SOLDIER MOUNTAIN RANCH (PWS # 5130002)
SOURCE WATER ASSESSMENT FINAL REPORT

April 15, 2003

State of Idaho
Department of Environmental Quality

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Executive Summary

Under the Federal 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. The Idaho Department of Environmental Quality (DEQ) is completing the assessments for all Idaho public drinking water systems.

The assessment for your particular drinking water source is based on a land use inventory within a 1,000-foot radius of your drinking water source, sensitivity factors associated with the source, and characteristics associated with either your aquifer or watershed in which you live.

The delineation process establishes the physical area around a drinking water source that will become the focal point of the assessment. The arbitrary-fixed radius method was used to delineate transient water systems (Idaho Source Water Assessment Plan, pg. 15 and E5-E6) by drawing a 1000-foot radius circle around the drinking water sources. This distance is the same for every transient drinking water source. It is impractical to develop more intensive delineations for these systems because of limited resources for protection and lack of jurisdiction over land use outside property boundaries.

This report, *Source Water Assessment for the Soldier Mountain Ranch: Public Water System (PWS) #5130002* describes the public drinking water system, the associated potential contaminant sources located within a 1,000-foot boundary around the drinking water source, and the susceptibility (risk) that may be associated with any associated potential contaminants. 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 system. **The results should <u>not be</u> used as an absolute measure of risk and is not intended to undermine the confidence in your water system.**

Final susceptibility scores are derived from equally weighing 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 most urban and heavily agricultural areas, the best score a well can get is moderate. Potential Contaminants/Land Uses are divided into four categories, inorganic contaminants (IOCs, e.g. nitrates, arsenic), volatile organic contaminants (VOCs, e.g. petroleum products), synthetic organic contaminants (SOCs, e.g. pesticides), and microbial contaminants (e.g. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

The *Soldier Mountain Ranch* drinking water system consists of three ground water wells that serves approximately 84 people through 23 connections: Well #1, Well #3, and Well #4. All of the wells rated highly susceptible to IOCs, VOCs, SOCs, and microbial contaminants. A well log and a sanitary survey were unavailable, resulting in a high system construction score. The predominant land use surrounding the wellheads is undetermined agriculture, contributing to the overall susceptibility of the system. If a well log and a sanitary survey are provided, the scores for hydrologic sensitivity and system construction could be reduced.

The initial computer generated contaminant source inventory conducted by DEQ did not identify any potential contaminant sources with the 1,000-foot boundary. However, the Geographic Information System (GIS) maps show that the delineations for the wells include the road that leads to the ranch, the West Fork of Threemile Creek, the East Fork of Threemile Creek, two lakes near the ranch, and a jeep trail near Well #4. All of these contaminants can contribute contaminants to the aquifer and make the well more vulnerable to contamination. The tables below list the contaminants for each well. A copy of the susceptibility analysis worksheets for the wells for your system along with maps showing any potential contaminant sources is included with this summary.

Table 1. Soldier Mountain Ranch, Well #1, Potential Contaminant Inventory

Site #	Source Description[1]	Source of Information	Potential Contaminants[2]
	Road to Ranch	GIS Map	IOC, VOC, SOC, Microbials
	East Fork of Threemile Creek	GIS Map	IOC, VOC, SOC, Microbials
	North Lake	GIS Map	IOC, VOC, SOC, Microbials
	South Lake	GIS Map	IOC, VOC, SOC, Microbials

[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 2. Soldier Mountain Ranch, Well #3, Potential Contaminant Inventory

Site #	Source Description[1]	Source of Information	Potential Contaminants[2]
	Road to Ranch	GIS Map	IOC, VOC, SOC, Microbials
	East Fork of Threemile Creek	GIS Map	IOC, VOC, SOC, Microbials
	West Fork of Threemile Creek	GIS Map	IOC, VOC, SOC, Microbials
	North Lake	GIS Map	IOC, VOC, SOC, Microbials
	South Lake	GIS Map	IOC, VOC, SOC, Microbials

[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 3. Soldier Mountain Ranch, Well #4, Potential Contaminant Inventory

Site #	Source Description[1]	Source of Information	Potential Contaminants[2]
	Road to Ranch	GIS Map	IOC, VOC, SOC, Microbials
	East Fork of Threemile Creek	GIS Map	IOC, VOC, SOC, Microbials
	Jeep Trail	GIS Map	IOC, VOC, SOC, Microbials

[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Analyses

The susceptibility of each well to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and 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 is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the 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.

The hydrologic sensitivity was moderate for the Soldier Mountain Ranch wells. The moderate score was based upon poor to moderately drained soil classes as defined by the National Resource Conservation Service (NRCS). Poor to moderately draining soils tend to impede the migration of contaminants to the aquifer. However, a well log was unavailable, limiting the information concerning the composition of the vadose zone, the depth to first ground water, and the presence of any fine-grained zones that could create an aquitard above the producing zone.

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 and the well casing is vented, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

System construction for the wells was rated highly vulnerable to contamination. A well log was unavailable, limiting the information concerning the thickness, diameter, and depth of the casing, the placement of the annular seal, the location of the highest production zone of the well, and the location of the static water level. A sanitary survey was also unavailable, limiting the information concerning the maintenance and condition of the wellhead and surface seals, the presence of a casing vent, and whether the wells are properly protected from surface flooding. When information is unavailable, a higher, more conservative score is given.

The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all Public Water Systems (PWSs) to follow DEQ standards. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Some of the requirements include casing thickness, well tests, and depth and formation type that the surface seal must be installed into. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Well tests are required at the design pumping rate for 24 hours or until stabilized drawdown has continued for at least six hours when pumping at 1.5 times the design pumping rate. Though the wells may have met standards at the time of construction, current construction standards are stricter. In this case, there was insufficient information to determine if the wells meet construction standards.

Potential Contaminant Source and Land Use

The wells rated moderate for IOCs (e.g., arsenic, nitrate), VOCs (e.g., petroleum products), SOCs (e.g., pesticides), and microbial contaminants (e.g., bacteria). Total coliform bacteria were detected in the distribution system between July 1998 and January 2001, with repeated detections in October 1998, April 1999, and June 1999. No VOCs or SOCs have been detected in the system. The IOC nitrate was detected at levels far below the maximum contaminant level (MCL) set by the EPA. The predominant agricultural land use contributed to the potential contaminant source and land use ratings for the wells

Final Susceptibility Rating

An IOC 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, having potential contaminant sources within 50 feet of the wellhead will give an automatic high susceptibility rating. Having multiple potential contaminant sources within the 1000-foot radius of the well and much agricultural land contribute greatly to the overall ranking. In terms of total susceptibility, the wells rated high to IOCs, VOCs, SOCs, and microbial contaminants. The predominant agricultural land use surrounding the wells, the lack of a well log, and the lack of a sanitary survey contributed greatly to the overall susceptibility of the system. If a well log and a sanitary survey are provided, the scores for hydrologic sensitivity and system construction could be reduced.

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, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For Soldier Mountain Ranch, drinking water protection activities should focus on implementation practices aimed at protecting the wells from contamination associated with potential contaminant sources within the 1000-foot radius of each wellhead. Partnerships with state and local agencies and industry groups should be established and are critical to success. You may want to establish a dialog with the relevant state and local agencies related to wellhead protection. Drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Providing a well log and a recent sanitary survey to the state or local agencies may assist them in determining your drinking water protection needs.

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 because the delineations show large areas of urban land use. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. For areas where transportation corridors transect the delineation, the Department of Transportation should be included in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

Assistance

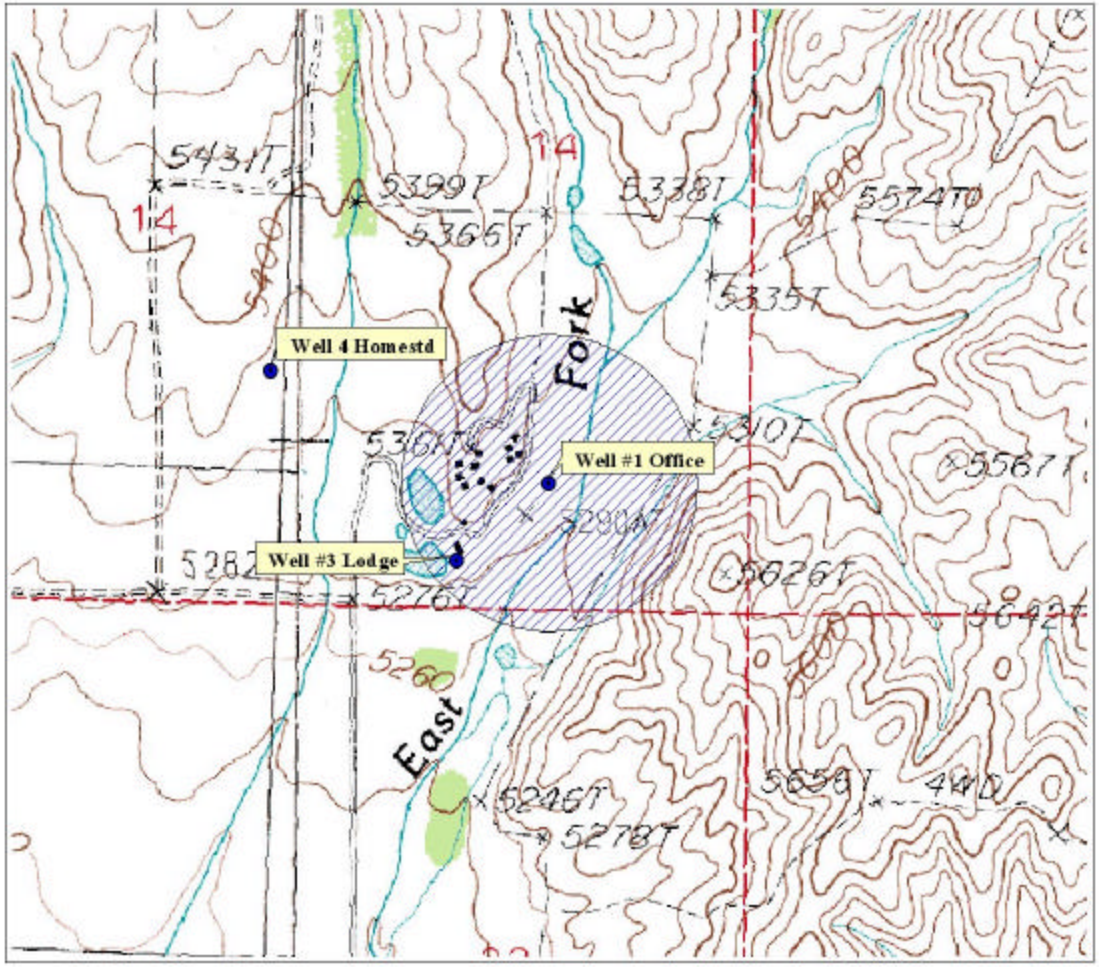
Public water suppliers and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Twin Falls Regional DEQ Office	(208) 736-2190
State DEQ Office	(208) 373-0502

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

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

Soldier Mountain Ranch: Well #1 Office
PWS Number: 5130002



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0 2000 4000 Feet

Legend

- Wellhead
- Enhanced Inventory
- Toxic Release Inventory
- CERCLIS Site
- RICRIS Site
- Business Mailing List
- Dairy
- LUST Site

UST Site

- Closed
- Open
- NPDES Site
- Mine
- AST
- Recharge Point
- SARA Title III Site (EPCRA)
- Injection Well
- Group1 Site
- Cyanide Site
- Boise VOCs
- Landfill
- Wastewater Land App.Site
- Transient Delineation

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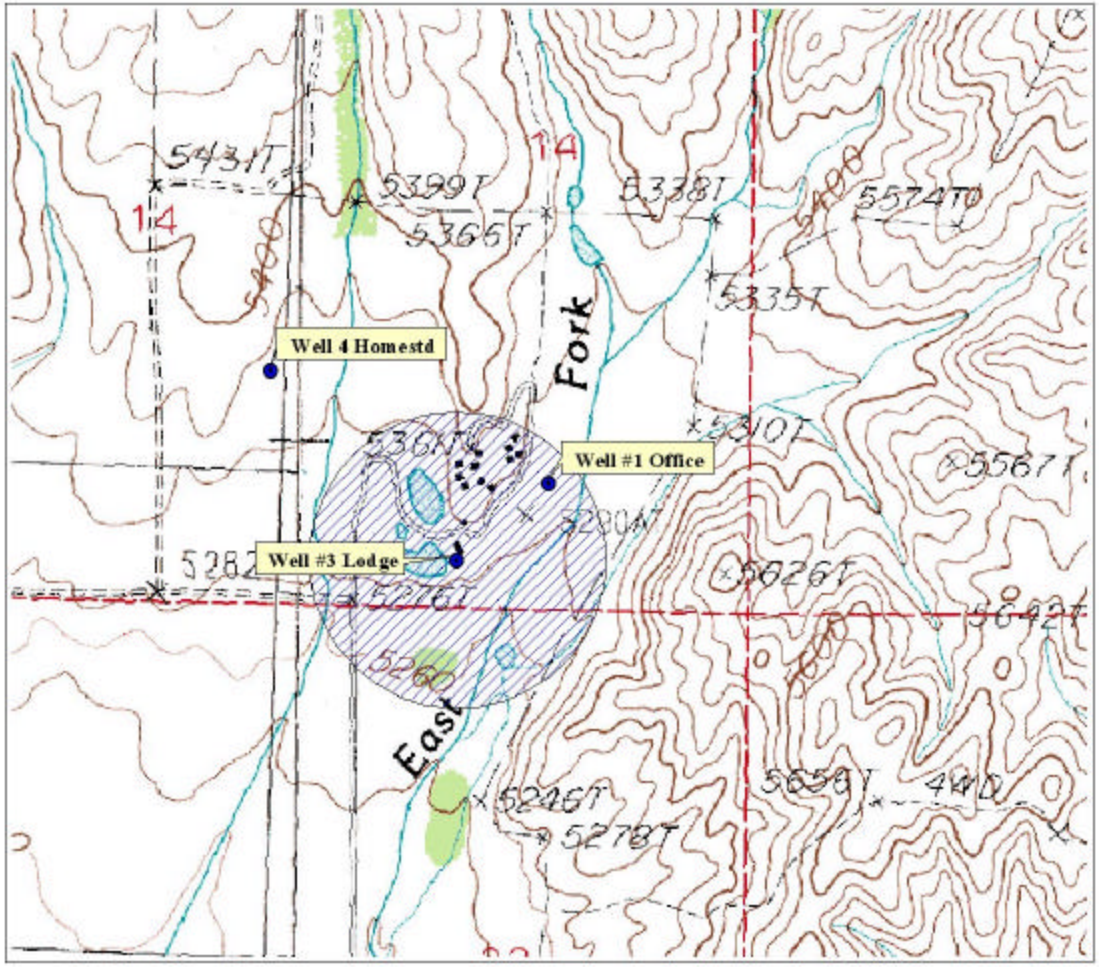
Soldier Mountain Ranch: Well #3 Lodge
PWS Number: 5130002



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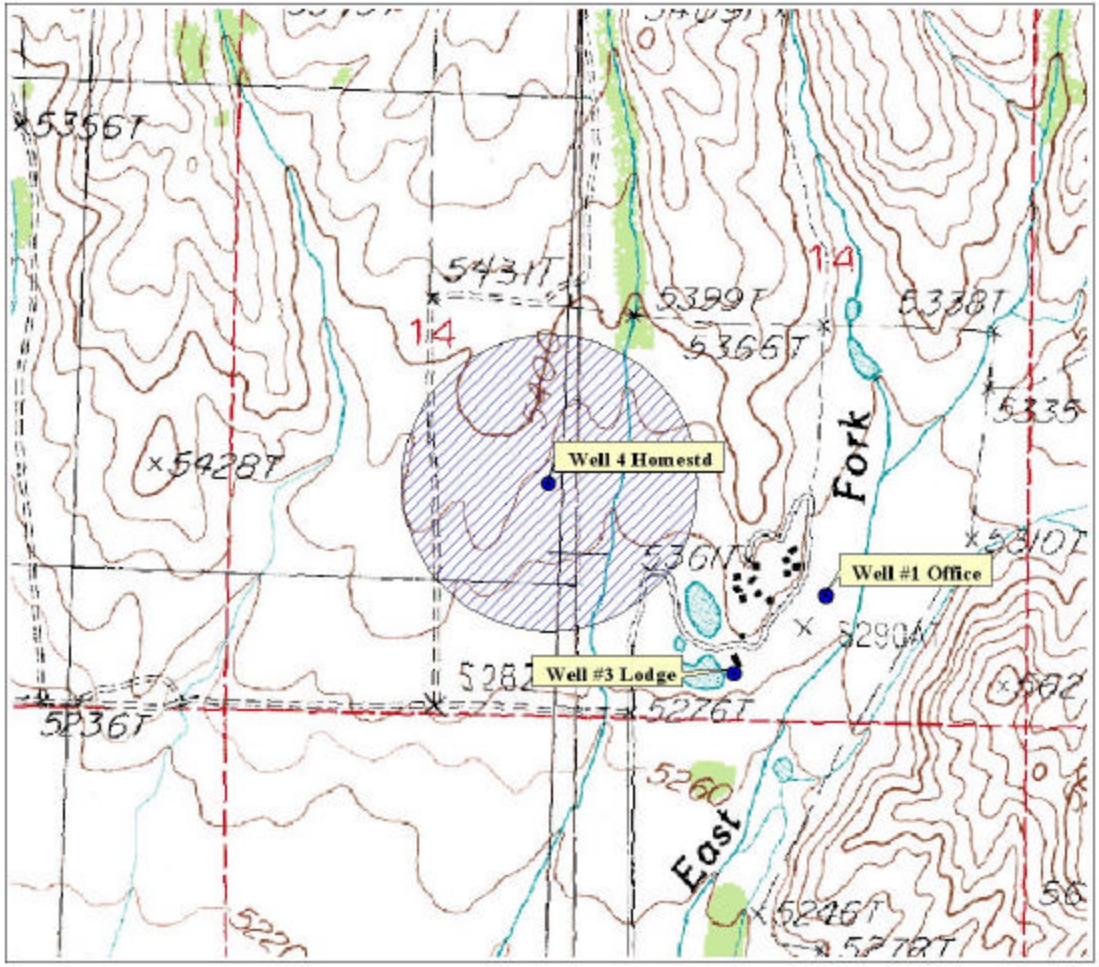
Soldier Mountain Ranch: Well 4 Homestd
PWS Number: 5130002



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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 Superfund 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 (IDEQ) 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 5 mg/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.

RICRIS – 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 IDEQ.

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.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

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

Idaho Department of Environmental Quality, 1997. *Design Standards for Public Drinking Water Systems.* IDAPA 58.01.08.550.01.

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

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

State Drinking Water Information System (SDWIS). IDEQ. 2003.

Susceptibility Analysis Formulas

The final 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 0.27)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report Public Water System Name : SOLDIER MOUNTAIN RANCH Well# : WELL #1 OFFICE

Public Water System Number 5130002 2/18/03 2:41:47 PM

1. System Construction		SCORE
Drill Date	UNKNOWN	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	NO	0
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	NO	1
Total System Construction Score		6

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	YES	0
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		4

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
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		1	1	1	1
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	4	4	4	4
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	6	4	4	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		14	14	14	10
Cumulative Potential Contaminant / Land Use Score		15	15	15	11
4. Final Susceptibility Source Score		14	14	14	14
5. Final Well Ranking		High	High	High	High

Ground Water Susceptibility Report Public Water System Name : SOLDIER MOUNTAIN RANCH Well# : WELL #3 LODGE

Public Water System Number 5130002 2/18/03 2:42:00 PM

1. System Construction		SCORE
Drill Date	UNKNONW	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	NO	0
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	NO	1
	Total System Construction Score	6

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	YES	0
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	4

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
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		1	1	1	1
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	5	5	5	5
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	7	5	5	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		14	14	14	10
Cumulative Potential Contaminant / Land Use Score		15	15	15	11
4. Final Susceptibility Source Score		14	14	14	14
5. Final Well Ranking		High	High	High	High

Ground Water Susceptibility Report Public Water System Name : SOLDIER MOUNTAIN RANCH Well# : WELL 4 HOMESTD

Public Water System Number 5130002 2/18/03 2:42:16 PM

1. System Construction		SCORE
Drill Date	UNKNOWN	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	NO	0
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	NO	1
	Total System Construction Score	6

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	YES	0
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	4

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
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		1	1	1	1
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	3	3	3	3
(Score = # Sources X 2) 8 Points Maximum		6	6	6	6
Sources of Class II or III leacheable contaminants or	YES	5	3	3	
4 Points Maximum		4	3	3	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Non-Irrigated Agricultural	2	2	2	2
Total Potential Contaminant Source / Land Use Score - Zone 1B		12	11	11	8
Cumulative Potential Contaminant / Land Use Score		13	12	12	9
4. Final Susceptibility Source Score		14	13	13	13
5. Final Well Ranking		High	High	High	High