AURORA SUBDIVISION (PWS #3140007)
SOURCE WATER ASSESSMENT FINAL REPORT

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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 assessment for your particular system is based on a land use inventory of the designated source water area, sensitivity factors associated with each well, and characteristics of the aquifer that supplies your community with drinking water.

This report, *Source Water Assessment for the Aurora Subdivision, located near Nampa, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within those 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 Aurora Subdivision (PWS #3140007) drinking water system consists of a single well. Well #1 rated an overall high susceptibility to inorganic, volatile organic, synthetic organic and microbial contaminants. These high ratings are a result of the delineated source water area residing within a region of elevated countywide farm chemical use. The Idaho Department of Environmental Quality (DEQ) considers these regions to be potentially vulnerable to drinking water contamination because of the leaching of pollutants from surrounding agricultural practices. The system is also encompassed by DEQ designated Group 1 Priority Areas for nitrates and the pesticides atrazine and alachlor. Because these compounds possess the ability to leach downward through the soil, the water system may be subject to drinking water contamination. Nevertheless, nitrate levels have never exceeded 1.0 milligrams per liter (mg/L) in any random sampling, and the two aforementioned pesticides have never been detected in the system.

The overall high rating may have been reduced if a well log would have been available and could have been incorporated into the susceptibility analysis. Well logs contain valuable information regarding well construction and hydrologic characteristics of the aquifer. Instead, the system was assigned a fairly conservative ranking, because the intricacies of the well are unknown.

Several potential contaminant sources are located within the delineated drinking water area including a historical leaking underground storage tank (LUST) located approximately 1 ½ miles from the wellhead. This site has been remediated and subsequently closed, but the impact of previous leaking gasoline at the LUST is unknown. All of the potential contaminant sources located within the delineated drinking water capture zone, along with the class of contaminants stored at each site can be found in Table 2 on page 20 of this report. The existence of these sites also increased the overall susceptibility scores.

The well has not recorded the presence of synthetic organic or volatile organic chemicals during any water chemistry tests. However, total coliform bacteria have been identified in three random samples taken from the distribution system in the seven-month period from October 2000 to May 2001. Each subsequent test for *E. coli* was negative but the presence of total coliform bacteria should be closely monitored in order to shelter the health of the Aurora Subdivision.

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.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed protection program will incorporate many strategies. For the Aurora Subdivision, drinking water protection activities should first focus on continued maintenance of the sanitary seal and distribution system. Actions should also be taken to keep a 50-foot radius circle clear around the wellhead. 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.

Any spills occurring on Highway 45 should be monitored and dealt with expeditiously. An emergency response plan should be developed and made available to help with this effort. There should also be a focus on implementation of practices aimed at reducing the leaching of agricultural chemicals within the delineated ground water capture zone. The system may want to periodically monitor for volatile organic chemicals that could possibly enter the well from the historical LUST site located up gradient from the well bore. In addition, because a large portion of the delineation is outside the direct jurisdiction of the Aurora Subdivision, the creation of partnerships with state and local agencies and industry groups are critical to the success of drinking water protection. Should microbial contamination become a persistent problem, appropriate disinfection practices would need to be implemented to ensure that the health of the Aurora Subdivision will be protected.

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, especially since the delineation contains both urban and residential land uses. Public education topics could include proper lawn care practices, household hazardous waste disposal methods, 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 U.S. Environmental Protection Agency. In addition, because a major transportation corridor (Highway 45) passes through the delineation, the Idaho Department of Transportation should be involved in any protection measures. Drinking water protection practices dealing with agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Canyon Soil Conservation District, and the Natural Resources Conservation Service.

A community should 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, water conservation, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of the Idaho Department of Environmental Quality at 373-0550 or the Idaho Rural Water Association at 1-800-962-3257.

SOURCE WATER ASSESSMENT FOR THE AURORA SUBDIVISION, NAMPA, 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.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are contained in this report (Attachment A, pages 17-20). The list of significant potential contaminant source categories and their rankings used to develop the assessment is also attached.

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 each drinking water source in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act Amendments of 1996. This assessment is based on a land use inventory of the delineated source water area, sensitivity factors associated with each well, and aquifer characteristics. Since there are over 2,900 public water sources in Idaho, there is limited time and resources available to accomplish the assessments. All of these 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. 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. 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

Aurora Subdivision has a community public drinking water system serving approximately 30 people that is located in Canyon County south of Nampa and east of Lake Lowell (Figure 1). Residents receive their water from a single well.

The primary water quality issue currently facing the Aurora Subdivision is the recent detection of total coliform bacteria in the distribution system. A random sample retrieved from the well in January of 1990 contained 90 colony forming units of bacteria per 1 Liter of water (cfu/L). This appears to be an isolated incident, and the system was free of bacteriological contamination until October of 2000, when total coliform bacteria were discovered, this time within the distribution system. Furthermore, total coliforms were again discovered in the distribution system in November of 2000, and in May of 2001. All subsequent tests performed on the contaminated samples were negative for *E. coli.* Because each of these three positive samples were obtained from the distribution system, it can be hypothesized that the bacteria are not originating from contaminated well water, but instead due to a problem somewhere within the distribution system or possibly because of tainted sampling techniques.

The well has not recorded the presence of synthetic organic compounds (SOCs) or volatile organic compounds (VOCs) during any water chemistry tests. The inorganic compounds (IOCs) nitrate, fluoride, arsenic, and barium have all been detected in the Aurora Subdivision water system, but at levels far below the respective maximum contaminant levels (MCLs).

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 (regions indicating the number of years necessary for a particle of water to reach a pumping well) for water in the aquifer. DEQ contracted with BARR Engineering to perform the delineations using a combination of MODFLOW and a refined analytical element 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 Boise Valley aquifer. The computer model used site specific data, assimilated by BARR Engineering from a variety of sources including area well logs, the Treasure Valley Hydrologic Project, and hydrogeologic reports (detailed below in Section 3).

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 ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. 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 these possible contamination sources, including educational visits, inspections of stored materials, and by encouraging the use of specific best management practices and

pollution prevention measures. 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 October of 2001. The first phase involved identifying and documenting potential contaminant sources within the Aurora Subdivision source water assessment area (Attachment A, pages 17-20) 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 system operator, Art Imel, to validate the sources identified in phase one and to add any additional potential sources in the area.

The delineated drinking water capture zone contains several sites that could potentially impact the water system. Within the 3-year TOT zone, the most significant site of concern is a remediated LUST site, which is located approximately 1 ½ miles from the well bore. The site is now closed, but the impact of previously leaking petroleum products into the vadose zone from the LUST is unknown. In addition, a National Pollutant Discharge Elimination Site (NPDES) is situated in the 3-year TOT zone. These sites possess NPDES permits, which allow the facility to discharge regulated pollutants from a point source into a surface water body. In this case, the facility discharges aquaculture wastes into Wilson Drain, which passes through the 3-year TOT zone.

Highway 45 (12th Avenue) also happens to cross through the designated source water area in the 3-year TOT zone. Because Highway 45 serves as an important transportation thoroughfare for the region, it was considered a possible source of contamination for all classes of pollutants. An emergency response plan should be available in the unlikely event of a spill or release on Highway 45 in the vicinity of Aurora Subdivision.

Within the 6-year TOT zone, there are two automobile repair shops. The Aurora Subdivision may wish to contact these shops to make them aware that inappropriate actions may potentially effect drinking water for the Aurora community. Partnerships with these businesses, along with the utilization of best management practices and pollution prevention, will assist with drinking water protection goals and measures.

Section 3. Hydrologic Conditions of the Treasure Valley

Treasure Valley Hydrologic Project Information (Petrich and Urban, 1996; Neely and Crockett, 1998; Petrich et al., 1999)

The "Treasure Valley" is a geopolitical region that includes the lower Boise River sub-basin. The lower Boise River sub-basin begins where the Boise River exits the mountains near the Lucky Peak Reservoir. From Lucky Peak Dam the lower Boise River flows about 64 (river) miles northwestward through the Treasure Valley to its confluence with the Snake River. The Treasure Valley Hydrologic Project area encompasses the lower Boise River area, and extends south to the Snake River. The southern area is included in the study area because of ground water flow from the Lower Boise River basin south toward the Snake River.

Significant amounts of desert area were converted to flood irrigated agriculture beginning in the 1860s. Irrigation led to increases in shallow ground water levels in some regions. These shallow ground water levels provided an inexpensive and readily obtainable source of water supply that is used extensively throughout the valley. Much of the population growth in the Treasure Valley has been occurring in previously flood-irrigated agricultural areas, resulting in increased pumpage and a reduction in local aquifer recharge. In addition, irrigation in some areas has become more efficient, reducing the amount of irrigation-related infiltration. Decreasing aquifer recharge and increasing pumpage is thought to be contributing to the decline of ground water levels in some areas.

The Treasure Valley experiences a temperate and arid-to-semiarid climate. Average high temperatures range from about 90°F in summer to 36°F in winter; low temperatures range from about 20°F in winter to about 56°F in summer. The average precipitation ranges from about 8 to 14 inches throughout most of the valley, most of which falls during the colder months in the form of snow in higher elevations and rain in the low-lying valleys.

Major surface water bodies include the Boise River, Lake Lowell, and Lucky Peak Reservoir. The primary source of surface water in the Treasure Valley is the high elevation area in the Boise River basin upstream of Lucky Peak Dam. Much of the spring runoff from the snow pack in high elevation areas is stored in three reservoirs: Anderson Ranch Reservoir, Arrowrock Reservoir, and Lucky Peak Reservoir.

Regional cropland is irrigated primarily with surface water through an extensive network of reservoirs and canals. The first canals were constructed in the 1860's; there are now over 1,100 miles of major and intermediate canals in the Treasure Valley, the majority of which are owned and maintained by canal companies and irrigation districts. Primary sources of irrigation water in the Treasure Valley include the Boise, Snake, and Payette Rivers.

Hydrogeology (from Petrich et al., 1999)

The lower Boise River sub-basin (Treasure Valley) is located within the northwest-trending topographic depression known as the western Snake River Plain. The western Snake River Plain is a relatively flat lowland separating Cretaceous granitic mountains of west-central Idaho from the granitic/volcanic Owyhee mountains in southwestern Idaho. The western Snake River Plain extends from about Twin Falls, Idaho northwestward to Vale, Oregon. The Snake River Plain is about 30 miles wide in the section containing the lower Boise River.

Historically, sediments originating from the surrounding mountains began accumulating on top of thick, basal basalts. Rifting and continued subsidence maintained the lowland topography, leading to the additional accumulation of water and sediments (Othberg, 1994). Basin infilling by sediments and basalt occurred from the late Miocene through the late Pliocene (Othberg, 1994). Incision caused by flowing water in major drainages (e.g., Snake and Boise Rivers) began in the late Pliocene or early Pleistocene, although deposition of coarse sediments continued during Quaternary glaciations (Othberg, 1994).

Several Quaternary basalt flows have been described in the western Snake River Plain, and have been assigned to the upper Snake River Group (Malde, 1991; Malde and Powers, 1962). Lava flowed across portions of the ancestral Snake River Valley (Malde, 1991) in an area that is now south of the Boise

River. The Snake River then changed course, incising at its present location along the southern margin of the basalt flows. More recent eruptions (from Kuna Butte and other local sources) spilled lava into the canyon south of Melba. The Snake River has since incised this basalt (Malde, 1991).

The general stratigraphy of the western Snake River Plain consists of (from top to bottom) a thick layer of sedimentary deposits underlain by a thick series of basalt flows, which in turn are underlain by older, tuffaceous sediments and basalt (Malde, 1991; Clemens, 1993). The upper thick zone of sediments (up to approximately 6,000 feet thick) distinguishes the western Snake River Plain from the eastern Snake River Plain, in which the upper section is primarily Quaternary basalt (Wood and Anderson, 1981).

The uppermost sediments and basalt belong to the Pleistocene-age Snake River Group. The Snake River Group consists of terrace sediments, Quaternary alluvium, and Pleistocene basalt flows (Wood and Anderson, 1981). Snake River Group sediments and basalts cover much of the project area (Othberg and Stanford, 1992).

The Snake River Group overlies the Idaho Group sediments. The Idaho Group sediments can be divided into two general parts (Wood and Anderson, 1981). The lower Idaho Group contains sediments described as lake and stream deposits of buff white, brown, and gray sand, silt, clay, diatomite, numerous thin beds of vitric ash, and some basaltic tuffs. The upper part of the lower Idaho Group also contains some local, thin, basalt flows. The upper Idaho Group consists of sands, claystones, and siltstones, but differs from the lower Idaho Group in that it contains a greater percentage of coarser-grained materials. The upper Idaho Group sediments are associated with a fluvial/deltaic/lacustrine depositional environment; the lower Idaho Group sediments were deposited in more of a lacustrine/deltaic environment (Wood, 1994).

Wood (1994) identified a buried lacustrine delta within the Idaho Group sediments in the Nampa-Caldwell area. The location of the delta in the middle of the western Snake River Plain suggests that the eastern part of the Boise River basin was delta plain and flood plain at the time of deposition, while the western part was a deep lake environment. The delta probably prograded northwestward into a lake basin 830 feet deep, based upon high resolution seismic reflection data and resistivity log interpretations. The delta-plain and front sediments were shown to be mostly fine-grained, well-sorted sand with thin layers of mud (Wood, 1994). The northwest trend of the delta indicates a sediment source to the southeast, such as where the Snake River flows today (Wood, 1994).

A substantial, laterally extensive layer of clay is found at depths of 300 to 700 feet below ground surface. The clay is important because it represents, in some areas, a significant aquitard separating shallow overlying aquifers from deeper zones. The clay, often described in well logs as having a blue or gray color, has been observed as far west as Parma, and as far east as Boise (although the clay is not found in the extreme eastern portions of the Treasure Valley). The clay varies from a few feet to a few hundred feet in thickness. Although significant layers of clay are present throughout the Idaho Group sediments, individual clay units are not necessarily continuous over large areas. Also, the top of the clay can vary in elevation by up to approximately 200 feet in some locations, such as in an area west of Lake Lowell. In general, sediments above the "blue clay" are coarser-grained than the interbedded sands, silts, and clays underlying the "blue clay."

The top of the upper Idaho Group is marked in several parts of the Treasure Valley by a widespread

fluvial gravel deposit known as the Tenmile gravels. Tenmile gravels contain rounded granitic rocks and felsic porphyries originating from the Idaho Batholith to the north and northeast. The Tenmile gravels range up to 500 feet in thickness along the Tenmile Ridge south of Boise, but are less than 50 feet thick in the Nampa-Caldwell area (Wood and Anderson, 1981).

Aquifer Systems and Hydrogeologic Characteristics

Ground water for municipal, industrial, rural domestic, and irrigation uses in the Treasure Valley is drawn almost entirely from Snake River Group and Idaho Group aquifers. Many domestic wells draw water from shallow aquifers, such as those in the Snake River Group deposits. Larger production wells (for municipal and agricultural uses) draw water from the deeper Idaho Group sediments.

Aquifers contained in the Snake River and Idaho Group sediments comprise shallow and regional ground water flow systems. Shallow aquifers contained in Snake River Group sediments and basalts may belong to local flow systems. Most local flow system recharge stems from irrigation infiltration and channel (e.g., streams or canals) losses. Discharge from shallow, local flow systems often is to local drains or streams. The time from recharge to discharge in shallow flow systems (residence times) probably ranges from days to tens of years.

In contrast, regional ground water flow systems extend much deeper than local flow systems. The Treasure Valley regional flow system begins in the eastern part of the valley, as indicated by downward hydraulic gradients in the Boise Fan sediments (Squires et al., 1992). Some water also enters the regional flow system as underflow from the Boise Foothills in the northeastern part of the valley. The regional flow system is thought to discharge primarily to the Boise and Snake Rivers in the western and southwestern parts of the valley.

Aquifer material characteristics, material heterogeneity, and structural controls influence Treasure Valley ground water flow. Coarse-grained materials (e.g., sand and gravel) in upper zones are more capable of transmitting ground water than fine-grained sediments (e.g., silt and clay). Clay and silt in the Snake River sediments can restrict vertical and/or horizontal ground water movement. Perched aquifers are created when fine-grained lenses impede downward vertical flow. A distinctive clay layer, sometimes referred to as "blue clay," is present over large portions of the valley. The clay is absent in the easternmost portions of the lower Boise River Basin, but can reach a thickness of more than 200 feet toward the central and western portions of the basin.

Sequences of interbedded sand, silt, and clay, such as the Deer Flat Surface and the upper portion of the Glenns Ferry Formation of the upper Idaho Group in the Nampa-Caldwell area, are the major water-producing aquifers in a large part of Canyon County (Anderson and Wood, 1981). The coarse-grained sediments in this zone produce water in excess of 2,000 gallons per minute (gpm).

The delineated source water assessment area for the Aurora Subdivision can best be described as an eastward trending corridor approximately 4 miles long and ½ mile wide (Figure 2, page 19). The actual data used by BARR Engineering in determining the source water zones of contribution are available from DEQ upon request.

Section 4. Susceptibility Analysis

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 B on page 22 of this report contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: 1) the surface soil composition, 2) the material in the vadose zone (region between the land surface and the water table), 3) the depth to first ground water, and 4) the presence of a 50-foot thick impermeable zone above the production interval of the well. Slowly draining fine-grained soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. For Aurora Subdivision, regional soil information indicates the presence of moderate to well draining soils within the delineation. These soils provide less protection to the system by allowing for a more rapid downward movement of contaminants in the unlikely event of a spill or release near the well bore.

A well log for Aurora Subdivision could not be located by DEQ; however, several well logs for systems in close proximity to Aurora were available. From the information gathered from these various systems, it is clear that the hydrologic conditions of the region are highly erratic. The surrounding well depths ranged in depth from 70 feet to 425 feet, and the static water level (depth to first ground water) varied from as little as 6 feet to as much as 86 feet below ground surface. Most of the vadose zones in these regional wells consisted of sand and gravel, but some wells contained sandy clay layers and even fractured basalt in one particular case. Because of the high degree of variability in these wells, it is very difficult to gauge the hydrologic conditions for the Aurora Subdivision well without the benefit of a well log specific to this system.

Hydrologic sensitivity rated high for the Aurora Subdivision well (Table 1). This rating can be attributed, in large part, to the fact that a well log was not available for the system. Therefore, little information could be obtained with regards to the below ground hydrologic environment. Had a well log been located, the hydrologic sensitivity score would most likely have been reduced.

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 a better buffering capacity. In addition, if the wellhead and surface seal are

maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less probable. Also, if the wellhead is protected from surface flooding and is outside the 100-year floodplain, then the likelihood of contamination from surface events is reduced.

A well log for the Aurora Subdivision was not available. However, according to the 1995 Sanitary Survey conducted by the Southwest District Health Department, the well seal is in good condition and therefore should provide adequate initial protection to surface events.

The system construction score for Aurora Subdivision was moderate. This ranking was lowered due to the presence of a sanitary seal, and the fact that the well lies outside of the 100-year flood plain. The score would likely have been even further reduced if a well log could have been incorporated into the susceptibility analysis. Instead, the system was assigned a fairly conservative ranking, because the intricacies of the well are unknown below ground surface.

Potential Contaminant Source and Land Use

In terms of the total potential contaminant source/land use score, the well rated high for IOCs such as nitrates and arsenic, VOCs including petroleum products, and SOCs such as pesticides, and low for microbial contaminants including bacteria.

Irrigated agricultural land uses in the area contributed significantly to this rating. These areas are considered by DEQ to be increasingly vulnerable to ground water contamination due to the leaching of organic chemicals and nitrates from the application of pesticides and fertilizers on the surrounding farmland. County level agricultural chemical use is high in the region. Additionally, the well resides within DEQ designated Group 1 Priority Areas for nitrates and the pesticides atrazine and alachlor. Because these compounds all possess the ability to leach downward through the vadose zone, the Aurora Subdivision may be subject to future ground water contamination. However, nitrate levels in random samples collected from the system have never exceeded 1.0 mg/L, far lower than the MCL of 10 mg/L. Furthermore, the pesticides atrazine and alachlor have never been recorded at any measurable level in the drinking water.

The presence of several possible sites of contamination within the drinking water capture zone also increased the potential contaminant source/land use score. The aforementioned historical LUST site poses the greatest source of concern due to residual amounts of petroleum products that may persist from this site, even though it has been remediated and officially closed. Highway 45 (12th Avenue) should also be closely monitored for spills or releases of pollutants, however unlikely these events may seem. All of the potential contaminant sources within the delineated drinking water area are listed, along with the classes of contaminants stored at each site in Table 2.

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a repeat 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 lead to an automatically 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) and the presence of agricultural land contribute greatly to the overall ranking. The Aurora Subdivision water system could have rated a lower overall susceptibility if a well log could have been located for the Aurora well. Instead, the system rated a high overall susceptibility to IOCs, VOCs, SOCs, and microbial contaminants (Table 1).

Table 1. Summary of the Aurora Subdivision 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	L	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

A high hydrologic sensitivity and moderate system construction combined to give the well a high overall rating for all contaminants. Though there are no significant water chemistry problems in the ground water, there have been detections of total coliform bacteria in routine water samples collected from the system. No VOCs or SOCs have ever been detected in the well water. The location of the water system can be held most responsible for the high ratings, since the delineated source water area does reside in a region of elevated countywide agricultural chemical use. DEQ considers these regions to potentially be vulnerable to drinking water contamination because of the leaching of pollutants from surrounding agricultural practices. DEQ designated Group 1 Priority Areas for nitrates and the pesticides atrazine and alachlor also encompass the water system. Additionally, the presence of several potential contaminant sources within the delineated drinking water area, especially those within the 3-year TOT zone (see Table 2, page 20) increased the overall susceptibility scores.

Section 5. 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 source water protection program is tailored to the particular local source water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the Aurora Subdivision, drinking water protection activities should first focus on continued maintenance of the sanitary seal and distribution system. Actions should also be taken to keep a 50-foot radius circle clear around the wellhead. 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.

Any spills occurring on Highway 45 should be monitored and dealt with expeditiously. An emergency response plan should be developed and made available to help with this effort. There should also be a focus on implementation of practices aimed at reducing the leaching of agricultural chemicals within the designated source water area. In addition, because a large portion of the ground water capture zone is outside the direct jurisdiction of the Aurora Subdivision, the creation of partnerships with state and local agencies and industry groups are critical to the success of drinking water protection. Should microbial contamination become a persistent problem, appropriate disinfection practices would need to be implemented to ensure the health of the Aurora Subdivision residents.

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, especially since the delineation contains some urban and residential land uses. Public education topics could include proper lawn care practices, household hazardous waste disposal methods, 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 U.S. Environmental Protection Agency. In addition, because a major transportation corridor (Highway 45) passes through the delineation, the Idaho Department of Transportation should be involved in any protection measures. Drinking water protection practices dealing with agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Canyon 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 Boise 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.

Boise Regional DEQ Office (208) 373-0550

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 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.

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.

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Attachment A

Delineation Figures and Potential Contaminant Source Table for Aurora Subdivision

FIGURE 1: Geographic Location of Aurora Subdivision

PWS# 3140007

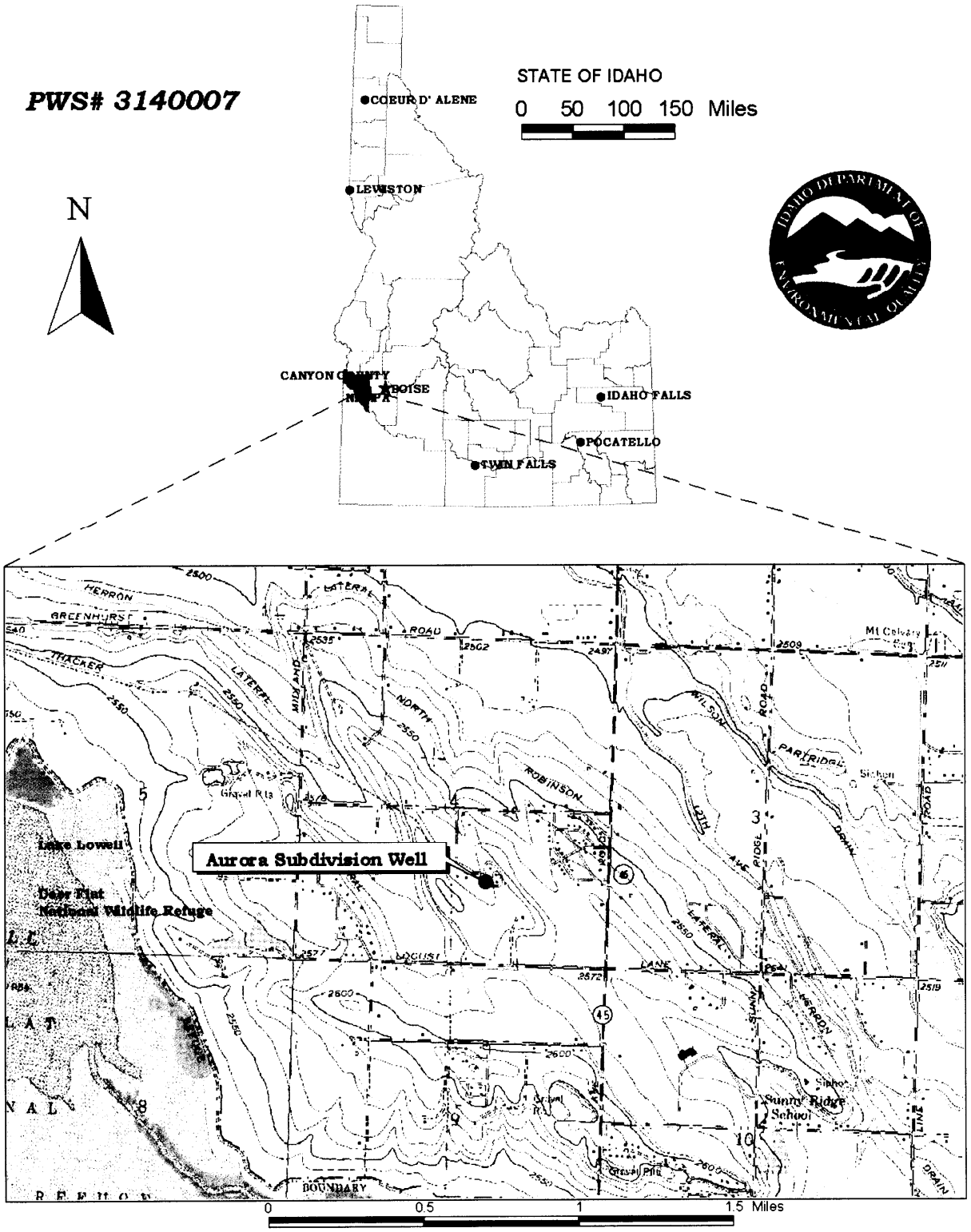
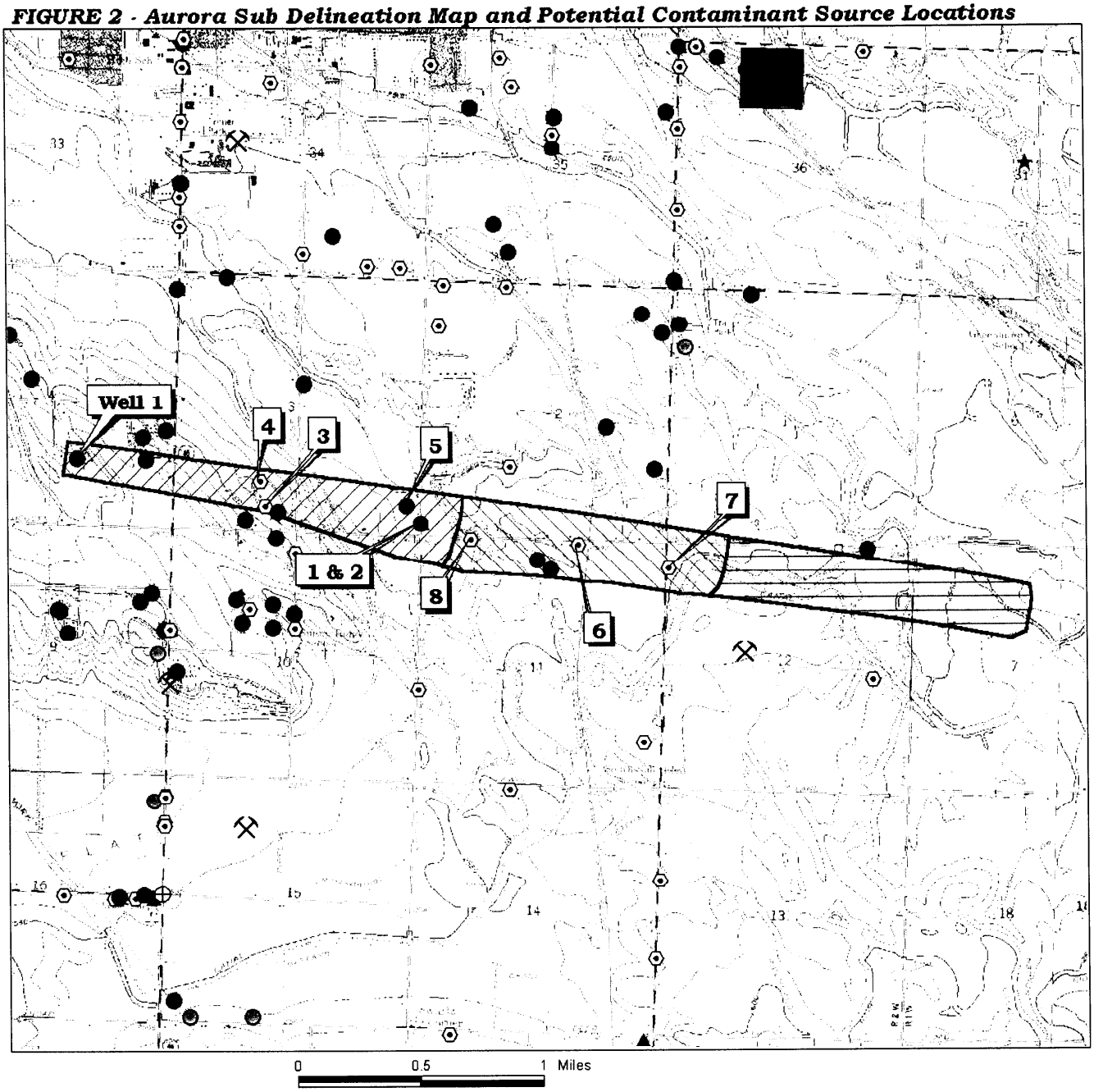


FIGURE 2 - Aurora Sub Delineation Map and Potential Contaminant Source Locations



LEGEND

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

N

PWS# 3140007
WELL# 1

Table 2. Aurora Subdivision Potential Contaminant Inventory

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
	Highway 45	0-3	GIS Map	IOC, VOC, SOC, Microbes
1,2	Historical LUST/UST Site. Now closed, ground water impact unknown	0-3	Database Search	VOC, SOC
3	Roofing Contractor	0-3	Business Mailing List	IOC, VOC, SOC
4	Ceramic Tile Contractor and Dealer	0-3	Business Mailing List	IOC
5	NPDES Site-Aquaculture Discharge	0-3	Database Search	IOC, Microbes
	Railroad	3-6	GIS Map	IOC, VOC, SOC
6	Motorcycle Repair Shop	3-6	Business Mailing List	IOC, VOC, SOC
7	Automobile Body Repair & Painting	3-6	Business Mailing List	IOC, VOC, SOC
8	General Contractor	3-6	Business Mailing List	IOC, VOC, SOC

[1] Find Source Description definitions on page 14
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

NOTE: The SITE # in this table corresponds to Figure 2, page 19.

Attachment B

Aurora Subdivision Susceptibility Analysis Worksheet

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 : AURORA SUBD
Public Water System Number 3140007

Well# : WELL 1

11/21/01 2:28:40 PM

1. System Construction		SCORE
Drill Date	UNKNOWN	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	YES	1995
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	2	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	4	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	4	3	3	2
(Score = # Sources X 2) 8 Points Maximum		8	6	6	4
Sources of Class II or III leacheable contaminants or	YES	5	2	1	
4 Points Maximum		4	2	1	
Zone 1B contains or intercepts a Group 1 Area	YES	2	0	2	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		18	12	13	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	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	5	5	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		1	1	1	0
Cumulative Potential Contaminant / Land Use Score		28	22	23	10
4. Final Susceptibility Source Score		16	14	15	14
5. Final Well Ranking		High	High	High	High