WOODLAND HEIGHTS WATER ASSOCIATION (PWS 7100107)
SOURCE WATER ASSESSMENT FINAL REPORT

December 17, 2001

State of Idaho
Department of Environmental Quality

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Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency 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 source water assessment area and sensitivity factors associated with the wells and aquifer characteristics in the area.

This report, *Source Water Assessment for the Woodland Heights Water Association*, describes the public drinking water system, 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 Woodland Heights Water Association drinking water system consists of two groundwater wells. Wells #1 and #2 have high susceptibility ratings for inorganic, volatile organic, synthetic organic, and microbial contamination due to aquifer properties, high countywide agricultural chemical use, and the presence of potential sources of contaminants in the source water assessment area. Neither well has recorded concentrations of microbial contamination, volatile organic contamination (VOC), or synthetic organic contamination (SOC) during any water chemistry tests thus far.

In August 1999, the inorganic contaminants (IOCs) barium and fluoride were detected in a water sample collected from well #1at concentrations well below the Maximum Contaminant Level (MCL). In May 1996 and again in March 1999, the fluoride was detected in two water samples collected from well #2 at concentrations well below the MCL. Nitrate concentrations detected in water samples collected from both wells are below the MCL for nitrate.

Despite the lack of significant contamination in the well water, the Woodland Heights Water Association should be aware that the potential for contamination still exists. Surrounding agricultural land use practices, high county wide agricultural chemical use, and multiple potential contaminant sources pose a potential threat to the quality of the source water for the two Woodland Heights Water Association wells. In addition, the source water assessment areas for the Woodland Heights Water Association wells cross an organics priority area for the synthetic organic pesticide Atrazine.

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 the Woodland Heights Water Association, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system’s components and its capacity). If concentrations of nitrate detected in the source water continue to increase the Woodland Heights Water Association should investigate the use of various systems like ion exchange, reverse osmosis, or activated alumina to remove this chemical. Additionally, there should be a focus on implementation of practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas and awareness of the potential contaminant sources in the area. Since much of the designated protection areas are outside the direct jurisdiction of the Woodland Heights Water Association, it is important that partnerships with industry groups and state and local agencies be established. These collaborative efforts are critical to the success of drinking water protection. Both wells should adhere to sanitary survey standards regarding wellhead protection.

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. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the

Soil Conservation Commission, the local Soil and Water Conservation District, and the Natural Resources Conservation Service. The Environmental protection Agency (EPA) makes available its Drinking Water Academy for drinking water protection to all public water systems. It ‘s important to utilize these resources because a community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection program. For assistance in developing protection strategies please contact the Idaho Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR THE WOODLAND HEIGHTS WATER ASSOCIATION, BONNEVILLE COUNTY, 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 source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included in this report ~~attached~~. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is attached included.

Background

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 susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, 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 ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (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 public drinking water system for the Woodland Heights Water Association is comprised of two ground water wells that serve approximately 89 people through 33 connections. The wells are located west of Idaho Falls, Idaho (Figure 1). An SOC priority area for the pesticide Atrazine crosses the delineated source water assessment areas. In addition, county wide agricultural chemical use is high for this area.

The main water chemistry issue with the ground water quality is increasing concentrations of nitrate in the source water. From December 1994 to August 1999, nitrate was detected in three water samples collected from well #1 at concentrations ranging from 2.31 milligrams per liter (mg/L) to 3.25 mg/L. From December 1994 to December 2000, nitrate was detected in six water samples collected from well #2 at concentrations ranging from 2.51 mg/L to 2.79 mg/L. These detections are below the MCL for nitrate of 10 mg/l.

In August 1999, the IOCs barium and fluoride were detected in a water sample collected from well #1 at concentrations of 0.08 mg/L and 0.62 mg/L, respectively. These detections are well below the MCLs for barium and fluoride of 2.0 mg/L and 4.0 mg/L, respectively. In May 1996 and again in March 1999, fluoride was detected in two water samples collected from well #2 at concentrations of 0.34 mg/L and 0.35 mg/L, respectively.

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 well) for water in the aquifer. DEQ contracted with Washington Group, International (WGI) to perform the delineations using the refined computer model, Wellhead Analytical Element Model (WHAEM) approved by the EPA in determining the source 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 Eastern Snake River Plain (ESRP) aquifer in the vicinity of the Woodland Heights Water Association wells. The computer model used site specific data, assimilated by WGI from a variety of sources including the Woodland Heights Water Association operator report, other local area well logs, and hydrogeologic reports (detailed below).

The ESRP is a northeast trending basin located in southeastern Idaho. Ten thousand square miles of the basin are primarily filled with highly fractured layered Quaternary basalt flows of the Snake River Group, which are intercalated with terrestrial and lake deposited sediments along the margins (Garabedian, 1992, p. 5). Individual basalt flows range from 10 to 50 feet in thickness and average 20 to 25 feet (Lindholm, 1996, p. 14). Basalt is thickest in the central part of the eastern plain and thins toward the margins. Whitehead (1992, p. 9) estimates the total thickness of the flows to be as great as 5,000 feet. A thin layer (0 to 100 feet) of windblown and fluvial sediments overlies the basalt.

The plain is bound on the northeast by rocks of the Yellowstone Group (mainly rhyolite) and Idavada Volcanics to the southwest. The Snake River flows along part of the southern boundary and is the only drainage that leaves the plain. Rivers and streams entering the plain from the south are tributary to the Snake River. Rivers entering from the north vanish into the basalts of the Snake River Plain aquifer.

The layered basalts of the Snake River Group host one of the most productive aquifers in the United States. The aquifer is generally considered unconfined, yet it may be locally confined in some areas because of inter-bedded clay and dense unfractured basalt (Whitehead, 1992, p. 26). Whitehead (1992, p. 22) reports that well yields of 2,000 to 3,000 gallons per minute (gpm) are common for wells open to less than 100 feet of the aquifer. Lindholm (1996, p. 18) estimates aquifer thickness to range from several hundred feet near the plain's margin to thousands of feet near the center.

The majority of aquifer recharge results from surface water irrigation activities (incidental recharge), which divert water from the Snake River and its tributaries (Ackerman, 1995, p. 4, and Garabedian, 1992, p. 11). Natural recharge occurs through stream losses, direct precipitation, and tributary basin underflow.

Regional ground water flow is to the southwest paralleling the basin (Cosgrove et al., 1999, p. 21; deSonneville, 1972, p. 78; Garabedian, 1992, p. 48; and Lindholm, 1996, p. 23). Ground water flow direction at the local scale is thought to be highly variable due to preferential flow paths through the fractured and layered basalts.

The delineated source water assessment areas for the Woodland Heights Water Association wells can best be described as corridors approximately 0.3 miles wide at the wellhead to 0.8 miles wide where they intersect the Snake River, 2.75 miles to the northeast (Figure 2). Each of the delineations only has the 3-year time of travel because the Snake River is assessed to be the main source of the wells' water. The actual data used by WGI in determining the source water assessment delineation areas are available from DEQ upon request.

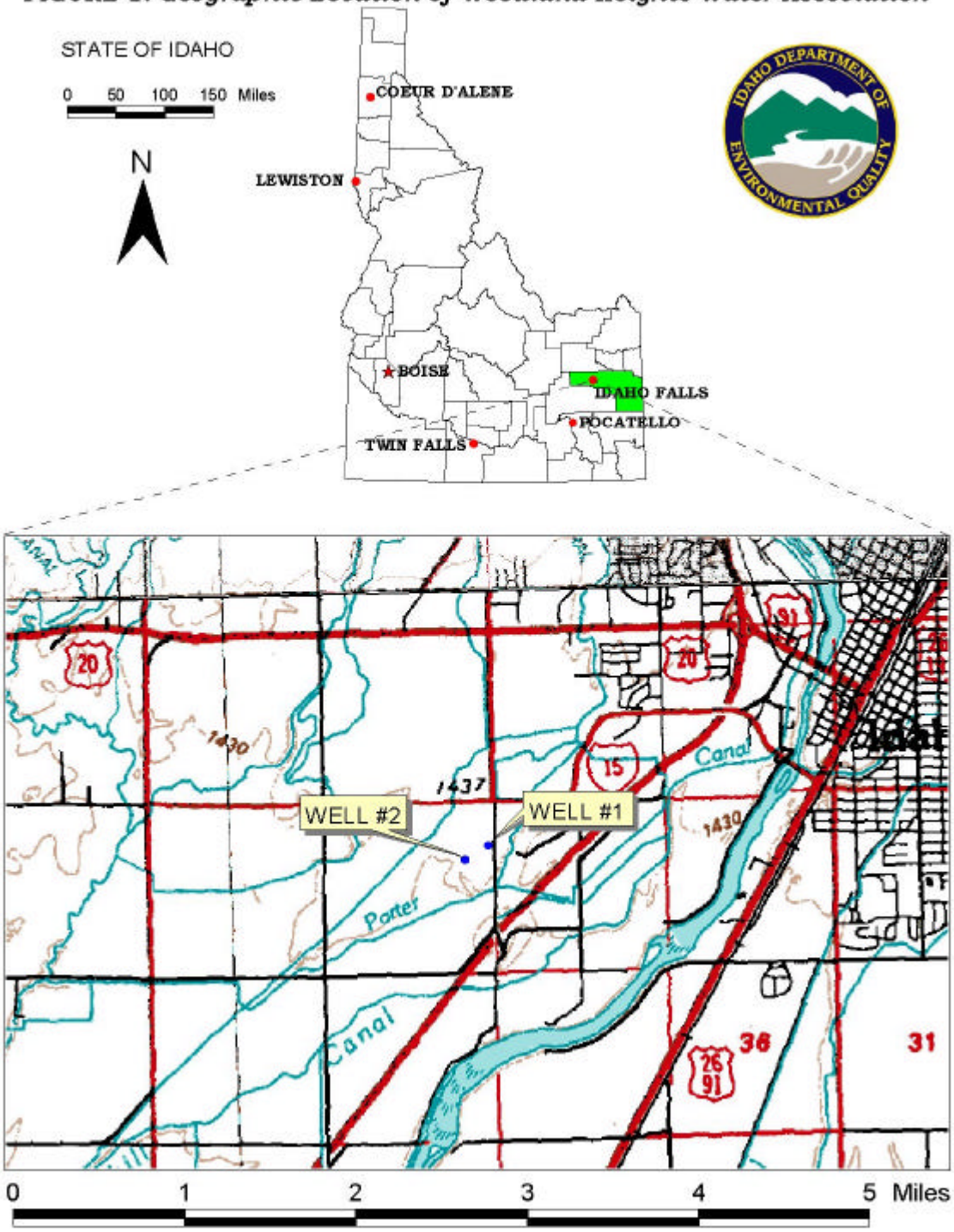
Identifying Potential Sources of Contamination

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 and has a sufficient likelihood of releasing such contaminants 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 groundwater contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use within the immediate area of the Woodland Heights Water Association wellheads consists of residential and agricultural land use, while the surrounding area is predominantly irrigated agriculture with urban land use where the delineation intersects Idaho Falls. Three major transportation corridors (Highway 15, Highway 20, and the Union Pacific Railroad) cross the source water assessment areas of the wells

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 <u>potential</u> 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.

FIGURE 1. Geographic Location of Woodland Heights Water Association



Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in May 2001. The first phase involved identifying and documenting potential contaminant sources within the Woodland Heights Water Association Source Water Assessment Areas (Figure 2) through the use of computer databases and Geographic Information System 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 area.

The delineated source water areas encompass corridors of land between the well sites and the Snake River. The delineated source water assessment areas for both wells (Table 1, Figure 2) contain one hundred and eleven (111) potential contaminant sources. These sources include Highway 15, Highway 20, the Union Pacific Railroad, and the Snake River. There are also numerous irrigation canals that cross the delineations. If an accidental spill occurred on the highway, Willow Creek, the Snake River, or the irrigation canals, IOCs, VOCs, SOCs, or microbial contaminants could be added to the aquifer system due to the fractured nature of the basalt aquifer.

Table 1. Inventory of potential sources that may contaminate Well #1 and Well #2 of the Woodland Heights water system.

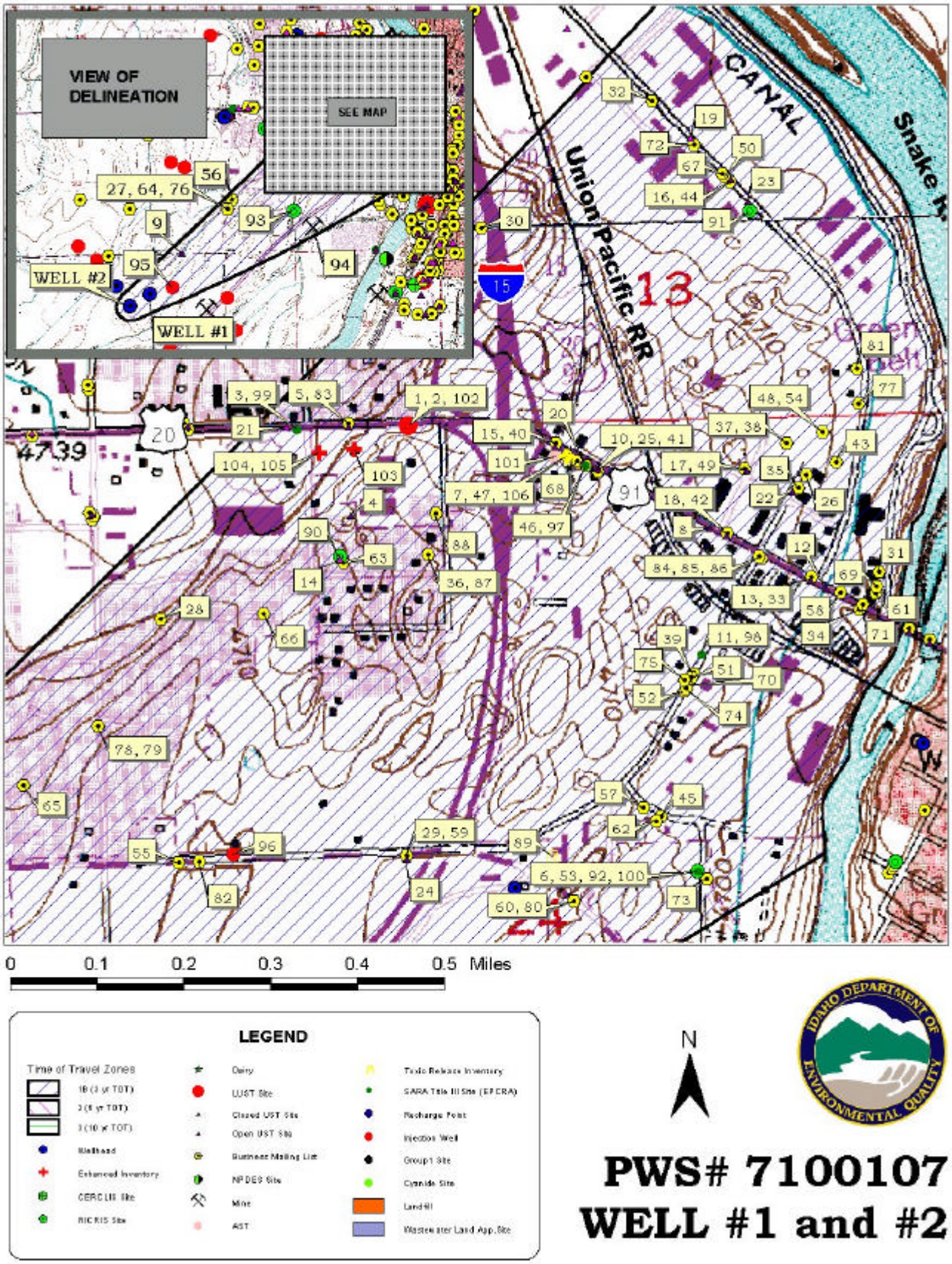
Site #	Source Description	TOT Zone[1]	Source of Information	Potential Contaminants[2]
1	Lust[3] site, Cleanup Completed , Impact: Unknown	0-3	Database Search	VOC, SOC
2	Ust[4] site, Gas Station; Closed	0-3	Database Search	VOC, SOC
3	Ust site, Gas Station; Open	0-3	Database Search	VOC, SOC
4	Ust site, Commercial; Closed	0-3	Database Search	VOC, SOC
5	Ust site, Not Listed; Closed	0-3	Database Search	VOC, SOC
6	Ust site, Contractor; Open	0-3	Database Search	VOC, SOC
7	Ust site, Gas Station; Open	0-3	Database Search	VOC, SOC
8	Ust site, Not Listed; Closed	0-3	Database Search	VOC, SOC
9	Ust site, Local Government; Closed	0-3	Database Search	VOC, SOC
10	Ust site, Not Listed; Closed	0-3	Database Search	VOC, SOC
11	Ust site, Truck/Transporter; Open	0-3	Database Search	VOC, SOC
12	Ust site, Auto Dealership; Closed	0-3	Database Search	VOC, SOC
13	Ust site, Not Listed; Closed	0-3	Database Search	VOC, SOC
14	Ust site, Local Government; Open	0-3	Database Search	VOC, SOC
15	Ust site, Gas Station; Closed	0-3	Database Search	VOC, SOC
16	Ust site, Commercial; Closed	0-3	Database Search	VOC, SOC
17	Ust site, Auto Dealership; Closed	0-3	Database Search	VOC, SOC
18	Ust site, Auto Dealership; Closed	0-3	Database Search	VOC, SOC
19	Ust site, Gas Station; Open	0-3	Database Search	VOC, SOC
20	Ust site, Not Listed; Closed	0-3	Database Search	VOC, SOC
21	Ust site, Gas Station; Open	0-3	Database Search	VOC, SOC
22	Ust site, Other; Closed	0-3	Database Search	VOC, SOC
23	Ust site, Other; Closed	0-3	Database Search	VOC, SOC
24	Ust site, Commercial; Closed	0-3	Database Search	VOC, SOC
25	Ust site, Gas Station; Closed	0-3	Database Search	VOC, SOC
26	Automobile Repairing & Service	0-3	Database Search	IOC, VOC, SOC
27	Veterinarians	0-3	Database Search	IOC, Microbes
28	Concrete Contractors	0-3	Database Search	IOC, VOC, SOC
29	Steel Fabricators	0-3	Database Search	IOC, VOC, SOC
30	General Contractors	0-3	Database Search	IOC, VOC, SOC
31	Landscape Contractors	0-3	Database Search	IOC, VOC, SOC

32	Automobile Electric Service	0-3	Database Search	IOC, VOC, SOC
33	Automobile Dealers-New Cars	0-3	Database Search	VOC, SOC
34	Automobile Dealers-Used Cars	0-3	Database Search	VOC, SOC
35	Industrial/Commercial Machinery/Equipment	0-3	Database Search	IOC, VOC, SOC
36	Tree Service	0-3	Database Search	VOC, SOC
37	Garbage Collection	0-3	Database Search	IOC, VOC, SOC, Microbes
38	Garbage Collection	0-3	Database Search	IOC, VOC, SOC, Microbes
39	Grinding Wheels (Manufacturers)	0-3	Database Search	IOC, VOC, SOC
40	Service Stations-Gasoline & Oil \+	0-3	Database Search	IOC, VOC, SOC
41	Service Stations-Gasoline & Oil	0-3	Database Search	IOC, VOC, SOC
42	Automobile Dealers-New Cars	0-3	Database Search	See 17
43	Bus Lines	0-3	Database Search	VOC, SOC
44	Textile Bags (Manufacturers)	0-3	Database Search	IOC, VOC
45	General Contractors	0-3	Database Search	IOC, VOC, SOC
46	Oils-Fuel (Wholesale)	0-3	Database Search	VOC, SOC
47	Service Stations-Gasoline & Oil	0-3	Database Search	IOC, VOC, SOC
48	Truck-Dealers-Used	0-3	Database Search	VOC, SOC
49	Automobile Renting & Leasing	0-3	Database Search	VOC, SOC
50	Coatings-Protective (Manufacturers)	0-3	Database Search	IOC, VOC, SOC
51	Electric Motors-Dealers/Repairing	0-3	Database Search	IOC, VOC, SOC
52	Movers	0-3	Database Search	VOC, SOC
53	Paving Contractors	0-3	Database Search	IOC, VOC, SOC
54	Engines-Diesel (Wholesale)	0-3	Database Search	IOC, VOC, SOC
55	Service Industry Machinery NEC	0-3	Database Search	IOC, VOC, SOC
56	Painters	0-3	Database Search	IOC, VOC, SOC
57	Trucking-Motor Freight	0-3	Database Search	VOC, SOC
58	Tools-Electric (Wholesale)	0-3	Database Search	IOC, Microbes
59	General Contractors	0-3	Database Search	IOC, VOC, SOC
60	Demolition Contractors	0-3	Database Search	IOC, VOC, SOC
61	Automobile Repairing & Service	0-3	Database Search	IOC, VOC, SOC
62	Automobile Parts & Supplies-Retail	0-3	Database Search	IOC, VOC, SOC
63	House & Building Movers	0-3	Database Search	IOC, VOC, SOC
64	Veterinarians	0-3	Database Search	IOC, Microbes
65	Painters	0-3	Database Search	IOC, VOC, SOC
66	Landscape Contractors	0-3	Database Search	IOC, VOC, SOC
67	General Contractors	0-3	Database Search	IOC, VOC, SOC
68	Automobile Parts & Supplies-Retail	0-3	Database Search	IOC, VOC, SOC
69	Photographers-Portrait	0-3	Database Search	IOC, VOC
70	Lawn Mowers	0-3	Database Search	IOC, VOC, SOC
71	Automobile Renting & Leasing	0-3	Database Search	VOC, SOC
72	Movers	0-3	Database Search	VOC, SOC
73	Excavating Contractors	0-3	Database Search	IOC, VOC, SOC
74	Screen Printing	0-3	Database Search	IOC, VOC
75	Storage-Household & Commercial	0-3	Database Search	IOC, VOC, SOC, Microbes
76	Veterinarians	0-3	Database Search	IOC, Microbes
77	Government-Forestry Services	0-3	Database Search	IOC, VOC, SOC
78	Landscape Contractors	0-3	Database Search	IOC, VOC, SOC
79	Tree Service	0-3	Database Search	VOC, SOC
80	Recycling Centers (Wholesale)	0-3	Database Search	VOC
81	Truck-Repairing & Service	0-3	Database Search	IOC, VOC, SOC
82	Excavating Contractors	0-3	Database Search	IOC, VOC, SOC
83	Service Stations-Gasoline & Oil	0-3	Database Search	IOC, VOC, SOC

84	Automobile Dealers-Used Cars	0-3	Database Search	VOC, SOC
85	Metalworking Machinery-NEC	0-3	Database Search	IOC, VOC, SOC
86	Snowmobiles	0-3	Database Search	IOC, VOC, SOC
87	Tree Service	0-3	Database Search	VOC, SOC
88	Leather Gloves & Mittens	0-3	Database Search	IOC, VOC
89	Toxic Release Inventory site	0-3	Database Search	IOC, VOC, SOC
90	RCRIS[5] site, Weed Control	0-3	Database Search	IOC, VOC, SOC
91	RICRIS site, Chemical Company	0-3	Database Search	IOC, VOC, SOC
92	RICRIS site, Contractors	0-3	Database Search	IOC, VOC, SOC
93	RICRIS site, Honda	0-3	Database Search	VOC, SOC
94	Sand & Gravel Mine	0-3	Database Search	IOC, VOC, SOC
95	Deep Injection Well, Active	0-3	Database Search	IOC, VOC, SOC
96	Deep Injection Well, Active	0-3	Database Search	IOC, VOC, SOC
97	SARA[6] site, no information	0-3	Database Search	IOC, VOC, SOC
98	SARA site, Delivery Service	0-3	Database Search	VOC, SOC
99	SARA site, Grocery	0-3	Database Search	Microbes
100	SARA site, Contractors	0-3	Database Search	IOC, VOC, SOC
101	AST[7] site, Diesel and Gasoline	0-3	Database Search	VOC, SOC
102	Arby's	0-3	Enhanced Inventory	VOC, Microbes
103	Comfort Inn	0-3	Enhanced Inventory	VOC
104	Chevron Station	0-3	Enhanced Inventory	VOC, SOC
105	McDonalds	0-3	Enhanced Inventory	VOC, Microbes
106	Wendy's	0-3	Enhanced Inventory	VOC, Microbes
	Highway 15	0-3	GIS Map	IOC, VOC, SOC, Microbes
	Highway 20	0-3	GIS Map	IOC, VOC, SOC, Microbes
	Union Pacific Railroad	0-3	GIS Map	IOC, VOC, SOC, Microbes
	Snake River	0-3	GIS Map	IOC, VOC, SOC, Microbes

[1] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
[3] LUST = Leaking Underground Storage Tank
[4] UST = Underground Storage Tank
[5] RICRIS = Site regulated under Resource Conservation Recovery Act
[6] SARA = Superfund Amendments and Reauthorization Act
[7] AST = Aboveground Storage Tank

Figure 2. Woodland Heights Water Association Delineation Map and Potential Contaminant Source Locations



PWS# 7100107
WELL #1 and #2

Section 3. Susceptibility Analyses

The water system's susceptibility 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. Attachment 'A' consists of the susceptibility analysis worksheet that DEQ has used to determine your system's susceptibility ranking. These results are summarized on Table 2 of this report. 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 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.

Hydrologic sensitivity is high for both wells (Table 2). This is a result of the soils being in the moderately to well-drained class, the fact that the water table is less than 300 feet from the surface, and the lack of laterally extensive low-permeability units to retard the downward movement of contaminants.

Well 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 and is outside the 100-year floodplain, then contamination from surface events is reduced.

Both wells have moderate system construction scores (Table 2). According to the 1990 Sanitary Survey, both wells have maintained wellheads and surface seals. Both wells are located outside of the 100-year floodplain and are protected from surface flooding.

The well logs indicate that the casing and annular seal of both wells was not extended into a low permeability unit. Although the wells may have met construction standards when the were first installed, they fail to meet current public water system (PWS) construction standards due to the lack of a pump test for both wells and the casing thicknesses. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Table 1 of

the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Eight-inch diameter well casing requires a casing thickness of at least 0.322 inches and six-inch diameter well casing requires a casing thickness of at least 0.280 inches. The Woodland Heights Water Association wells were constructed with 0.250-inch thick casing.

Potential Contaminant Source and Land Use

The wells rate high for IOCs (i.e. nitrates, arsenic), VOCs (i.e. petroleum products), and SOCs (i.e. pesticides), and moderate for microbial contaminants (i.e. bacteria). Agricultural land use, high county wide agricultural chemical use, and multiple potential contaminant sources in the delineated source water areas account for the potential contaminant inventory rating.

Both wells fall within the SOC priority area for the pesticide atrazine. The wells are also in a county with high levels of nitrogen fertilizer use, high herbicide use, and high total agricultural chemical use. Fortunately, no significant water chemistry problems have been recorded in the finished well water thus far.

Final Susceptibility Ranking

A detection above a drinking water standard MCL or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead indicates that a pathway for contamination already exists and therefore a high susceptibility rating is assigned regardless of land use of the area. 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) and agricultural land contribute greatly to the overall ranking. In terms of total susceptibility, both wells rate high for all categories.

Table 2. Summary of The Woodland Heights Water Association Susceptibility Evaluation

Well	**Susceptibility Scores[1]**									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	H	H	H	H	M	M	H	H	H	H
Well #2	H	H	H	H	M	M	H	H	H	H

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

Susceptibility Summary

Aquifer properties, intense agricultural practices, the high county wide use of agricultural chemicals, and the presence of multiple potential contaminant sources (Table 1) all contribute to the high susceptibility ratings. Though there are no significant water chemistry problems recorded for the source water to date, there have been detections in the finished well water of the IOCs barium, fluoride and nitrate at levels below the current MCL. Both wells fall within the SOC priority area for the pesticide atrazine. No VOCs or SOCs have been detected in the well water thus far.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility 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.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan. For the Woodland Heights Water Association, drinking water protection activities should focus on correcting any deficiencies outlined in the Sanitary Survey. If concentrations of nitrates detected in the source water continue to increase, the Woodland Heights Water Association should investigate the use of various systems like ion exchange, reverse osmosis, or activated alumina that could be used to remove this chemical. Additionally, there should be a focus on the implementation of practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas and awareness of the potential contaminant sources in the area. Since much of the designated protection areas are outside the direct jurisdiction of the Woodland Heights Water Association, it is important that partnerships with state and local agencies, and industry groups be established. These collaborative efforts are critical to the success of drinking water protection. Both wells should adhere to sanitary survey standards regarding wellhead protection. Continued vigilance in keeping the wells protected from surface flooding can also keep the potential for contamination reduced.

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 as the delineation contains some urban and residential land uses. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. Environmental Protection Agency. As there are transportation corridors through the delineation, the Idaho Department of Transportation should be involved 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.

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 Idaho Falls Regional Office of the Idaho Department of Environmental Quality 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.

Idaho Falls Regional DEQ Office	(208) 528-2650
State DEQ Office	(208) 373-0502

Website: http://www2.state.id.us/deq

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at 1-800-962-3257 for assistance with 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 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 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.

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

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Garabedian, S.P., 1992, Hydrology and Digital Simulation of the Regional Aquifer System, Eastern Snake River Plain, Idaho, U.S. Geological Survey Professional Paper 1408-F, 102 p.

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Idaho Department of Agriculture, 1998. Unpublished Data.

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Lindholm, G.F., 1996, Summary of the Snake River Plain Regional Aquifer-System Analysis in Idaho and Eastern Oregon, U.S. Geological Survey Professional Paper 1408-A, 59 p.

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Attachment A

Woodland Heights Water Association
Susceptibility Analysis
Worksheets

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 0.2)

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

Ground Water Susceptibility Report Public Water System Name :WOODLAND HEIGHTS WATER ASSN Well# : WELL #1
Public Water System Number 7100107 8/7/01 10:20:55 AM

1. System Construction		SCORE
Drill Date	4/4/69	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1990
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	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	59	99	95	10
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	11	29	29	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		12	12	14	8
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II		0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		21	19	23	10
4. Final Susceptibility Source Score		14	14	15	14
5. Final Well Ranking		High	High	High	High

Ground Water Susceptibility Report Public Water System Name :WOODLAND HEIGHTS WATER ASSN Well# : WELL #2
Public Water System Number 7100107 8/7/01 10:20:55 AM

1. System Construction		SCORE			
Drill Date	6/16/71				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES	1990			
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	IFRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	59	99	95	10
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	11	29	29	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		12	12	14	8
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II		0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		21	19	23	10
4. Final Susceptibility Source Score		14	14	15	14
5. Final Well Ranking		High	High	High	High