0	
4 Points Maximum		4	0	0	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		10	4	4	4
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		3	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		2	1	1	0
Cumulative Potential Contaminant / Land Use Score		17	9	9	6
4. Final Susceptibility Source Score		10	5	5	7
5. Final Spring Ranking		Moderate	Low	Low	Low