

Twin Falls County Groundwater Quality Management Plan



December 2001

This plan meets the requirement set forth in Policy PM00-04 to address the Salmon Falls
Creek/Rock Creek area of concern.

EXECUTIVE SUMMARY

Numerous groundwater sampling events have shown elevated nitrate in the groundwater within Twin Falls County. To address this issue, the Idaho Department of Environmental Quality (IDEQ) formed the Twin Falls County Groundwater Quality Advisory Committee, to design a management plan to prevent future nitrate level increases. This plan is intended to be a communication tool, not an enforcement tool. It will provide direction and guidance to the community and its leaders.

The committee identified five land use activities that could potentially affect nitrate levels in the county groundwater. In addition to regulations in place, recommendations for each of these activities are provided in this document. In no particular order, these activities can be summarized as follows:

- Agriculture – Irrigation and nutrient management techniques need to be employed together.
- Wastewater Land Application – Additional education for personnel/operators is suggested and encouraged.
- Residential – The same guidelines and regulations established for new construction of septic systems and wells should be utilized by existing systems. Residential landscaping and animal pasture activities should follow the suggestions in the agriculture and animal feeding operation portions of this document.
- Animal Feeding Operations – Separation, minimization, and proper management of waste products is recommended for all sizes of animal feeding facilities.
- Groundwater Recharge - In general, the committee supports groundwater recharge projects whenever the quality of the recharge water will not have a negative impact on the groundwater quality.

The committee will cooperate with the IDEQ, the Idaho State Department of Agriculture (ISDA) and the Idaho Department of Water Resources (IDWR) to implement this plan. Other governmental agencies will also assist in conducting surveys, making presentations, and providing information. Education, public awareness, and adoption of recommendations are key to this plan's success.

At this time, adoption of this plan is strictly voluntary. A compilation of groundwater monitoring data collected by state agencies will be made each year by the IDEQ, with the support of the committee. Additionally, every four years, an extensive review and evaluation of the effectiveness of the plan will be completed as a joint effort between the agencies. At each step, modifications to the plan will be discussed. If improvements to groundwater nitrate concentrations are not noted, then regulatory intervention may be necessary.

ACRONYMS

AFO	Animal Feeding Operation
BMP	Best Management Practice
EPA	United States Environmental Protection Agency
FFA	Future Farmers of America
GW	Ground Water or Groundwater
GQAC	Groundwater Quality Advisory Committee
IASCD	Idaho Association of Soil Conservation Districts
IDEQ	Idaho Department of Environmental Quality
IDOC	Idaho Department of Commerce
IDWR	Idaho Department of Water Resources
ISCC	Idaho Soil Conservation Commission
ISDA	Idaho State Department of Agriculture
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resource Conservation Service
SCD	Soil Conservation District
SCDH	South Central District Health
SWCD	Soil and Water Conservation District
TF	Twin Falls
U of I	University of Idaho
UI	University of Idaho
WWLAP	Wastewater Land Application Permit

Glossary

Animal Feeding Operation – AFO – The holding of any number of animals in buildings, pens or lots.

Agricultural activity/Agriculture – Any activity conducted on land or water for the purpose of producing an agricultural commodity, including crops, livestock, trees, and fish.

Ambient – The water quality at a specific location at the time sampled.

Anti-backflow (anti-backsiphoning) device – A check valve or other mechanical device to prevent the unwanted reverse flow of liquids back down a water supply pipe into a well.

Aquifer – A geological formation of permeable saturated material, such as rock, sand, gravel, etc., capable of yielding economically significant quantities of water to wells and springs.

Background concentration – is defined in two different ways:

- Natural background ground water quality – The groundwater quality unaffected by man.
- Site background groundwater quality – the water quality directly upgradient of a site.

Best management practice (BMP) – A practice or combination of practices determined to be the most effective and practical means of preventing or reducing contamination to groundwater and/or surface water from nonpoint and point sources to achieve water quality goals and protect the beneficial uses of the water.

Chemigation – Adding a chemical to an irrigation system for distribution to the crops.

Compost – A biologically stable material derived from the biological decomposition of organic matter.

Coliform – A type of bacteria found in water whose presence in drinking water assumes the risk of contracting a water-borne illness.

Contaminant – Any chemical, ion, radionuclide, synthetic organic compound, microorganism, waste or other substance which does not occur naturally in groundwater or which naturally occurs at a lower concentration.

Crops needs – Factors required by a crop in order to grow. These include water, nutrients, and sunlight.

Crop root zone – The zone that extends from the surface of the soil to the depth of the deepest crop root and is specific to a species of plant, group of plants or crop.

Crop uptake – Water and nutrients actually used by the crop.

Degradation – The lowering of groundwater quality as measure in a statistically significant and reproducible manner.

Denitrification – The changing of nitrate into nitrogen gas which then escapes to the air.

Downgradient – A location downstream with regard to the groundwater direction.

Drinking water standards (Federal and State) – There are two types of standards. Primary standards protect human health, while secondary standards protect the aesthetic quality of drinking water. Nitrate is both a federal and state primary drinking water standard.

Effluent – solid or liquid – Any waste material moving away from its point of origin.

Fertilizer – Any substance containing one or more plant nutrients which is used for its plant nutrient content and/or for promoting plant growth, including limes, gypsum and manipulated animal and vegetable manure.

Groundwater – Any water of the state that occurs beneath the surface of the earth in a saturated geological formation of rock or soil.

Groundwater quality standard – Values, either numeric or narrative, assigned to any contaminant for the purpose of establishing minimum levels or protection.

Infiltration rate – The rate at which water seeps into the soil.

Irrigation water management – Determining and controlling the rate, amount and timing of irrigation water in a planned and efficient manner.

Leach – Water passing the root zone into the soil below, sometimes reaching the groundwater.

Legume – Crops that have nodules on the roots that contain bacteria that are able to convert nitrogen in the air into a usable form for the plant.

Liquid manure – A mixture of water and manure that can be pumped, generally less than 10 percent solids.

Livestock wastes – A term sometimes applied to manure that may also contain bedding, spilled feed, water or soil. It also includes wastes not particularly associated with manure, such as milking center or washing wastes, milk, hair, feathers or other debris.

Local government – Cities, counties and other political subdivisions of the state.

Manure – The fecal and urinary excretions of livestock and poultry.

Milligrams per liter (mg/L) – The weight of a substance measured in milligrams contained in one liter.

Mineralization – Decomposition; or the slow release of nitrogen through the conversion of organic nitrogen to inorganic nitrogen.

Nitrate – The most common contaminant identified in groundwater. This form of nitrogen is available to the crop. It often originates from nitrate in fertilizer or wastes at the soil surface or from naturally occurring processes in the soil, such as the mineralization of organic nitrogen.

Nitrogen-fixing crop – A crop that is able to take nitrogen from the air and convey it to soil microorganisms for their consumption.

Nonpoint source – Entry of effluent into a water body in a diffuse manner so there is no definite point of entry.

Nutrient – Any substance applied to the land surface or to plants that is intended to improve germination, growth, yield, product quality, reproduction, or other desirable characteristics of plants.

Nutrient management – Managing the amount, form, placement and timing of the plant nutrient applications.

Nutrient management plan – A plan for managing the amount, placement, form and timing of the land application of nutrients and soil amendments.

Nutrient-pathogen study – A study whose primary purpose is to determine the linkage between nutrients and pathogens, particularly how they enter surface water or groundwater.

Organic matter –These are substances of biological origin containing carbon. Up to a point, they are desirable in the soil.

Organic nitrogen – Most of the nitrogen in the soil is bonded to carbon in living and decaying cells of plants, microorganisms or small animals. This form of nitrogen is unavailable to plants until the mineralization process takes place.

Point source – The release of a contaminant or pollutant, often in concentrated form, from a conveyance system or discrete source, such as a pipe, into a water body.

Pond – A water impoundment made by constructing a dam or an embankment or by excavating a pit or dugout.

Qualitative evaluation – An evaluation process that emphasizes the artistry of a process or project.

Quantitative evaluation – An evaluation process that emphasizes concrete data.

Process water – Water that is used within a facility or an animal feeding operation for the clean-up of equipment, the facility, or the animals. This water is treated prior to irrigation on fields.

Recharge area – An area in which water infiltrates into the soil or geological formation from precipitation, irrigation practices and seepage from creeks, streams, lakes etc. and percolates to one or more aquifers.

Residual nitrogen/nutrients – Residual nitrogen is the unused nitrogen left in the soil after a crop is harvested.

Root zone – The zone within a soil profile where the roots predominate; normally, 0 – 9 inches of soil depth.

Soil characteristics – Parameters that can be used to describe or quantify the basic characteristics of a soil, often generated from lab tests.

Soil profile – A vertical section of soil made up of distinct horizontal layers.

Solid manure storage – A storage unit in which accumulations of bedded manure or solid manure are stacked before subsequent handling and field spreading.

Upgradient – Immediately above the zone of impact or just upstream from a point or area of impact.

Volatilization – The loss of gaseous components, such as ammonium nitrogen, from animal manure

Waste storage pond – An impoundment made by excavation or earthfill for temporary storage of animal or other agricultural waste.

Waste treatment lagoon – An impoundment made by excavation or earthfill for biological treatment of animal or other agricultural wastes.

Wastewater – AFO's - Water used within a facility or an animal feeding operation whose major components include manure and/or urine.

Wastewater – Wastewater land application – Water that has been sent from the facility to a treatment system prior to land application.

Water quality – The excellence of water in comparison with its intended use or uses.

Well bore – A well bore is the actual hole dug by a well drilling rig.

Well cap – A manufactured device installed at the top of a well casing which creates an air and watertight sanitary seal to prevent surface water and contaminants from gaining access to the groundwater supply,

Wellhead – The physical structure, facility, or device at the land surface from or through which groundwater flows or is pumped from subsurface, water-bearing formations.

Table of Contents

SECTION I BACKGROUND.....	1
A. INTRODUCTION.....	1
B. AUTHORITIES	2
SECTION II MANAGEMENT PLAN GOAL.....	3
SECTION III MANAGEMENT PLAN APPROACH.....	4
A. INTRODUCTION.....	4
B. GROUNDWATER CONTAMINATION CONCERNS.....	5
SECTION IV OBJECTIVES TO ACCOMPLISH THE MANAGEMENT PLAN GOAL	7
SECTION V METHODS FOR IMPLEMENTING THE MANAGEMENT PLAN	8
SECTION VI IMPLEMENTATION ACTIVITIES.....	8
A. AGRICULTURE	8
B. WASTEWATER LAND APPLICATION	12
C. RESIDENTIAL	13
D. ANIMAL FEEDING OPERATIONS	16
E. GROUNDWATER RECHARGE.....	19
SECTION VII IMPLEMENTATION TASKS.....	20
A. GENERAL	20
B. IMPLEMENTATION FUNDING.....	22
C. AGRICULTURE – IMPLEMENTATION ACTIVITIES:	23
D. WASTEWATER LAND APPLICATION - IMPLEMENTATION ACTIVITIES:	24
E. RESIDENTIAL – IMPLEMENTATION ACTIVITIES:	24
F. ANIMAL FEEDING OPERATIONS – IMPLEMENTATION ACTIVITIES:	27
G. GROUNDWATER RECHARGE.....	27
SECTION VIII EVALUATION OF MANAGEMENT PLAN PROGRESS AND SUCCESS.....	27
A. INTRODUCTION.....	27
B. ANNUAL PROGRESS REPORT	28
C. PROPOSED SCHEDULE.....	28
D. QUALITATIVE EVALUATION	29
E. QUANTITATIVE EVALUATION	29
F. AUDIENCE.....	30
G. TABLE I: MANAGEMENT PLAN EVALUATION MILESTONES	30
APPENDIX A - MANAGEMENT PLAN SUPPORT AND APPROVAL.....	1
APPENDIX B – COMMITTEE MEMBERS.....	3
APPENDIX C - DUTIES, ROLES AND RESPONSIBILITIES	4
APPENDIX D - RESOURCES AND REFERENCES	8
APPENDIX E - FIGURES	14
APPENDIX F - GROUNDWATER QUALITY MONITORING.....	17

Table of Figures In Appendix

Figure 1: Location of Twin Falls County within the State of Idaho	15
Figure 2: Land Use within Twin Falls County.....	16
Figure 3: Groundwater Quality Monitoring, Twin Falls County	18

Twin Falls County Groundwater Quality Management Plan

Section I Background

A. Introduction

From Milner Dam to the community of King Hill, Idaho, the Snake River flows through a deep, often vertical-walled basalt canyon cut into the Snake River Plain. The Snake River Plain, is an arc-like depression, extending 400 miles across the southern portion of Idaho. In the Twin Falls sub area of the plain, the principal water-bearing units are the Idavada Volcanics Formation, Banbury Basalt Formation, Glens Ferry Formation and Snake River Group. Depth-to-water is generally less than 150 feet in a radial distance of about six miles around Buhl, and in the area northwest of Twin Falls. East of Twin Falls, the depth-to-water is typically over 150 feet but less than 300 feet.

The climate of the Snake River Plain is semi-arid, characterized by low annual rainfall, moderately hot summers, and cold winters. Annual precipitation averages 10.5 inches. These low levels of precipitation limit native vegetation and the organic residue that becomes soil humus. Leaching of soluble minerals from the soil profile is not common in undeveloped areas. However, in Twin Falls County where population and agricultural activities have increased, groundwater monitoring by several governmental agencies shows increasing levels of nitrate.

At this time, more than 25% of Salmon Falls Creek/Rock Creek wells within the Statewide Ambient Ground Water Quality Monitoring Program exceed 5 milligrams per Liter (mg/L), with some wells exceeding the state and federal drinking water standard of 10 mg/L. As a result, the Idaho Department of Environmental Quality (IDEQ) has placed this area on the statewide priority list that addresses degraded groundwater quality. For convenience, the Twin Falls County Groundwater Quality Advisory Committee (formed by IDEQ) decided to expand the area of concern to include the entire Twin Falls County. A management plan was developed with the intent of preventing additional nitrate degradation and improving existing conditions through education and voluntary actions.

(Supporting figures are in Appendices E and F.)

B. Authorities

1. The IDEQ is designated as the primary agency to coordinate and administer groundwater quality protection programs for the state (Ground Water Quality Protection Act of 1989, Idaho Code 39-120). Various state and local agencies have responsibilities for and are involved in implementing the Ground Water Quality Plan (adopted in 1992 and amended in 1996).
2. The Groundwater Quality Rule (IDAPA 58.01.11.400.02 and IDAPA 58.01.11.400.03) sets forth a number of alternative actions that the IDEQ may follow when a numerical groundwater quality standard has been exceeded, as well as when one has not been exceeded but significant degradation of the groundwater has been detected.
3. In March 2000, the Policy for Addressing Degraded Ground Water Quality Areas (Policy No. PM00-04) was published. One of the purposes of this policy is to set forth a process to identify, designate, and delineate areas where groundwater quality is significantly degraded as defined by rule. Groundwater nitrate levels were detected near or above the State of Idaho Groundwater Quality Standard (IDAPA 58.01.11.200.01) of 10 mg/L by several government agencies in Twin Falls County.
4. Another purpose of Policy Memo PM00-04 is to develop groundwater quality management strategies for improving groundwater quality in high priority areas based on current categorization and applicable standards with the use of local input. The Twin Falls County Groundwater Quality Advisory Committee (GQAC) was formed as a pro-active measure to address local groundwater quality degradation. The IDEQ has not yet completed the prioritized list of areas with nitrate concerns. However, initial data indicate that the Salmon Falls Creek/Rock Creek area will be somewhere near the top of this priority list.
5. Twin Falls County Groundwater Quality Advisory Committee
 - a) The GQAC is composed of local area residents and governments representing a broad range of interests within the county. The IDEQ is the lead agency assisting the committee in developing a management plan to address the groundwater degradation in the county. Other agencies providing technical support include:
 - Idaho Department of Water Resources (IDWR) – well drilling permits, water rights, adjudication and monitoring
 - Idaho State Department of Agriculture (ISDA) – all aspects of agriculture land use
 - Natural Resource Conservation Service (NRCS) – agriculture

- Idaho Association of Soil Conservation Commission (IASCC) – support local offices (Soil Conservation Districts and Soil and Water Conservation Districts)
- Idaho Rural Water Association (IRWA) – wellhead protection and community drinking water
- South Central District Health (SCDH) – individual well and septic tank approval/inspection
- University of Idaho Cooperative Extension System – soil and water

The full committee and its sub-committees have met in open public forums since September 2000 to form the recommendations in this document.

- b) The GQAC has agreed to promote and encourage a voluntary approach for addressing the groundwater contamination in the county. Progress will be based on the evaluation criteria outlined in Section VIII Evaluation of Management Plan Progress and Success.

(See Appendix D for additional sources of information on: regulatory laws, rules, policies, and criteria; committee members; governmental agency descriptions and contact information.)

Section II Management Plan Goal

The ultimate goal of this plan is to reduce the levels of nitrate in the groundwater for the entire Twin Falls County. It is anticipated that activities recommended herein should, within a reasonable time, bring levels of nitrate back below the level triggering the Salmon Falls Creek/Rock Creek area of the county to be placed on the statewide priority list. To be placed on this list, 25% or more of the sample wells need to exceed 5 mg/L nitrate. (Note: The state and federal drinking water standard for nitrate is 10 mg/L.) The exact position of Salmon Falls Creek/Rock Creek on this list has not been fully established. However, it appears that this area will be near the top of the priority list.

Section III Management Plan Approach

A. Introduction

1. The Twin Falls Groundwater Quality Advisory Committee, GQAC, has chosen to implement this Management Plan on a voluntary basis. This voluntary approach is based on the premise that individuals, businesses, organizations and governments, given adequate information and encouragement, will take positive actions and adopt or modify practices and activities to reduce nitrate loading to groundwater. Since the plan is voluntary, it is assumed that additional regulatory requirements will not be necessary to achieve success.
2. The committee chose this voluntary approach because it has several key components that are considered important advantages. As such, the committee believes that:
 - a) A voluntary approach allows for more flexibility than a regulatory approach. Individuals, businesses or organizations may choose to address the nitrate problem with more innovative solutions.
 - b) A voluntary approach allows people to more willingly accept responsibility and make the necessary changes if they understand the issues. People will feel it is a choice they are making rather than being forced to participate.
 - c) The voluntary approach provides the opportunity to encourage participation from individuals, organizations and businesses that are not currently regulated.
3. As described in Section VIII, periodically the state agencies and the GQAC will jointly evaluate the progress and success of this management in reducing the nitrate levels in the county's groundwater. IDEQ will provide oversight.
4. The voluntary nature of this management plan is in lieu of new regulatory requirements. It is intended to complement water quality rules, regulations and permitting requirements. However, if the voluntary approach does not result in satisfactory progress towards reducing nitrate levels in the groundwater, mandatory requirements may be considered as part of the future management. Idaho Code 39-120 and the Groundwater Quality Plan provide for inclusion of mandatory requirements as part of this management plan.

(See Appendix D for more information on Idaho Code and the Groundwater Quality Plan.)

B. Groundwater Contamination Concerns

The committee initially identified five land use activities that could affect groundwater nitrate levels. In no particular order, these are:

- 1) Agriculture
- 2) Wastewater Land Application Areas
- 3) Residential
- 4) Animal Feeding Operations
- 5) Groundwater Recharge

1. Agriculture

- a) Irrigated agriculture is the dominant land use in the county with approximately 308,139 acres under cultivation (1997 Ag Census). The major sources of nitrate from agricultural activities come from all forms of fertilizers, legumes and mineralization of organic matter. Nitrogen not utilized by plant growth is stored in the soil and can be leached to groundwater as nitrate, if sufficient water is available to move it through the soil profile.

(See Appendix E - Figure 2: Land Use Within Twin Falls County.)

2. Wastewater Land Application

- a) Wastewater land application facilities generate nutrient rich process water as part of their daily operations. These facilities are one of the few sources of nitrate that are already under direct regulatory requirements. These facilities are required to obtain a permit for National Pollution Discharge Elimination Systems (NPDES) to discharge into waters of the state and/or a Waste Water Land Application Permit (WWLAP) to land apply wastewater.
- b) Today, through IDEQ's regulatory waste discharge permit system and the cooperation/innovation of the facilities in Twin Falls County, land appliers are:
 - Expanding their land application areas.
 - Building or expanding process wastewater treatment and storage.

- Scheduling process water applications to meet crop nutrient and water needs.
- Developing management plans for irrigation and nutrient use.
- Developing water and nutrient budgets.
- Periodically sampling wastewater, groundwater, soil and crops as required by permit.
- Preparing reports on how activities are functioning and whether the process is meeting the goals that were established.

3. Residential

- a) Domestic septic systems are potential contributors to the elevated groundwater nitrate concentrations. Groundwater problems can occur under special conditions in localized areas where high densities of septic systems exist. These areas occur primarily within the urban growth boundaries of cities or in isolated subdivisions. Standard septic systems are not designed to remove nitrate. In low-density settings, the impact to the groundwater is low because of dilution by the groundwater and the small volume of discharge spread over a large area. However, as densities increase, the combined discharge volume increases, thus overcoming the groundwater's ability to dilute the wastes, and increases the potential for noticeable groundwater contamination.
- b) Several other activities associated with residential development were also identified as possible contributors to the nitrate problems in residential areas. These include:
 - Excessive fertilization related to landscaping, lawns and gardens.
 - Over-watering related to landscaping, lawns and gardens.
 - Well construction and location.
 - Animal pastures and/or ranchette-type farms.
- c) The combination of these activities with septic system discharges makes residential development a potentially important localized source of groundwater nitrate contamination.

4. Animal Feeding Operations

- a) An Animal Feeding Operation (AFO) is generally defined as the holding or confining of animals in buildings, pens or lots.
- b) Regulations for protecting groundwater are in place for larger AFOs (see Appendix D for specific resources) regarding solid and liquid effluents. Suggested activities discussed in this management plan apply to all AFOs, regardless of size.
- c) AFOs are increasingly incorporating pollution prevention technologies into their environmental management systems and strategies. AFO managers are focusing on manure and wastewater management while providing well-maintained feedlot conditions for animals.

5. Groundwater Recharge

- a) Unmanaged groundwater recharge occurs whenever standing water, with potentially high pollutant levels, is allowed to seep into the soil. Depending on the specific conditions, unmanaged recharge with high quality water may or may not adversely affect the groundwater quality.
- b) Managed groundwater recharge takes place when higher quality water is allowed to seep into the ground to refresh the aquifer.

Section IV Objectives to Accomplish the Management Plan Goal

The committee has set the following objectives:

- 1. Implement the management plan in a manner that encourages voluntary actions by members of the community to protect groundwater quality in Twin Falls County, so that a regulatory approach is not necessary.
- 2. Reducing nitrate loading to the groundwater without adversely affecting the economy.
- 3. Make the plan a communication tool that provides direction and guidance to the community about the basic steps needed to prevent future nitrate level increases.
- 4. IDEQ will assure compliance of regulated sources through periodic review of permit conditions.

(See Sections VI, VII, and VIII for specific implementation activities, implementation tasks and plan evaluation.)

Section V Methods for Implementing the Management Plan

The committee considered the following methods most appropriate for implementing a voluntary action plan:

1. Develop awareness in the Twin Falls County community about the nature of the nitrate groundwater issues, including causes, effects, concerns and remedies.
2. Identify, organize and provide information that will assist individuals, public entities, businesses and organizations to reduce nitrate loading.
3. Encourage research, investigation and the development of materials useful for addressing nitrate concentration concerns where information is not available or in a useable form.
4. Develop educational material and a program that will allow the community to independently assess and choose the practices most useful to them for reducing the nitrate loading to groundwater.
5. IDEQ and ISDA will continue to review permits and inspect regulated sources to determine compliance with groundwater rules and regulations.

(See Sections VI, VII, and VIII for specific implementation activities, implementation tasks and plan evaluation.)

Section VI Implementation Activities

A. Agriculture

1. Introduction

Both irrigation and nutrient management must be considered to address the nitrate leaching concerns in irrigated agriculture. Due to their inherent connection, recommendations for these activities are combined.

2. Irrigation Management

- a) Many irrigation methods have been used in Twin Falls County: gravity; solid set; hand line; wheel line; drip and center pivot. Today the predominant method is by gravity.
- b) Gravity methods of irrigation are predisposed to the leaching of water through the soil profile.

- c) In the late 1960s, sprinkler irrigation practices were initiated in the valley. Beginning in the 1970's, whole irrigation projects were constructed based on sprinkler irrigation. This trend toward sprinkler irrigation continues today.
- d) Proper application of water, regardless of irrigation method, requires a knowledge of the following items:
 - Crop demand
 - Infiltration rate
 - Soil characteristics
 - Frequency of application
 - Application rate
 - Mechanics of the irrigation system
 - Evaporation rate
- e) Lack of adequate information sometimes results in over-application of water. Continual maintenance of irrigation systems is critically important in order to reduce over-application of water.
- f) All irrigation systems have the potential to contribute to nitrate loading of groundwater. Irrigation practices have improved greatly in recent years. Accurate water use models as well as better technology to apply and monitor water application have resulted in greater irrigation efficiency.

3. Nutrient Management

- a) Applying nitrogen in excess of crop needs can cause groundwater contamination. Over application of nitrogen can occur in several ways:
 - Applying fertilizers at rates greater than crop uptake.
 - Failing to account for residual and organic nitrogen sources present in the soil profile, especially nitrogen-fixing crops.
 - Inappropriate timing of nutrient application with regard to crop needs.
- b) Currently, growers have a better understanding about crop quality and yield as related to available nutrients and water.

- c) Crop nutrient recommendations by crop advisors continue to be modified, favoring more efficient management techniques that may protect groundwater.

4. **Recommended Irrigation and Nutrient Management Practices**

Using the following practices could benefit irrigated agriculture and groundwater quality. No single practice will completely resolve the leaching problem. Therefore, these practices should be implemented in combination to reduce further leaching of nitrates to the groundwater.

- a) Develop crop management strategies and recommendations to address irrigation and nutrient management. These may be developed jointly between the grower and these entities:

- Natural Resource Conservation Service (NRCS)
- Idaho Soil Conservation Commission (ISCC)
- Soil Conservation Districts (SCDs - Balanced Rock, Twin Falls, and Snake River)
- University of Idaho Cooperative Extension System – Local office
- United States Department of Agriculture (USDA) – Agriculture Research Service
- Twin Falls Canal Company
- Agricultural associations
- Irrigation equipment dealers
- Private agricultural service companies

(See the Appendix D for more information about the governmental groups.)

- b) Increase awareness of the nitrate problem: Provide education and information to assist in making informed choices on how best to address irrigation and nutrient concerns.
- c) Irrigation scheduling: Balance irrigation applications with crop needs and soil characteristics throughout the irrigation season. Efficient irrigation scheduling, regardless of application method, is becoming the preferred practice in Twin Falls County. This involves the correct timing, placement, and volume of water to reduce nitrate leaching beyond the root zone.

- d) Plant tissue and soil testing: Determine fertilizer usage based upon crop demands as determined by plant tissue and soil testing. Apply only the amount of fertilizer necessary to maintain crop quality and yield based upon most recent test analyses.
- e) Nutrient management: Properly timed fertilization should coincide with specific crop nutrient uptake characteristics. In general, the following guidelines may apply:
- Single application (spring grains, peas, beans, alfalfa, pasture/range land).
 - Split application (winter wheat, corn).
 - Multiple applications (onions, sugar beets and potatoes – often based on petiole samples).
- f) Precision farming: Balance nutrient and irrigation applications to crop requirements according to soil variations within a field to whatever degree practical by use of precision irrigation systems.
- g) Manage inputs for all crops: Management activities and strategies identified in this plan should be followed regardless of the crop value.
- h) Nutrient removal by proper crop rotation: Consider crop rotations that will salvage residual nutrients, including those from previous nitrogen-fixing crops.
- i) Nutrient value of compost and manure: Account for the nutrient value of any compost and manure spread on a field before adding additional fertilizer. If these nutrients have not been taken into account, over-fertilization becomes more likely.
- j) Maintain irrigation equipment: Develop operation and maintenance schedules for irrigation equipment to ensure water is applied at correct rates.

(Specific information about these practices is explained in Section VII. References and resources are listed in Appendix D.)

B. Wastewater Land Application

1. Introduction

Historically, the focus of wastewater land application sites was the disposal of process water. The highest priority was preventing run-off from the application fields. Today, IDEQ works with facilities to issue and/or re-issue wastewater land application permits to protect groundwater quality.

2. Recommended Management Practices

To properly manage nitrate in a land application facility, both water and nutrients must be managed. The following steps can be used by any land application facility to manage water and nutrient resources:

- a) Identify the limiting factors associated with the land and crop being used for wastewater land application management.
- b) Review pre-treatment, waste minimization and conservation practices that may reduce the quantity and concentration of the wastewater.
 - Determine whether there are pollution prevention opportunities through waste minimization efforts.
 - Market by-products.
 - Reuse process waters for other internal functions.

Pollution prevention opportunities can save in several ways:

- Reducing processing and disposal costs.
 - Generating revenue through service or products.
 - Reducing regulatory oversight costs.
- c) Observe and monitor the process regularly to recognize problems early and make adjustments accordingly. Routine visual observations confirm assumptions and allow periodic system adjustments (fine tuning). Review analytical results in a timely manner.
 - d) Continually reassess functions and systems to develop viable alternatives to meet groundwater protection goals. Determine what is the most economic means to achieve the established goals.
 - e) Encourage continuing education for all relevant personnel/operators.

(Resources and references are provided in Appendix D.)

C. Residential

1. Introduction

Several activities associated with residences may contribute to the nitrate concentration issue. These include: septic systems; landscaping, lawn and garden activities; wells; and animal pastures.

2. Septic Systems

- a) The standard household septic system is not designed to effectively treat wastewater for nitrates. Properly operating systems deliver a certain amount of nitrate to the groundwater (an average of about 45 mg/L nitrate). Under certain soils and specific conditions, some denitrification may take place.
- b) Generally this source of nitrate is not a concern when the volume of wastewater is relatively small compared to the volume of groundwater. However, there is a concern when the density of septic systems exceeds the dilution capabilities of the groundwater system. In some areas of Twin Falls County, septic system densities affect groundwater quality.
- c) **Recommended Management Practices**
 - 1) Encourage local, city and county government and planning departments to review development impacts on area groundwater quality and to require mitigation where necessary.
 - 2) South Central District Health should work with local governments to develop a process to take into consideration the cumulative effects of septic systems when planning for and reviewing developments, which will rely on septic system for waste disposal. Developers may be required to perform a nutrient-pathogen study on the land in question.
 - 3) South Central District Health should distribute septic tank maintenance handouts to all new septic system permittees.

(See Appendix D for more information on septic systems.)

3. Landscaping, Lawns and Gardens

- a) Several landscaping, lawn and garden activities on the county's soils can deliver nitrate to the groundwater. Not understanding the diagnosis and treatment of landscape, lawn and garden systems can result in over-fertilizing and watering and/or mis-timing of fertilizing and watering.
- b) **Recommended Management Practices**
 - 1) People need to understand the nature of their landscape, lawn or garden problem before attempting to solve the problem. To do this, they should seek help, advice and information from knowledgeable professionals. In many cases, applying additional fertilizer or water will not solve the plant health problem, but may only deliver additional nitrate to the groundwater.
 - 2) Residents need to apply fertilizers per label instructions for the plants being fertilized. Fertilizers applied at greater than recommended rates can lead to a nitrogen build-up and/or imbalance of nutrients in the soil profile. Given enough water, these nutrients are then available to leach to groundwater.
 - 3) Residents should provide only that amount of water needed to maintain a healthy landscape, lawn or garden. Over-watering tends to drive available nutrients below plant roots. These nutrients easily find their way to groundwater as additional water is applied or precipitation occurs. This situation also leads residents to use additional fertilizer to replace the nutrients washed below the root zone.
 - 4) Residents should apply fertilizer and water in amounts and at times which do not contribute to nitrate leaching. Over-watering right after certain fertilizer applications can immediately wash nutrients past the root zone making them unavailable for plant uptake and a threat to groundwater quality.

(See Appendix D for further information.)

4. Wells – Construction/location/leakage

- a) Contaminated water moving down a well casing from the land surface to groundwater or moving between aquifers via well bores could contribute to the nitrate contamination problem. Many individual wells in the county were constructed before current requirements came into effect. Improperly sealed wells can facilitate water movement, possibly carrying contaminants from land surface to the groundwater or between aquifer units.
- b) Locating a septic system or other contamination source too close or up gradient from a poorly sealed well may cause the well to capture contaminated water and allow contaminated water to move further into the aquifer or between aquifers.
- c) **Recommended Management Practices**
 - 1) Encourage owners of older wells to get their well casing and seals inspected to ensure that no leakage is occurring.
 - 2) Encourage owners of wells having an inadequate seal or casing to improve the well construction.
 - 3) Encourage people to test their well water annually for fecal and E. coli and nitrate.
 - 4) Encourage local officials to pass regulations that will require all wells to comply with current code.
 - 5) The location of existing wells, septic systems and other possible contamination sources should be taken into account before siting a new well or septic system.
 - 6) Encourage owners who are drilling new wells to case and seal the well a minimum of 50 feet, at least through the first clay or water-bearing strata, with a solid casing (not slotted pipe or screens.)
 - 7) Store liquid and solid contaminants at least 50 feet away from wellheads or provide barriers to prevent well contamination.
 - 8) When using chemigation, provide back-flow prevention devices to prevent contamination of the well and groundwater through back siphoning of chemigation tanks.

(See Appendix D for additional information on these topics.)

5. Animal Pastures

- a) Pasturing animals on small acreages can degrade groundwater if not managed properly.
 - 1) Excess manure in a pasture will allow nutrients to accumulate in the soil making them available to leach when irrigation or precipitation occurs.
 - 2) Exceeding the carrying capacity of a pasture can enable animals to over graze grasses, reducing the plant's ability to utilize manure for growth. This leads to an accumulation of nitrates that are then available for leaching to groundwater.
 - 3) Allowing manure accumulation in low-lying areas where precipitation or irrigation water is allowed to percolate through the manure may leach nutrients into the groundwater.
- b) **Recommended Management Practices**
 - 1) Follow generally accepted pasture and irrigation management practices to avoid over grazing of pastures. Include pasture maintenance and renovation, pasture rotation and winter grazing management.
 - 2) Practice proper manure management techniques for collecting, storing and applying the manure.

(Appendix D provides more specific information.)

D. Animal Feeding Operations

1. Introduction

The following recommendations are generally considered Best Management Practices for AFOs, but do not limit the use of other practices that apply to a particular operation if the practice is effective. These practices can be implemented in combination to obtain the desired protection.

To manage waste effectively at AFOs, the following aspects of the operation need to be addressed: Surface Water Management; Waste Water Effluent Management; Solid Manure Management; and Management of Feedyard Surfaces.

(A substantial amount of information is available on AFOs. See Appendix D.)

2. **Surface Water Management**

- a) Twin Falls County provides a good location for animal feeding operations due to its low annual rainfall and low levels of surface runoff. Although precipitation in the Twin Falls County area is low, heavy rainfall or snow events can at times generate enough runoff water to cause a problem. Managing runoff water to minimize contact with manure and feed will reduce the amount of water that will need to be managed as effluent.
- b) **Recommended Management Practices**
 - 1) Feedyard operations should incorporate facility management techniques that will divert runoff from clean surfaces and storm waters away from feedyard facilities to prevent contact with manure and stored feed products.
 - 2) If surface and storm waters become contaminated from contact with manure and stored feed products, runoff should be diverted to the waste water effluent treatment site.

3. **Waste Water Effluent Management**

- a) Lagoons and wastewater conveyance facilities are an important part of a feedyard's wastewater effluent management. These facilities allow the capture, managed use and disposal of:
 - Surface water runoff
 - Corral water
 - Process waters that have come into contact with manure or stored feed products.
- b) **Recommended Management Practices**
 - 1) Surface and groundwater protection measures should include lagoons or holding ponds to capture and hold waters that come in contact with manure or feed stores.
 - 2) New lagoons and wastewater conveyance facilities should be designed and constructed in accordance with state standards to minimize leakage of stored wastewater.
 - 3) Existing lagoons and wastewater conveyance facilities should be redesigned and/or modified to meet state standards to minimize leakage of stored wastewater.

- 4) Routinely analyze lagoon water to determine the nutrient levels.
- 5) Apply waste and water to provide both a hydraulic balance and proper nutrient uptake. Follow the recommendations in the Agriculture portions of this plan.
- 6) Best Management Practices (BMPs), or applicable regulations, should also be followed when cleaning out sediments from lagoons and holding ponds to prevent damage to the seals or structures that could result in leakage.
- 7) Storage facility sediments should be managed as per recommendations in the Solid Manure Management section of this document.

(See Appendix D for more information.)

4. Solid Manure Management

- a) Solid manure should be managed as a nutrient source for growing crops. Application of solids should follow the recommendations on fertilizing and irrigation practices outlined in the Section VI A.
- b) **Recommended Management Practices**
 - 1) Manure should be stored in a manner that minimizes impact to groundwater.
 - 2) Routinely analyze manure for its nutrient value for use in applying to crops.
 - 3) Annual soil testing should be performed to determine current soil nutrient status and application requirements.
 - 4) The Natural Resource Conservation Service (NRCS) or other agricultural field services should be consulted to select a system of BMPs including agronomic rates for manure application.
 - 5) Consider composting of solids as a method of managing the nutrients. Benefits include:
 - Stabilization of nutrients
 - Lower salt index
 - A more consistent product

- Pathogen and weed seed destruction
- Cheaper transportation costs

5. Management of Feedyard Surfaces

- a) Studies have shown that concentrating animals in a small area produces a surface seal of compacted organic matter and soil that inhibits movement and leaching of effluent through the seal. Anaerobic conditions can also be created in the seal that will assist in the denitrification process.
- b) **Recommended Management Practices**
 - 1) Direct the drainage to adequately constructed effluent facilities.
 - 2) Maintain the surface seal while removing manure and scraping the feedlot pens.
 - 3) Maintain grades on existing corrals to provide drainage and prevent ponding within the corrals.
 - 4) Upgrade facilities to meet accepted BMPs.

(Appendix D references more information available on this topic.)

E. Groundwater Recharge

1. Introduction

Investigation has found:

- Water leakage from irrigation canals and ditches have been recharging aquifers in certain areas of the county.
- Canal leakage rates are high enough to dilute local groundwater and reduce nitrate concentrations in those localized areas.
- Changing irrigation practices in Twin Falls County, i.e. conversion from gravity to sprinkler irrigation, will reduce the amount of water available for recharge.
- Local irrigation districts have begun a program to improve the efficiency of their water delivery systems by decreasing canal leakage rates, which may increase nitrate concentration levels in certain areas as dilution water becomes less abundant.

- The recharge of groundwater is a possibility for actively flushing nitrates through the aquifer and has the potential to assist in diluting the nitrate already present in the aquifer.

(Additional information is found in Appendix D.)

2. Recommended Management Practices

- a) Encourage the development of recharge projects using winter and spring excess river flows where such projects would be beneficial in meeting the recharge goals.
- b) Recharge projects should be defined specifically by IDEQ and IDWR and ISDA.

Section VII Implementation Tasks

A. General

1. The GQAC will act as overall coordinator for encouraging the adoption of practices that will reduce nitrate loading to the groundwater.
2. The GQAC will encourage the development of a physical characterization of the aquifer to help determine the fate of nitrate in the aquifer.
3. Implementation will initially rely on education, encouragement and a promotion effort, backed by an effort to gather information pertinent to practices and activities that will protect groundwater quality. The assumption is that once business, organizations, government and individuals are aware of the environmental consequences of certain practices they will seek alternatives to reduce the likelihood of groundwater contamination.
4. It is envisioned that the IDEQ, ISDA, and IDWR will cooperate to implement this management plan. A Memorandum of Agreement between these agencies should be developed along with a work plan for activities associated with this management plan's implementation.
5. Implementation Tasks, Section VII of this Management Plan, should be reviewed after each evaluation period by the committee to determine if changes should be made to the plan.
6. The following general activities are recommended for implementing this plan. All local, state and federal agencies and government bodies are encouraged to coordinate their efforts to help implement the following activities.

- a) Education and Public Awareness
 - 1) Develop Public Information and Education plans which emphasizes groundwater quality protection in the Twin Falls County. Then, as resources allow, implement components of the plan.
 - 2) Design presentations or workshops that could be used to present groundwater protection concepts to a variety of target audiences. Attempt to include groundwater protection presentations into various forums attended by targeted audiences.
 - 3) Prepare and/or encourage the development of media addressing different aspects of groundwater quality protection.
- b) References and Resources (Appendix D of this document) – IDEQ will be the lead agency to update this information.
- c) Implementation Strategy – IDEQ will be the oversight agency leading implementation of this component with the assistance from local government agencies, individuals, businesses and organizations.
 - 1) Identify approved BMPs or implementation plans that would be useful for protection of groundwater quality. Encourage the development and adoption of strategic plans by individuals, businesses, organizations and governments to protect the groundwater quality.
 - 2) Gather, organize, and make available existing relevant information pertaining to practices and strategies that will protect groundwater from contamination.
 - 3) Develop and implement specific plans that highlight the groundwater concerns to be addressed and the practices that will be promoted and encouraged to address those concerns.
 - 4) Identify gaps in knowledge and develop plans for obtaining the information or research needed to fill those gaps.
- d) Documentation of Results – IDEQ will be the lead agency for implementing of this component, however, other local government agencies, individuals, businesses and organizations are encouraged to participate.

- 1) Develop a plan to document how well activities, practices and alternative practices recommended in the Management Plan are being adopted. Include specifics on types of practices, geographic extent, location, time of adoption, continued use of recommendations and other factors relevant to document progress in implementing the action plan. This plan will be used to address the evaluation milestones in Section VIII.

(Section VIII will determine the effectiveness of the above land use implementation activities.)

B. Implementation Funding

1. Very minimal funding is currently available for implementing this management plan.
2. Although dedicated funds are not available, there are a number of grant funding sources and low-interest loans available for addressing certain aspects of the plan. All these funding options have their own eligibility requirements, application procedures, and conditions for application. Most grants and loans are competitive in nature and proposed projects compete with other proposals submitted throughout the state or nation.

Grant programs:

- Federal Clean Water Act - Section 319 (Nonpoint Source) Administered by the Idaho Department of Environmental Quality (IDEQ).
- Idaho Soil Conservation Commission (ISCC)
- United State Department of Agriculture (USDA)
- Regional Environmental Protection Agency (EPA – Region X)
- Idaho Department of Commerce (IDOC)

Low-interest loans:

- Idaho Soil Conservation Commission (ISCC)
- Idaho Department of Environmental Quality (IDEQ) – State Revolving Loan Program

Those wishing to pursue a project implementing some aspects of this management plan are urged coordinate their efforts with the lead agencies and the GQAC. A funding committee may be formed for this project.

(For additional information on grants and loans see Appendix D.)

2. Ultimately, grants and loans can only cover a small portion of the activities needed to make the necessary changes to improve the groundwater quality. In the end, successful implementation of this plan will rely on individuals, organizations, businesses, and governments taking the initiative to incorporate the concepts presented here into their existing or new practices.
4. Letters will be sent to pertinent local businesses and organizations advising them of the existence of this plan. The committee encourages all those organizations that provide advice to area residents and businesses to incorporate the concepts on protecting groundwater quality into recommendations given to their clientele. Businesses and private organizations are encouraged to support efforts to implement this action plan by: adopting the necessary activities and practices needed to protect the groundwater from contamination; funding and supporting activities outlined in the action plan; and/or using internal resources to support aspects of the activities recommended in the management plan.

C. Agriculture – Implementation Activities:

1. **Education/Demonstration** - Implementation of this plan will be based on educational programs and demonstration projects designed to familiarize growers with the recommendations made in Section VI A and encourage them to adopt practices that prevent the leaching of nitrate to groundwater.
 - a) Survey local growers as to what practices they are now using to determine base line practices. This can also be used as an educational tool to highlight what practices the advisory committee is recommending for use in the county.
 - b) With the aid of this document and other references, agricultural service providers should coordinate and assist the agricultural community:
 - Identify practices that reduce or eliminate nitrate loading to the groundwater.
 - Determine whether recommended practices are being used and applied correctly.
 - Determine the levels and variance of nitrate at depth in the soil profile under agricultural fields in the area. Recommend appropriate methods and sample size for growers to use to account for variations in their fields. Promote an increased understanding of the variation in practices and nutrient requirements across agricultural fields.

- Evaluate whether there are certain times of the year when nutrients leach out of the soil profile.
 - Determine the nutrient requirements for each stage and given yields of the major crops being grown in the county.
2. **Publicity** - To familiarize the agricultural sector in the reasoning and use of the recommended management practices, presentations on groundwater quality protection should be developed and presented at appropriate local forums.
 3. **Reference Materials** - Develop inventories of reference materials, guidance documents and articles which recommend management practices and strategies to reduce nitrate loading for targeted crops and conditions in Twin Falls County. The Appendix provides some references for this information.
 4. **Funding** - Target grant applications and other assistance funds to implementing recommended management practices and strategies.
 - a) Support funding activities to develop, compile information, or demonstrate the use of BMPs and strategies for the protection of the county's groundwater quality resources.

D. Wastewater Land Application - Implementation Activities:

Implementation of this plan will rely on the current permitting practices of IDEQ with input from the land appliers. The permittees will strive to address the intent of the laws and regulations established for environmental protection. They will continue to follow their permit conditions and requirements and meet or exceed all requirements. Additionally, appliers will commit to the continued use of the Operation and Management Plans and Monitoring Plans required by their permits.

E. Residential – Implementation Activities:

1. General

- a) **Publicity** - Develop appropriate articles and newsletters for local publication and media outlets. Emphasize and encourage the adoption of recommended practices to reduce nitrogen loading to the groundwater.
- b) **Information** - Develop and establish an educational/outreach program and material to provide the residential community with information and alternatives on how to develop property while protecting groundwater quality. Encourage local area libraries to house information for the public. Investigate, where available, bilingual outreach material for the Hispanic community.

- c) **Public meetings** - Integrate a groundwater quality component into the local area educational forums (such as: Water Awareness Week, 4H, FFA and Scouts).
- d) **Local surveys** - Conduct surveys of local residents to determine their awareness of the groundwater quality concerns and problems in the area. Do surveys at local community events or in conjunction with a nitrate testing program.
- e) **Realtors** – Develop brochures for realtors on groundwater quality concerns and suggested mechanisms and BMPs to minimize those concerns.

2. Septic Systems – Implementation Activities:

- a) **South Central District Health and County Planning Departments** – Research and provide recommendations to address present and future development.
 - Determine the potential cumulative impact of multiple septic systems, based on current development, hydrogeology and potential future development.
 - Develop a policy that requires developers of proposed subdivisions to conduct nutrient-pathogen studies.
 - Determine where in the county septic system loadings could create a groundwater quality problem based on the criteria above.
- b) **South Central District Health** –
 - Encourage the public to perform routine maintenance on septic systems to extend useful life of system and minimize groundwater impacts.
 - Encourage periodic citizens to inspect, replace or upgrade their septic systems to meet current standards.
- c) **City and County Governments and Planning Departments** –
 - Review Land Use Plans and Codes to determine how to incorporate groundwater concerns and incorporate groundwater quality as criteria in land use review of development proposals.
 - Continue to develop a long-term municipal sewer system plan.

- Where and when possible, connect residences to the municipal system.

3. Landscape, Lawn and Garden – Implementation Activities:

- a) Coordinated by Idaho Association of Soil Conservation Districts – Home*A*Syst
 - Provides information on environmental and health issues around the home.
- b) University of Idaho Cooperative Extension System - Master Gardener Program
 - Organize information and develop an educational/outreach program on methods and alternatives to properly maintain landscaping, lawns and gardens to prevent leaching nutrients to the groundwater.

4. Wells – Implementation Activities:

- a) **IDWR and South Central District Health –**
 - Develop and distribute information to well drillers and the public about the groundwater contamination concerns in the county.
 - Outline the need to construct and repair wells to prevent possible contamination from the surface.
 - Highlight the need to repair wells that are connecting aquifers so cross-contamination of aquifers does not occur.

5. Animal Pastures – Implementation Activities:

- a) **County Planning Departments, working with ISDA, IDEQ, IDWR, Soil Conservation Commission and Districts** - Develop comprehensive policies that encourage the implementation of guidelines establishing the appropriate animal density to prevent groundwater contamination.
- b) **County governments** – Review existing zoning code restrictions on allowable animal densities and continue to revise.

(See Appendix D for the latest information.)

F. Animal Feeding Operations – Implementation Activities:

1. **IDEQ, IDWR, Soil Conservation Commission and Districts, University of Idaho Cooperative Extension System, and ISDA** – The committee envisions numerous tasks that will be accomplished by these agencies.

a) **Resources -**

- Review scientific literature and studies regarding groundwater quality management of AFO operations.
- Review research and identify BMPs that will address waste management problems within AFOs.
- Develop informational/educational materials introducing BMPs for groundwater protection to AFO operators.
- Develop and maintain a bibliography of literature on AFO BMPs.

b) **Technical assistance** – A number of resources could provide technical assistance.

- Develop a plan for educating the public that will clarify the science in regards to groundwater quality and the management of AFOs.
- Develop and maintain a list of individuals and agencies with technical expertise in design, construction, and operation of AFOs.
- Provide resources for individual farm evaluations of AFOs to assess the adequacy of groundwater protection measures.

G. Groundwater Recharge

1. The committee will encourage financially sensible and environmentally beneficial groundwater recharge projects.

Section VIII Evaluation of Management Plan Progress and Success

A. Introduction

1. The committee recommends the following schedule for the evaluation of the management plan's progress and success in reducing nitrate contamination of the groundwater.

2. Ultimately, the goal of this plan and the Ground Water Quality Rule is to reduce the contamination of nitrate in the aquifer so that the county is no longer on the statewide priority list for groundwater. (Development of this list is explained in Section I.)
3. Due to the slow nature of ground water movement, it is not anticipated that quantitative reductions in nitrate levels will occur in the early implementation phases of the plan. Therefore, qualitative measures will also be established to evaluate the progress and success of the plan in the short term (3 – 5 years).

B. Annual Progress Report

1. A compilation of findings from federal, state and local agencies will be made each year. The IDEQ, with the support of the committee, will be the lead entity for the development of this information.
2. Additionally, every four years, an extensive review and evaluation of the effectiveness of the plan will be completed as a joint effort between the agencies. The first review would be scheduled for 2005.

C. Proposed Schedule

1. By the end of the first year (Fall 2002) - The plan will have been endorsed and adopted by local government and support agencies, as well as the general public.
2. At four years (2005) – After the first four years, the success of this management plan will be based on whether strategies and plans have been developed as outlined under the Implementation Tasks Section VII. This qualitative evaluation will include documentation of the information gathered and organized, whether the appropriate institutions have been put into place to promote the plan recommendations and documentation of what activities, practices and alternatives have been adopted that reduce nitrate loading to the groundwater.
3. At eight years (2009) – After 8 years, a rough quantitative evaluation will document the trend of nitrate levels since the implementation of the plan. A qualitative evaluation will determine whether the protection strategies are still being promoted and whether a high enough proportion of the citizens and organizations are participating in adopting plan.
4. Every four years thereafter (starting in 2013) – Both a qualitative and quantitative evaluation of the plan's progress and success will be undertaken to document continued improvements in groundwater quality in the county. If no improvements are noted, regulatory activities may be initiated per the Ground Water Rule (IDAPA 58.01.11.400.02). These activities will be a joint effort between IDEQ, ISDA, SCDH, IDWR and this committee.

(See Appendix D for Ground Water Rule details.)

5. At each step, the committee and governmental agencies will need to determine whether this management plan is addressing the groundwater contamination concerns adequately or whether modifications need to be made to the plan to better enable it to succeed.

D. Qualitative Evaluation

1. The intent of a qualitative evaluation is to demonstrate that management practices and strategies that reduce the leaching of nitrate to groundwater have been developed and how fully they have been implemented. The new practices, activities and strategies will, given time, and the increased adoption rate of the beneficial practices, result in better groundwater quality.
2. The following shall be part of the four year qualitative evaluation:
 - a) A summary/description of the practices, activities and strategies being recommended for the reduction of nitrate loading to the groundwater.
 - b) Document the extent of changes and adoption of groundwater quality protection practices, activities and strategies that are recommended in this plan.
 - c) Conduct surveys to document adoption of beneficial groundwater protection practices, activities and strategies.

E. Quantitative Evaluation

1. The ultimate goal of the management plan and the Groundwater Protection Act is to reduce the concentration of nitrate in the aquifer. Specifically, the goal is to reduce nitrate levels below the statewide priority list level, as explained in Section I.
2. The ISDA (Groundwater program) and IDWR (Statewide Ambient Groundwater Quality Monitoring program) will continue to sample for nitrate on a regular basis.

(Figures showing these well locations are in Appendix F.)

3. The determination of the success of this management plan will depend on:
 - a) The results of on-going trend analysis, based on statistical analysis of monitoring results from the state monitoring networks.
 - b) Evaluation of nitrate changes along several groundwater paths from upgradient sites to downgradient sites.

4. The committee will work with IDEQ, IDWR, SCDH, and the ISDA to evaluate other factors associated with a reduction in nitrate loading to the groundwater (an example would be: long term trends in nitrate levels of shallow and deep soil samples).
5. IDEQ will assist the committee and other state agencies to evaluate the data.

F. Audience

1. Reports should be targeted for two audiences:
 - a) Residents within the county – The public in Twin Falls County should be the primary audience. The report should act as an educational tool to inform people about nitrate concerns in the county and how they are being addressed. The report should be useful as a reference of the practices, activities and strategies being promoted in the area to protect groundwater quality.
 - b) State agencies and the interested public outside of the county – The reports should also be targeted to document the progress being made to address nitrate concerns. IDEQ, IDWR, SCDH, and ISDA should be able to use the report to demonstrate to the interested public that the nitrate concern is being addressed in the area. The report should also:
 - Determine whether the plan is being implemented in such a manner that the nitrate concentrations will be reduced in the future.
 - Document what practices, activities and/or strategies have been implemented and to what extent.
 - Identify what changes in the management plan would better address the nitrate concentration.

G. Table 1: Management Plan Evaluation Milestones

In order to evaluate the progress and success of the plan, a schedule has been proposed by the committee. Details of the data evaluation and review dates are discussed earlier in this section. A simplified version of this same information is provided on the following page.

Table 1: Management Plan Evaluation Milestones

Land Uses	Time Frame – Years				Goals	Topic Addressed	Responsible Party
	Baseline	2005	2009	2013	%		
Agriculture	X					Acres assessed for GW quality protection measures – type of irrigation & fertilizer management.	Agriculture Service Providers
		X			50	% of acres in the county that are implementing an accepted system of BMPs .	
			X		75		
				X	90+		
Residential	X					Determine initial public awareness of elevated nitrate in Twin Falls county ground water, and its possible causes.	Local Govt., SCDH, & IDEQ
		X			50	Half of the county residents surveyed are aware of elevated nitrate levels in the ground water and know of at least one potential contributor. A large percentage of residents have made practice improvements (50% by 4 yrs, and 75% by 8 yrs.). Septic system nitrate loading issues (including high density areas and cumulative effects) have been investigated and addressed in terms of permits or practices.	
			X		75		
				X	90+		
Land Application	X					Land appliers will sample existing monitoring wells per the existing permits.	Permitees & IDEQ
		X			75	Nitrate analysis of monitoring wells will likely be added to permits as they are re-issued. Trends of the nitrate levels will be compiled.	
			X		85		
				X	95+		
Animal Feeding Operations	X					As of this printing, all dairies are required to have nutrient management plans and are implementing them (July 1, 2001). The beef industry is to have nutrient management plans by Jan. 2005.	Agriculture Service Providers
		X			50	Percent of confined animals that are under an accepted system of BMPs. All dairies and the beef industry should be following their Nutrient Management Plan.	
			X		75		
				X	95+		

Appendix A - Management Plan Support and Approval

A. Statement by the Committee

The Idaho Department of Environmental Quality (IDEQ) formed the Twin Falls County Groundwater Quality Advisory Committee Fall 2000 to address elevated levels of nitrate in the area's groundwater. Members for this committee were chosen based on their individual talents and areas of expertise. A Technical Advisory Committee, composed of governmental agency scientists and private business people, presented numerous educational sessions to the group.

With this additional knowledge, the committee was able to identify potential activities that contribute to nitrate in groundwater. Work sessions over the next several months resulted in the development of practices, activities and strategies designed to reduce the amount of nitrate reaching the groundwater. These suggestions, when added to the legal and scientific information, are referred to as the "Twin Falls County Groundwater Quality Management Plan".

We, as a collective, approve of this document and strongly recommend adoption by our fellow citizens.

The Twin Falls County Groundwater Advisory Committee

B. Concurrence with Management Plan

Agency	Signature	Date
City of Buhl		
City of Castleford		
City of Filer		
City of Hansen		
City of Hollister		
City of Kimberly		
City of Murtaugh		
City of Rogerson		
City of Twin Falls		
Idaho Rural Water Association		
Idaho Soil Conservation Commission		
Idaho Soil Conservation District – Balanced Rock		
Idaho Soil and Water Conservation District – Twin Falls		
Idaho Soil and Water Conservation District – Snake River		
Idaho State Department of Agriculture		
South Central District Health		
Twin Falls County		

C. Acceptance of Management Plan

Agency	Signature	Date
Idaho Department of Environmental Quality		

Appendix B – Committee Members

Twin Falls County Groundwater Quality Advisory Committee Members

Phyllis Beard – Agriculture/Industry
Steven Bingham – U.S. Bank/Agriculture
Stuart Canada – Twin Falls County Board of Realtors
Randy Clark – Buhl Planning & Zoning
Trip Craig – Twin Falls City Council
Terry Downs – Twin Falls Chamber of Commerce
Merl Egbert – South Central District Health
Lewis Eilers – Idaho Dairymen Association
Gary Grindstaff – Twin Falls County Commissioner
Reagon Hatch – Animal Feeding Operations
Kathy Hieb – Concerned Citizen
Jeff Lynn – Concerned Citizen
John O’Connor – Agriculture
Mike Schroeder – City of Twin Falls Water Department
Bob Templeman – Filer City Council

Technical Advisory Committee

Idaho Association of Soil Conservation Districts – Lance Holloway
Idaho State Department of Agriculture – Rick Carlson, Matt Thompson
Idaho Department of Environmental Quality – Bill Allred, Dave Anderson, Joe Baldwin,
Barry Burnell, Steve Staufer, Mike Thomas
Idaho Department of Water Resources – Allen Merritt, Ken Neely
Idaho Rural Water Association – John Bokor
Middle Snake Regional Water Resources Commission – Bob Muffley
Paul Chemical and Fertilizer – Rex Schorzman
University of Idaho Cooperative Extension System – Bob Ohlensehlen, Steve Salisbury

Appendix C - Duties, Roles and Responsibilities

The following is a brief description of the roles and responsibilities of the participating agencies and organizations.

A. Twin Falls County Groundwater Quality Advisory Committee (GQAC)

The Twin Falls County Groundwater Quality Advisory Committee and Subcommittees have been appointed to assist the State of Idaho, represented by the Idaho State Department of Agriculture and the Idaho Department of Environmental Quality, in the formation and implementation of a groundwater management plan. After the approval of agricultural portions of the plan by ISDA and adoption of the plan by IDEQ, the GQAC will continue to meet periodically to review the implementation of the management plan.

The committee may establish sub-committees as necessary to implement portions of the plan. These sub-committees will periodically review and report plan implementation progress to the full committee. The GQAC will review these reports and provide recommendations for plan revisions to local governments, state and federal agencies.

Sub-Committees:

- Agriculture
- Wastewater Land Application
- Residential
- Animal Feeding Operations

B. United States Department of Agriculture - Natural Resource Conservation Service (NRCS)

The Natural Resource Conservation Service (NRCS) activities include working with the local Soil and Water Conservation Districts (SWCDs) to implement technical and financial assistance programs related to soil and water resources. After formal research and development of BMPs, the NRCS in cooperation with FSA, IDEQ, and ISDA will perform public, group and individual demonstration projects to ensure the acceptance of the established BMPs by the industry and community. In cooperation with FSA and SWCD, the NRCS shall provide technical and financial assistance that will assist land operators in the planning and implementation of nutrient, pest and irrigation management plans designed to protect groundwater and surface water quality through the use of “best management systems”.

C. Twin Falls County Soil and Water Conservation Districts (SWCD)

Primary activities of the Soil and Water Conservation Districts include soil erosion control; conservation and development of water resources; control of water pollution from agricultural non-point sources; and protection, conservation, development and enhancement of the quality and productive potentials of land and water resources in Idaho. The SWCD is administered and coordinated by the Idaho State Department of Agriculture (ISDA).

The SWCD shall promote, assist and encourage landowners in addressing and implementing this action plan. The SWCDs may develop work plans and compile and issue reports and assessments on implementation of the management plan to the ISDA and IDEQ.

For the action plan, the SWCD will coordinate recommended implementation activities in the action plan. SWCD will establish schedules for plan renewals and responses to plan applications, voluntary compliance actions, provide technical assistance, act as a clearing house for groundwater protection information, identify priority area activities, and develop and present water quality protection education programs.

D. Idaho Department of Water Resources (IDWR)

The Idaho Department of Water Resources administers surface and ground water programs and activities that are predominately related to water supply issues. However, the IDWR also has responsibilities for ground water quality in areas such as Statewide Monitoring, Managed Recharge, and Injection Wells. The programs conducted by IDWR affect ground water management and protection, and are designed to ensure that water is used efficiently and without waste.

The IDWR can assist with this groundwater plan in the following ways:

- Continue to conduct hydrogeologic characterization studies.
- Continue to enforce well construction standards and determine if stricter standards are needed.
- Ensure proper regulation and distribution of water in accordance with water rights and allocation.
- Recommend solutions where ground water quality problems exist or may be emerging.

The IDWR shall cooperate with, and assist, other agencies involved in the planning and implementation of measures designed to protect the groundwater quality and improve the efficiency of the water use in Twin Falls County.

E. Idaho Rural Water Association (IRWA)

The IRWA Circuit Riders are available to meet with operators and managers at their public drinking water system to provide technical support. Assistance is given in complying with federal and state mandates, in maximizing the efficiency of the system, in ensuring system capacity, and in addressing environmental challenges.

The IRWA Wellhead Protection specialist can assist public drinking water systems in designing and implementing groundwater protection plans. The protection plan initiates measures at the local level to prevent contamination, prevent noncompliance with the safe Drinking Water Act, lessen the burden on consumers, and prevent the degradation of drinking water for future generations.

F. Idaho State Department of Environmental Quality (IDEQ)

The Idaho Department of Environmental Quality administers the Idaho State Groundwater Quality Protection Act and implements the groundwater quality protection requirements for federal and state agencies, cities, counties, industry, and citizens. IDEQ has the following responsibilities:

- Assist with a regional groundwater monitoring network and perform periodic water quality assessments to evaluate the performance of the management action plan in reducing the groundwater contamination resulting from the identified sources of contamination as outlined in the investigative report.
- Establish monitoring requirements for determining water quality conditions and establish and coordinate local monitoring efforts to obtain information on groundwater quality.
- Work in conjunction with the committee, ISDA and other state and local agencies to periodically evaluate and assess the implementation of the action plan to determine whether the plan is effective in reducing nitrate loading to the groundwater. It will also assist the advisory committee as requested.
- Administer rules and regulations for the permitting of land application of wastewater. The Department will continue to work with permittees to protect the state's groundwater resources.
- Carry out the provisions of the federal Safe Drinking Water Act by establishing drinking water standards and certifying water and treatment systems and operators. IDEQ is responsible for identifying health hazards, and issuing public notification on such hazards.
- Perform all health risk assessments concerning groundwater quality and provide for the regulation and protection of all public water supplies within the management.

G. Idaho State Department of Agriculture (ISDA)

ISDA has the lead role in assuring the implementation of groundwater protection activities in the agricultural sectors. As agricultural activities are potential non-point sources of pollution, ISDA is involved with the identification of existing agricultural management practice problems and development and implementation of alternatives for such practices. ISDA's network with the Soil and Conservation Districts provides an avenue for financial assistance to farmers for conservation projects, research and demonstration projects, and public education and information.

ISDA will work with IDEQ to review and evaluate the effectiveness of the implementation of the agricultural elements of the action plan.

H. Idaho Soil Conservation Commission (ISCC)

The Idaho Soil Conservation Commission provides administrative, financial and technical support to all of the Soil and Water Conservation Districts in the state, including the local offices in Twin Falls County. The Idaho Soil Conservation Commission with Soil and Water Conservation Districts (SWCDs) and Soil Conservation Districts (SCDs) develop annual work plans, review and evaluate district projects, practices, budgets, contracts and assists districts in helping meet their obligations.

ISDA will work with IDEQ to review and evaluate the effectiveness of the implementation of the agricultural elements of the action plan.

I. City and County Governments

In general local governments are not involved with environmental regulation of agriculture practices, food processing or confined animal feeding operation. County Planning Departments are however, directly involved in rural residential land use. Planning Departments issue zoning permits to build on land, review land partition and subdivision proposals and enforce code provisions. County Planning Commissions also act on requests to rezone properties, allow non-residential land uses and to make amendments to comprehensive plans for longer term land use needs. Local government's roles are one avenue for education about groundwater quality concerns and planning for development, which is compatible with the protection of the groundwater resource.

Appendix D - Resources and References

Rules, codes, acts and standards:

1. State of Idaho

Topics: groundwater protection, well construction standards and well driller licensing rules

<http://www.oneplan.org>

<http://www2.state.id.us/adm/adminrules/rules/idapa58/0111.pdf>

<http://www3.state.id.us/cgi-bin/newidst?sctid=390010020.K>

Agriculture:

1. Idaho State Department of Agriculture (ISDA)

Topics: public meetings and press releases, pesticide and weed information, programs, forms, laws, safety, drought information

(208) 332-8599

<http://www.agri.state.id.us>

2. United States Environmental Protection Agency (EPA)

Topics: fertilizer use; ordinances; source water protection; small quantity chemical users

<http://www.epa.gov/r5water/ordcom>

<http://www.epa.gov/owow/nps/ordinance>

<http://www.epa.gov/owow/nps/ordinance/links.htm>

<http://es.epa.gov/oeca/main/compasst/index.html>

3. United States Department of Agriculture – Natural Resources Conservation Services
Topics: pollution prevention; fertilizer use; conservation practices; watershed
http://www.ftw.nrcs.usda.gov/tech_ref.html
<http://www.nhq.nrcs.usda.gov/PROGRAMS/ahcwpd/ahCNMP.html>
<http://id.nrcs.usda.gov>
<http://www.wcc.nrcs.usda.gov/watershed/products.html>
<http://www.stormwatercenter.net>
4. Twin Falls County Agriculture Extension
Topics: Best Management Practices
<http://extension.ag.uidaho.edu/twinfalls>
5. Idaho Soil Conservation Commission (SCC)
Topics: programs to improve the environment, water quality issues and solutions, access to technical information on resource management, technical assistance

(208) 322-8650
<http://www.scc.state.id.us>
6. Idaho Association of Soil Conservation Districts (IASCD)
Topics: programs (soil conservation districts, total maximum daily load, Envirothon, Idaho State Forestry Contest, Home*A*Syst, Lake*A*Syst), conferences, numerous web links

(208) 338-5900
<http://www.iascd.state.id.us>
7. Twin Falls Canal Company
Topics: General information, water supply (reservoir storage, education, tail water management), water operations (ditch rider, delivery, rights of way, community ditches, maintenance and construction, rodent control, flooding)

(208) 733-6731
<http://www.tfcanal.com>

Wastewater Land Application:

1. Idaho Department of Environmental Quality – Twin Falls office

Topics: Local information

(208) 736-2190

<http://www2.state.id.us/deq/>

http://www2.state.id.us/deq/ro_t/maintro.htm

Residential: (refer to the Agriculture and AFO sections for information on animal pastures, lawn and garden care)

1. Home*A*Syst

Topics: Environmental and health issues around the home

<http://www.uwex.edu/homeasyst>

2. United States Environmental Protection Agency (EPA) – Drinking Water Academy (DWA)

Topics: drinking water

<http://www.epa.gov/safewater/dwa.html>

3. United States Environmental Protection Agency (EPA) - Safe Drinking Water Act

Topics: drinking water

1-(800) 426-4791 or (202) 260-7908

4. United States Department of Agriculture – Cooperative State Research, Education and Extension Service State Partners

Topics: septic systems

<http://www.reeusda.gov/1700/statepartners/usa.htm>

5. United States Geological Survey

Topics: soil and water mapping, ground and surface water information, general

(208) 387-1326

<http://idaho.usgs.gov>

<http://idaho.usgs.gov/projects/sr3>

6. University of Idaho Cooperative Extension System – local office
Topics: 4-H, Master Gardener, livestock, dairy
(208) 734-9590
<http://extension.ag.uidaho.edu/twinfalls>
7. Idaho Water Resource Research Institute (IWRRRI)
Topics: maps
<http://www.if.uidaho.edu/SR3/home.html>
<http://teton.if.uidaho.edu/~ifwrrri/sr3/gwswhome.html>
8. Idaho Department of Water Resources (IDWR)
Topics: hydrogeologic studies; well construction standards; water rights; advice
Boise office: (208) 327-7992
Local office: (208) 736-3083
<http://www2.idwr.state.id.us/>
9. South Central District Health (SCDH)
Topics: individual drinking water systems and domestic sub-surface sewage systems
(208) 734-5900
<http://www2.state.id.us/phd5/>
10. Idaho Rural Water Association (IRWA)
Topics: conferences, training schedules, wellhead protection, public awareness
<http://www.idahoruralwater.com>
11. Groundwater Foundation
Topics: programs and educational materials for adults and youth
<http://www.groundwater.org>

Animal Feeding Operations:

1. Idaho Cattle Association (ICA)
Topics: contact information, consumer educators, rural news service
(208) 343-1615
<http://www.idbeef.org/>

2. United States Environmental Protection Agency (EPA) – Office of Science and Technology and Office of Wastewater Management
Topics: proposed rules, permit nutrient plans, publications, regulations, outreach contacts
<http://www.epa.gov/npdes/afo>
<http://www.epa.gov/owmitnet/afo.htm>

3. University of Idaho Cooperative Extension System – local office
Topics: research-based education
(208) 734-9590
<http://www.uidaho.edu/ag/extension/>
<http://www.sustainable.doe.gov/database/451.html>

4. Idaho Association of Soil Conservation Districts (IASCD)
Topics: site maps, programs (soil conservation districts, total maximum daily load, Envirothon, Idaho State Forestry Contest, Home*A*Syst, Lake*A*Syst), conferences, numerous web links
(208) 338-4321
<http://www.iascd.state.id.us>
<http://www.iascd.org/>
<http://www.nacdnet.org/>

5. United States Department of Agriculture – Natural Resources Conservation Services (NRCS)

Topics: pollution prevention; fertilizer use; conservation practices; watershed

<http://www.nhq.nrcs.usda.gov/PROGRAMS/ahcwpd/ahCNMP.html>

<http://id.nrcs.usda.gov>

<http://www.wcc.nrcs.usda.gov/watershed/products.html>

<http://www.stormwatercenter.net>

6. Idaho State Department of Agriculture (ISDA)

Topics: public meetings and press releases, pesticide and weed information, programs, forms, laws, safety, drought information

(208) 332-8599

<http://www.agri.state.id.us>

7. United States Environmental Protection Agency (EPA)

Topics: fertilizer use; ordinances; source water protection; small quantity chemical users

<http://www.epa.gov/r5water/ordcom>

<http://www.epa.gov/owow/nps/ordinance>

<http://www.epa.gov/owow/nps/ordinance/links.htm>

<http://es.epa.gov/oeca/main/compasst/index/html>

Groundwater Recharge:

1. Idaho Department of Water Resources (IDWR)

Topics: hydrogeologic studies; well construction standards; water rights; advice

Boise office: (208) 327-7992

Local office: (208) 736-3083

<http://www.idwr.state.id.us/recharge/>

Appendix E - Figures

Figure I: Location of Twin Falls County within the State of Idaho

Figure II : Land Use within Twin Falls County

Figure 1: Location of Twin Falls County within the State of Idaho

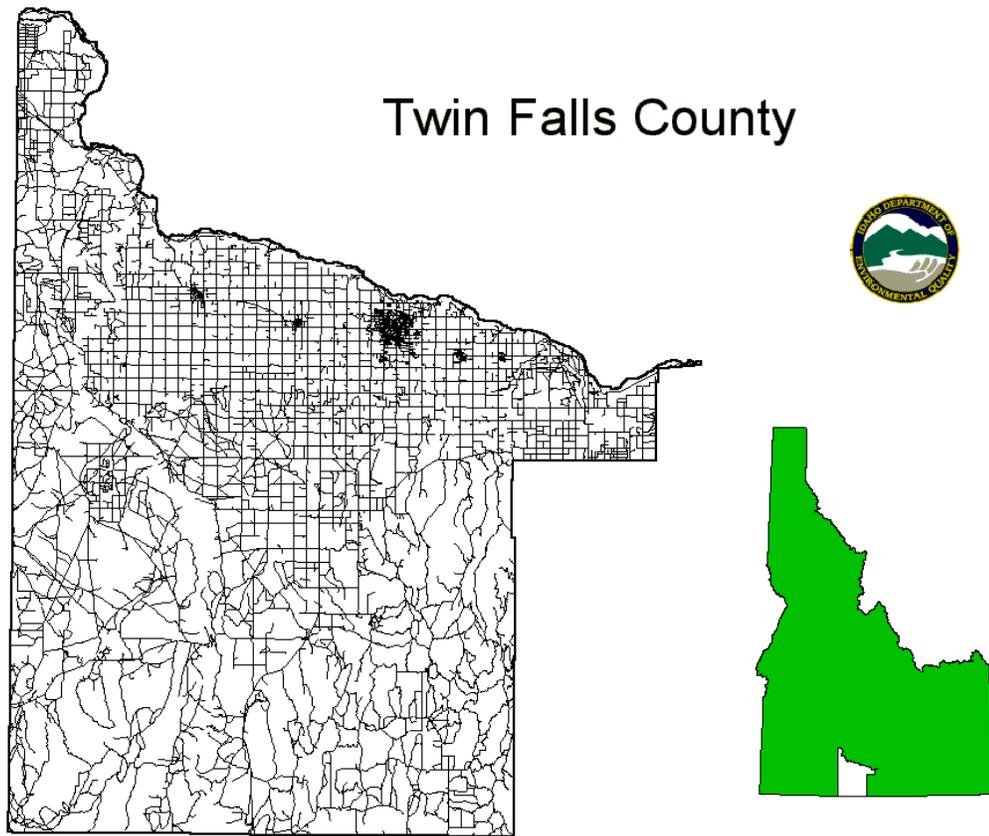
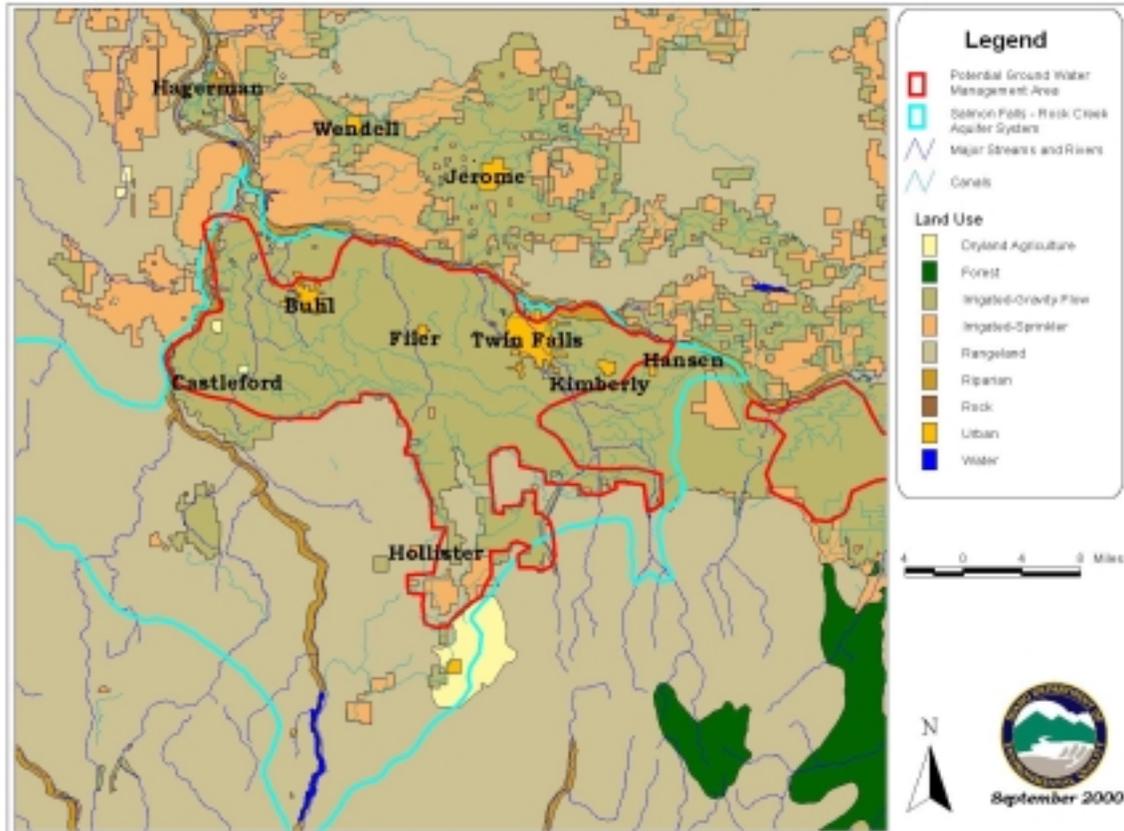


Figure 2: Land Use within Twin Falls County



Appendix F - Groundwater Quality Monitoring

The Idaho State Department of Agriculture (ISDA) and the Idaho Department of Water Resources (IDWR) will continue their groundwater monitoring programs. The Idaho Department of Environmental Quality (IDEQ) will cooperate with these agencies to compile the data annually. This joint effort will reduce the chance of duplication of effort between the agencies, and provide each agency with a larger database from which to work.

Figure 3 (courtesy of Ken Neely - IDWR) demonstrates some of the information collected thus far.

Figure 3: Groundwater Quality Monitoring, Twin Falls County

