

Camas Prairie Nitrate Priority Area

Ground Water Quality Management Plan

May 28, 2008



Idaho Department of Environmental Quality
Lewiston Regional Office



Idaho Soil Conservation Commission
Lewis Soil Conservation District



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SUMMARY

Ground water has historically been viewed as a valuable but inexhaustible resource - a resource that is inexpensive, readily available, and invulnerable to detrimental effects from activities occurring on the land surface. We know now that ground water contamination has occurred from agricultural chemicals, household chemicals, industrial chemicals, and failing septic systems. Ground water protection from known contaminant sources can best be achieved by managing and controlling the sources. Ground water protection from land use activities can best be achieved by implementing best management practices while conducting land use activities.

INTRODUCTION

Idaho's Ground Water Quality Protection Act, passed by the State Legislature in 1989, authorized a comprehensive approach for maintaining and improving Idaho's ground-water quality. The Act resulted in legislative adoption of the Idaho Ground Water Quality Plan requiring maintenance of the existing high quality of Idaho's ground water. The Idaho Department of Environmental Quality (DEQ) policy PM00-4 provides guidance for DEQ to evaluate ground water and identify areas being significantly degraded or having impaired beneficial uses. Areas determined to have significant degradation are to be prioritized for implementation of protective management strategies or corrective action measures.

During 1998 and 1999 the Idaho Ground Water Monitoring Technical Committee established criteria to prioritize degraded areas of ground water quality. In 2000, 25 areas with elevated nitrate were identified and delineated using ground water quality data collected through 1999. Within a nitrate priority area 25% or more of the sampled wells exceed 5 mg/l of nitrate. The nitrate priority areas were then ranked based on the severity of the nitrate problem and to establish a work priority for agency resources. Ranking criteria consist of population, existing water quality, and water quality trends. The process also considers impacts on beneficial uses other than drinking water, such as aquaculture. The initial ranking process was finalized in December 2001.

The Camas Prairie Nitrate Priority Area is ranked 5 out of the 25 areas. It encompasses approximately 187,000 acres within the 1700 square mile Clearwater Plateau in Lewis and Idaho counties (Figure 1). The Camas Prairie is the home of rural farms and farming communities. Cultivated prairie farms produce primarily dry land grains and lentils. Livestock operations exist in areas not conducive for cultivated farming and there are a few other specialty farms and small and growing agri-business industries. The average annual precipitation for the area is 20 to 24 inches.

Two major rivers border the Camas Prairie: the Salmon River on the west side, and the South Fork of the Clearwater River on the east. The most significant watershed on the prairie is Cottonwood Creek which flows west to east across the Prairie and into the South Fork Clearwater River. Other watersheds on the Camas Prairie include Holes Creek, Long Hollow Creek, Big Canyon Creek, and Lawyer Creek. Elevations range from approximately 2,600 to 3,800 feet. Ground water beneath these watersheds

generally flows toward the northeast through Miocene basalts. A detailed description of the area's hydrogeology, historic and current water quality conditions, and nitrate fate and transport analyses can be found through review of the reports listed in Appendix A.

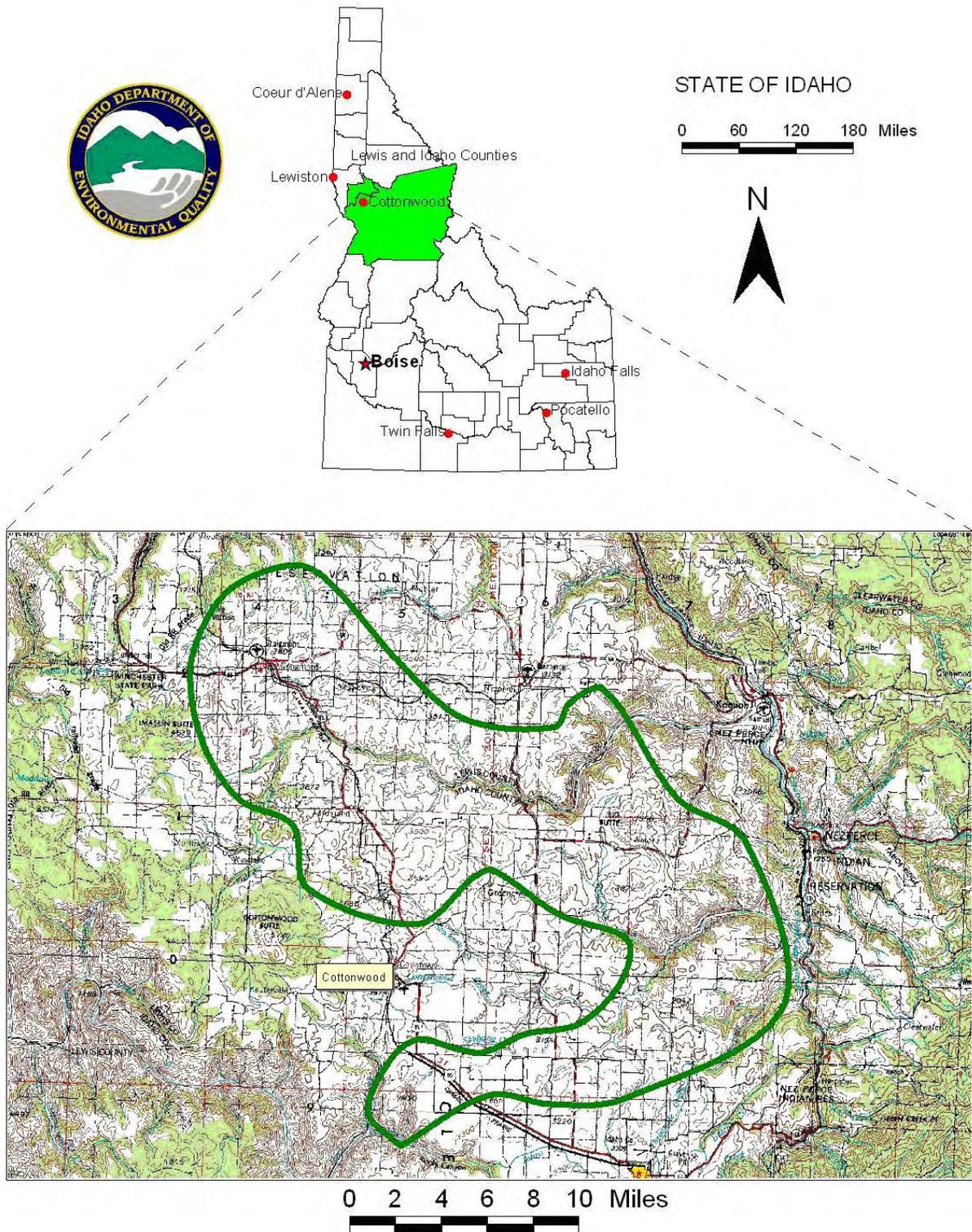


Figure 1. Camas Prairie Nitrate Priority Area.

Camas Prairie Ground Water Nitrate Nitrogen

Nitrogen isotope signatures measured in 17 ground water quality samples collected by DEQ in 2006 (Baldwin, Dai and McVay 2007) are shown in Figure 2. Six percent of the wells (1) had inorganic nitrogen, 35 % of the wells (9) had a mixture of organic and inorganic nitrogen, and 59% of the wells (7) had organic nitrogen. Common sources of inorganic nitrogen on the Camas Prairie are commercial fertilizers. Common sources of organic nitrogen on the Camas Prairie are legumes and green manure crops, manure, and sewage.

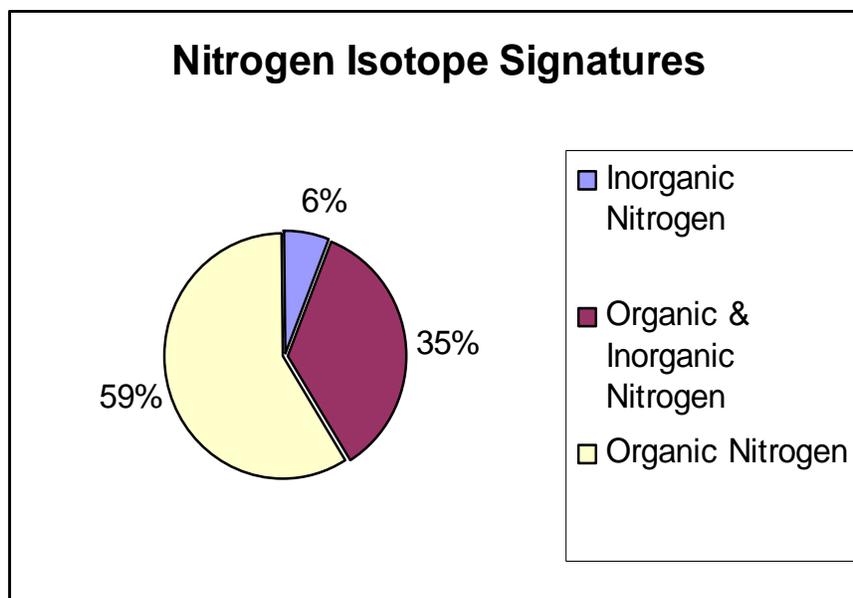


Figure 2. Nitrogen Isotope Signatures in 17 Ground Water Samples from the Camas Prairie, 2006.

Appendix A lists applicable Camas Prairie ground water analysis reports. In summary, these reports suggest that

- aquifers below the Camas Prairie lie within complex fractured basalt interbeds,
- more than one aquifer exists,
- aquifer recharge areas are not characteristically similar,
- recharge appears to be seasonal with snow melt or precipitation,
- nitrate concentrations do not correlate spatially,
- nitrate concentrations do not correlate with well construction characteristics,
- nitrate concentrations vary seasonally in routinely sampled wells,
- variability is most pronounced in wells with higher nitrate concentrations,
- high and variable concentrations probably represent a site specific source, and
- low or moderate concentrations probably represent regional conditions.

Management Plan Goal and Objective

The goal of this plan is to promote the voluntary adoption of best management practices for the control and management of nitrogen sources to protect ground water quality and the future of the general Camas Prairie community. The objective of the management plan is to cause a decreasing trend in ground water nitrate nitrogen concentrations. The plan should be considered a success if nitrate-nitrogen concentrations measured in at least 75 percent of samples collected from water wells on the Camas Prairie are found to be below 5 milligrams per liter, the measure upon which the nitrate priority area designation is based.

PLAN IMPLEMENTATION

This plan relies on the efforts coordinated through the Lewis Soil Conservation District to assist local communities and individuals to manage rural and agricultural nitrate sources. Management strategies most easily implemented without causing economic problems for the residents of the Prairie were utilized.

The majority of the land use in and around the Camas Prairie is agriculturally oriented with local municipal economies supported primarily by agricultural operations. In recent years, a number of small and growing industrial businesses have been established on the prairie, but no other industry matches the dominance of the prairie's agricultural economy, its culture, and communities. This plan focuses on improvements in agricultural practices because of the dominance of agriculture on the prairie. Since the Lewis Soil Conservation District (the District) provides leadership in water quality and resource management on the prairie, the District is considered to be the local lead for coordinating most ground water quality protection projects promoted by this plan.

Idaho Statute Title 22, Chapter 27 enlists Idaho conservation districts to emphasize non-regulatory, science-based technical assistance, incentive-based financial programs, and informational and educational programs at the local level to assist private landowners and land users to plan, develop, and implement best management practices. Best management practices have been developed for cultivated production, livestock management, agribusiness, and farmstead facilities on the prairie. The District's work, in combination with water quality protection work being completed by local communities and municipalities, provides a comprehensive watershed approach to the reduction of nitrate-nitrogen reaching and further impacting the ground water below the Camas Prairie.

The Lewis Conservation District Board coordinates locally with District members and associates, numerous private land owners and agricultural producers of the Camas Prairie. Local partners participating in, providing assistance for, or supporting the development and implementation of this plan are Idaho Soil Conservation Commission, Idaho Association of Soil Conservation Districts, Natural Resources Conservation Service, Lewis County Commissioners, Idaho Department of Agriculture, Department of Environmental Quality, Idaho Department of Water Resources, Nez Perce Tribe, City of Craigmont, City of Nezperce, Winchester Lake Watershed Advisory Group, Clearwater Basin Advisory Group, and the Greater Chamber of Commerce of Craigmont, Reubens, and Winchester.

Management Strategies

The following general strategies have been identified for protecting public health and reducing nitrate contributions to ground water:

- Provide information and education on ground water protection, pollutant source controls, and wellhead protection through:
 - private well testing,
 - fertilizer handling,
 - livestock waste management,
 - soil nutrient testing.
- Provide technical and financial assistance to implement best management practices for nitrogen management and water quality protection on:
 - 3,500 acres direct seed/no till conservation tillage,
 - 20,000 acres nutrient management/spring top dress applications.
- Provide technical and financial assistance to implement best management practices for livestock management and water quality protection by installing:
 - waste storage structures,
 - storm water controls,
 - access control and exclusion area fencing.
- Promote management of sewage disposal systems for nitrogen control by:
 - using North Central District Health Department permit program for new and repaired individual subsurface systems,
 - investigating complaints and enforce corrective actions,
 - obtaining US EPA permit for municipal treatment lagoons and disposal systems,
 - obtaining DEQ permit for land application treatment of wastewater.
- Provide management tools and protection measures to manage contamination and protect public drinking water wells by:
 - using Source Water Assessments completed for the Cities of Reubens, Fenn, and Grangeville,
 - implementing Drinking Water Protection Plans developed and being implemented by the Cities of Craigmont, Nez Perce, Cottonwood, Ferdinand, and Winchester.

Participants' Activities, Tasks, and Schedules

The following tables provide a listing of special project tasks and lead participants. A schedule is provided to indicate the estimated time frame for completing these activities. Project activities may be adjusted if circumstances require.

Table 1 lists management tasks being completed and the project lead for each task.

Table 1. Project Management Activities.

Action Item	Lead Entity
Facilitate DEQ Nitrate Management Plan	Department of Environmental Quality
Monitor ambient nitrate concentration trends	Department of Environmental Quality
Coordination of community participants	Lewis Conservation District
Provide news articles for landowners and the public	Lewis Conservation District
Provide project and BMP information materials	Lewis Conservation District
Provide community education presentations	Lewis Conservation District
Maintain local data base for project information	Lewis Conservation District
Prepare periodic project progress reports	Lewis Conservation District
Maintain project mailing list	Lewis Conservation District
Identification of priority sites for BMP implementation	Lewis Conservation District
BMP development	Idaho Conservation Commission
BMP effectiveness monitoring	Idaho Department of Agriculture
Seek funding sources	Lewis Conservation District

Table 2 summarizes the outreach activities for ground water quality protection for the Camas Prairie. The Lewis Soil Conservation District is the project lead for outreach activities.

Table 2. Outreach Actions.

Action Item	Schedule
Test homeowners' wells	December 2004
Project BMP demonstration tour	November 2005
Test homeowners' wells	December 2006
Provide project related information with City of Grangeville	October 2006
Public meetings to inform, educate, encourage participation	March 2006 / August 2009
Conduct crop tour for nutrient inhibitor field trials	May - June 2006
Sixth Grade field day, water quality information outreach	Spring 2005/2006/2007/2009
Inventory septic systems & provide information on proper operation	January - June 2007
Project BMPs field trip and tour	November 2007/December 2011
Test homeowners' wells	December 2007

Table 3 lists meetings scheduled to provide the community, the public, and specific interest groups information concerning the ground water management project.

Table 3. Meeting Schedule.

Schedule	Location	Target Audience	Agenda
June 2004	Craigmont	Local producers, City of Craigmont, wheat growers, direct seed association	Ground water protection, project concerns and priorities, ground water best management practices
October 2005	Craigmont area farms	Local producers	Ground water best management practices
May 2006	Winchester	Local producers, school children	Ground water education, water quality protection, best management practices
June 2006	Craigmont	Local producers, City of Craigmont, wheat growers, direct seed association	Ground water protection, project concerns and priorities, ground water best management practices
September 2006	Nezperce	Homeowners, local producers	Water well testing, ground water quality, ground water protection
February 2007	Craigmont	Local producers, City of Craigmont, wheat growers, direct seed association	Ground water protection, project concerns and priorities, ground water best management practices
March 2007	Nezperce	Local producers	Ground water quality protection, ground water best management practice, best management practice funding
April 2007	Nezperce	Local producers	Ground water quality protection, ground water best management practice, best management practice funding
August 2009	To Be Determined	Local producers	Ground water quality protection, ground water best management practice, best management practice funding

Table 4 summarizes the implementation, monitoring, and review of best management practices being employed to protect, maintain, and improve ground water quality in the Camas Prairie. The table identifies the implementing entity and includes general time frames for completion of each action item. The Idaho DEQ Nonpoint Source 319 program will conduct periodic reviews of the status of these activities.

Table 4. Best Management Practices Implementation.

Action Item	Schedule	Entity
Install BMPs	October 2004	Lewis SCD, ISCC, NRCS
Monitor and evaluate BMP effectiveness	December 2004	ISCC, IASCD, NRCS
Install BMPs	June 2005	Lewis SCD, ISCC, NRCS
Monitor and evaluate BMP effectiveness	June 2005	ISCC, IASCD, NRCS
Install BMPs	November 2005	Lewis SCD, ISCC, NRCS
Monitor and evaluate BMP effectiveness	December 2005	ISCC, IASCD, NRCS
Test homeowners' wells	December 2005	Lewis SCD
Install BMPs	October 2006	Lewis SCD, Landowners
Monitor and evaluate BMP effectiveness	December 2006	ISCC, IASCD, Lewis SCD
Install BMPs	June 2007	Lewis SCD, ISCC, Landowners
Monitor and evaluate BMP effectiveness	June 2007	ISCC, IASCD, Lewis SCD
Install BMPs	November 2007	Lewis SCD, ISCC, Landowners
Monitor and evaluate BMP effectiveness	December 2007	ISCC, IASCD
Install BMPs	August 2010	Lewis SCD, City of Craigmont, ISCC
Monitor and evaluate BMP effectiveness	August 2011	Lewis SCD, City of Craigmont, ISCC, IDA

SCD=Soil Conservation District, IASCD=Idaho Association of Soil Conservation Districts, ISCC=Idaho Soil Conservation Commission, NRCS=Natural Resource Conservation Service

The Lewis Soil Conservation District coordinates and participates in many ongoing environmental and wildlife programs projects in the Camas Prairie area. The majority of these projects will have an effect on water quality protection. Some of the major programs and projects are listed in Table 5.

Table 5. Concurrent and Supportive Water Quality Protection Activities.

Action Item	Entity	Schedule
Clearwater Focus – Bonneville Power Administration Project	Idaho Soil Conservation Commission	Ongoing
USDA Environmental Incentives Program; Conservation Reserve Program	Natural Resource Conservation Service	Limited basis
Water Quality Protection for Agriculture – Holes and Long Hollow Projects	Idaho Soil Conservation Commission	Ongoing
Animal Feeding Operations CWA 319 Projects	Idaho Association of Soil Conservation Districts Division II	2002 - 2008

GROUND WATER QUALITY MONITORING

The Lewis Soil Conservation District coordinates a well testing program that accompanies and complements the implementation of best management practices. The District also hosts public information events to educate the public about ground water quality protection and reduce health risks from the elevated nitrate concentrations

currently found in water samples from private wells. Water well testing also helps well owners identify wells that should be replaced, repaired, or abandoned.

The Idaho Department of Agriculture implements Idaho's Agricultural Ground Water Quality Protection Program and Agricultural Ground Water Quality Monitoring Program. The Programs assess the status of ground water quality related to agriculture, tracks water quality trends, determines impacts from dairy and feedlot facilities, and provides data to support BMP or regulatory development and evaluation processes.

The Idaho Association of Soil Conservation Districts collects ground water quality samples from selected monitoring locations and analyzes samples for nutrients and pesticides. The data are compiled and shared to help track and assess the application of BMP's and their success in protecting the area's ground water quality.

The Idaho Department of Water Resources characterizes Idaho's ground water quality, identifies trends and changes in ground water quality, and identifies potential ground water quality problems through the Statewide Ground Water Quality Monitoring Program. The Department of Water Resources contracts with the U.S. Geological Survey to test water wells for the Statewide Ground Water Quality Monitoring Program.

The Idaho Department of Environmental Quality conducts regional and local ground water quality monitoring when the statewide program or other government agencies detect potential problem areas, prioritizes management areas, periodically reviews the effectiveness of management strategies, and re-evaluates the priority designation when management strategies have shown to be effective. The Department of Environmental Quality, with the support from participating agencies and the Lewis Soil Conservation District, will periodically monitor nitrate concentrations in samples collected from available domestic water wells selected to represent regional ambient ground water under the Camas Prairie.

FUTURE ASSESSMENTS

Information being generated through the coordinated efforts of this plan and the agencies involved will be periodically compiled, evaluated, and made available to the public. Also, it will be included in the educational and informational programs conducted by the Lewis Soil Conservation District.

The information will include an evaluation of the success of the plan, the outreach activities conducted, the degree of BMP implementation completed, and the effectiveness of the BMPs implemented. A determination will be coordinated by the Lewis Soil Conservation District as to whether modifications are needed to the plan.

REFERENCE

Baldwin, J., X. Dai and M. McVay. January 2007. Camas Prairie Nitrate Priority Area Ground Water Monitoring Results. Idaho Department of Environmental Quality, Ground Water Quality Technical Report No. 29, 27 p.

GLOSSARY

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 best-assumed level of water quality prior to human land use activities.

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.

Beneficial uses – Various uses of ground water in Idaho include, but are not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, aquacultural water supplies, and mining. A beneficial use is defined as an actual current or projected future use of ground water.

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 ground water and/or surface water from nonpoint and point sources in order to achieve water quality goals and protect the beneficial uses of the water.

Contaminant – Any chemical, ion, radionuclide, synthetic organic compound, microorganism, waste, or other substance that does not occur naturally in ground water, or a constituent that occurs naturally that may cause health concerns.

Degradation – When a numerical ground water quality standard has been exceeded.

Fertilizer – Any substance containing one or more plant nutrients utilized to enhance plant nutrient content and/or for promoting plant growth.

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

Ground water quality standards – Values, either numeric or narrative, assigned to any contaminant for the purpose of establishing maximum levels or protection. Ground water quality standards are a portion of the Idaho Ground Water Quality Rule (IDAPA 58.01.11).

Local government – Cities, counties, and other political entities 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 – Increases in concentration of one or more inorganic constituents resulting from contact of ground water with geologic formations.

Nitrate – A common contaminant identified in ground water. Nitrate is a component in fertilizer, is found in wastes at the soil surface, and occurs naturally in the soil through a process such as mineralization of organic nitrogen. The MCL for nitrate is 10 mg/L.

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 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.

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

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

Process water – Water used in a facility or an AFO that cleans equipment, the facility, or animals.

Wastewater – Process water after use within a facility or AFO; the water is usually treated prior to disposal.

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

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

APPENDIX A

- Bahr, G. and R. Carlson, March 2002. Ground Water Quality of Southern Clearwater Plateau Volcanic Aquifer. Idaho State Department of Agriculture, Technical Results Summary #9, March 2002, 2 p.
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