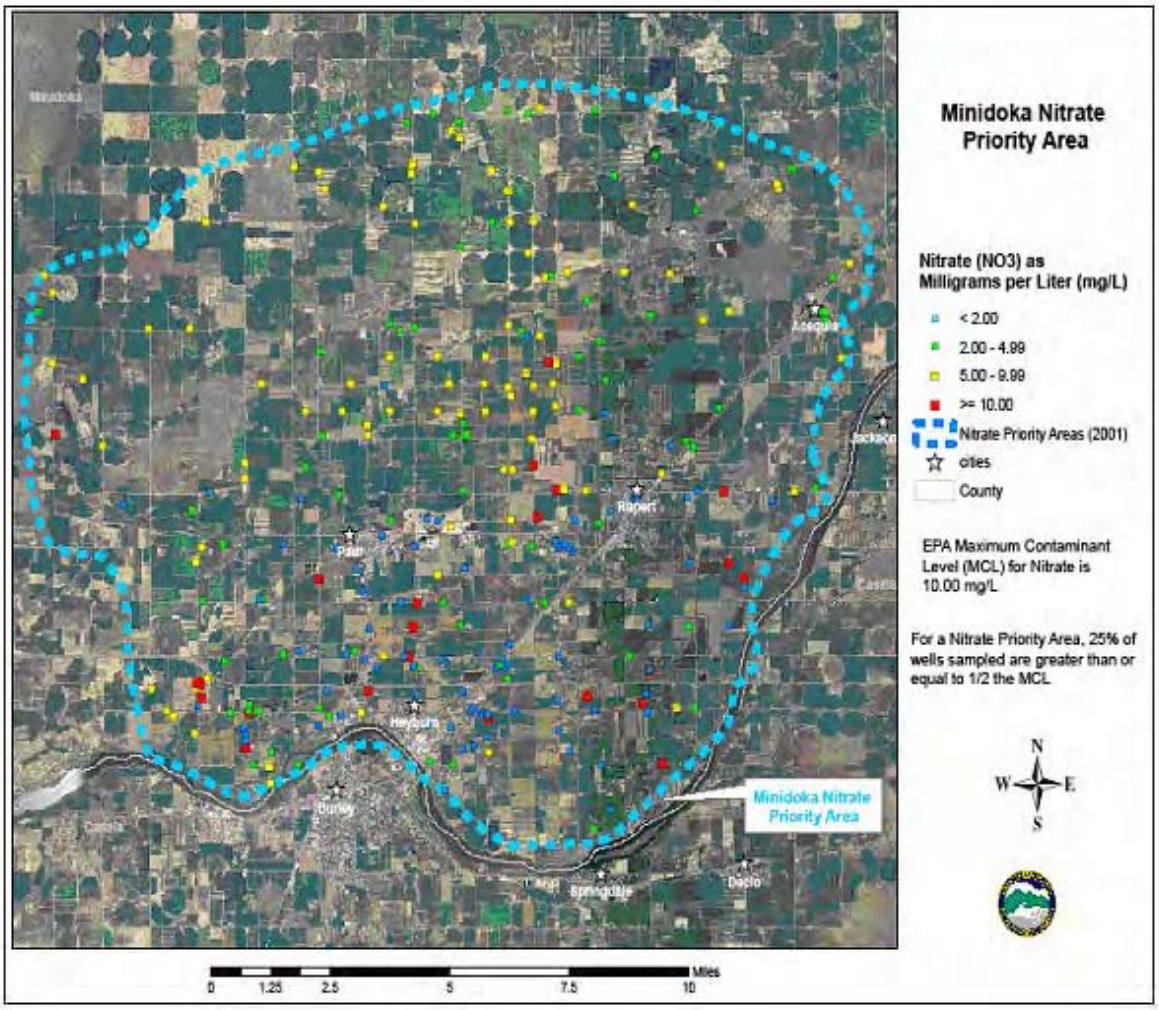
Minidoka Nitrate Priority Area

Ground Water Quality Management Plan

March 25, 2008



Idaho Department of Environmental Quality

This plan meets the requirement set forth in
Policy PM00-4 to address the Minidoka area of concern.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFO	animal feeding operation
bgs	below ground surface
BMP	best management practice
CAFO	confined animal feeding operation
DEQ	Idaho Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
ESRP	Eastern Snake River Plain
IDAPA	Idaho Administrative Procedures Act
IDWR	Idaho Department of Water Resources
ISDA	Idaho State Department of Agriculture
MCL	maximum contaminant level
mg/L	milligrams per liter
MSCD	Minidoka Soil Conservation District
NPA	Nitrate Priority Area
NRCS	Natural Resources Conservation Service
SCC	Soil Conservation Commission
SCPHD	South Central Public Health District
UICES	University of Idaho Cooperative Extension Service
U of I	University of Idaho
WLAP	wastewater land application permit

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SUMMARY

Policy for Addressing Degraded Ground Water Quality Areas

In March 2000, the Idaho Department of Environmental Quality (DEQ) established the Policy for Addressing Degraded Ground Water Quality Areas (Policy No. PM00-4, which is available on the DEQ Web site at www.deq.idaho.gov/rules/policies/pm004.cfm). One of the purposes of the policy is to set forth a process for DEQ to identify, designate, and delineate areas where ground water quality is significantly degraded as defined by rule (see the Idaho Ground Water Quality Rule at http://adm.idaho.gov/adminrules/rules/idapa58/0111.pdf). Another purpose of the policy is to identify the process for DEQ to facilitate and coordinate the development of management strategies with the use of local input for improving ground water quality in high priority areas, based on current nitrate priority area (NPA) categorization and applicable standards. This document meets the requirement in the policy to address the Minidoka NPA.

Nitrate Contamination

DEQ, the Idaho Department of Water Resources (IDWR), and the Idaho State Department of Agriculture (ISDA) have determined that nitrate[1] is the most widespread, preventable ground water contaminant in Idaho and that nitrate contamination is increasing in extent and severity. Nitrate levels tend to increase when contaminants such as fertilizer, livestock manure, or septic waste reach a water supply.

Nitrate contamination of ground water is of concern because over 95% of the drinking water consumed in Idaho is supplied by ground water. Strategies that eliminate or minimize nitrate contamination in the environment are critical because ground water is such a vital resource.

Minidoka Nitrate Priority Area

The Minidoka NPA is located in the Magic Valley in south central Idaho. The area covers 116,780 acres and includes the communities of Rupert, Paul, Heyburn, and Acequia. Originally, the area was referred to as the Rupert NPA. However, because the NPA encompasses a large portion of Minidoka County, the area is now called the Minidoka NPA. The Minidoka NPA has been placed on the DEQ nitrate priority list and is ranked ninth highest in the state in terms of ground water quality degradation from nitrate. (More information regarding nitrate priority ranking is available at http://www.deq.idaho.gov/water/prog_issues/ground_water/nitrate.cfm#ranking.)

[1] In this document, whenever the term “nitrate” is used, it refers to the more scientifically correct term “nitrate as nitrogen” or “nitrate-nitrogen,” abbreviated as NO_3-N.

Minidoka Nitrate Priority Area Ground Water Quality Management Plan

To address nitrate contamination in the Minidoka NPA, DEQ formed the Minidoka Ground Water Quality Management Advisory Committee to develop and implement a ground water quality management plan that aims to reduce current nitrate levels and prevent future nitrate level increases.

This plan is aimed at reducing ground water contamination in the Minidoka NPA through the voluntary implementation of best management practices. It is intended to provide direction and guidance to businesses, operators, landowners, and the public within the Minidoka NPA to protect both ground water and surface water from nitrate contamination.

Adoption of this plan is voluntary. DEQ will continue to compile and analyze ground water monitoring data collected by state agencies to evaluate the effectiveness of this voluntary plan. Depending upon results, possible changes may be initiated.

If ground water quality objectives are not met due to inadequate implementation of best management practices, best practical methods, or other corrective or preventive measures, then regulatory actions as authorized by law may be pursued as set forth in the Ground Water Quality Rule (IDAPA 58.01.11.400.02 and .400.03).

INTRODUCTION

The Minidoka Nitrate Priority Area (NPA) is located in the Magic Valley in south central Idaho (Figure 1). The area covers 116,780 acres and includes the communities of Rupert, Paul, Heyburn, and Acequia. Originally, the area was referred to as the Rupert NPA. However, because the NPA encompasses a large portion of Minidoka County, the area is now called the Minidoka NPA. The Minidoka NPA has been placed on the Idaho Department of Environmental Quality (DEQ) nitrate priority list and is ranked ninth highest in the state in terms of ground water quality degradation. (More information regarding nitrate priority ranking is available at http://www.deq.idaho.gov/water/prog_issues/ground_water/nitrate.cfm#ranking.) Refer to Figure 2 for a map of the Minidoka NPA.

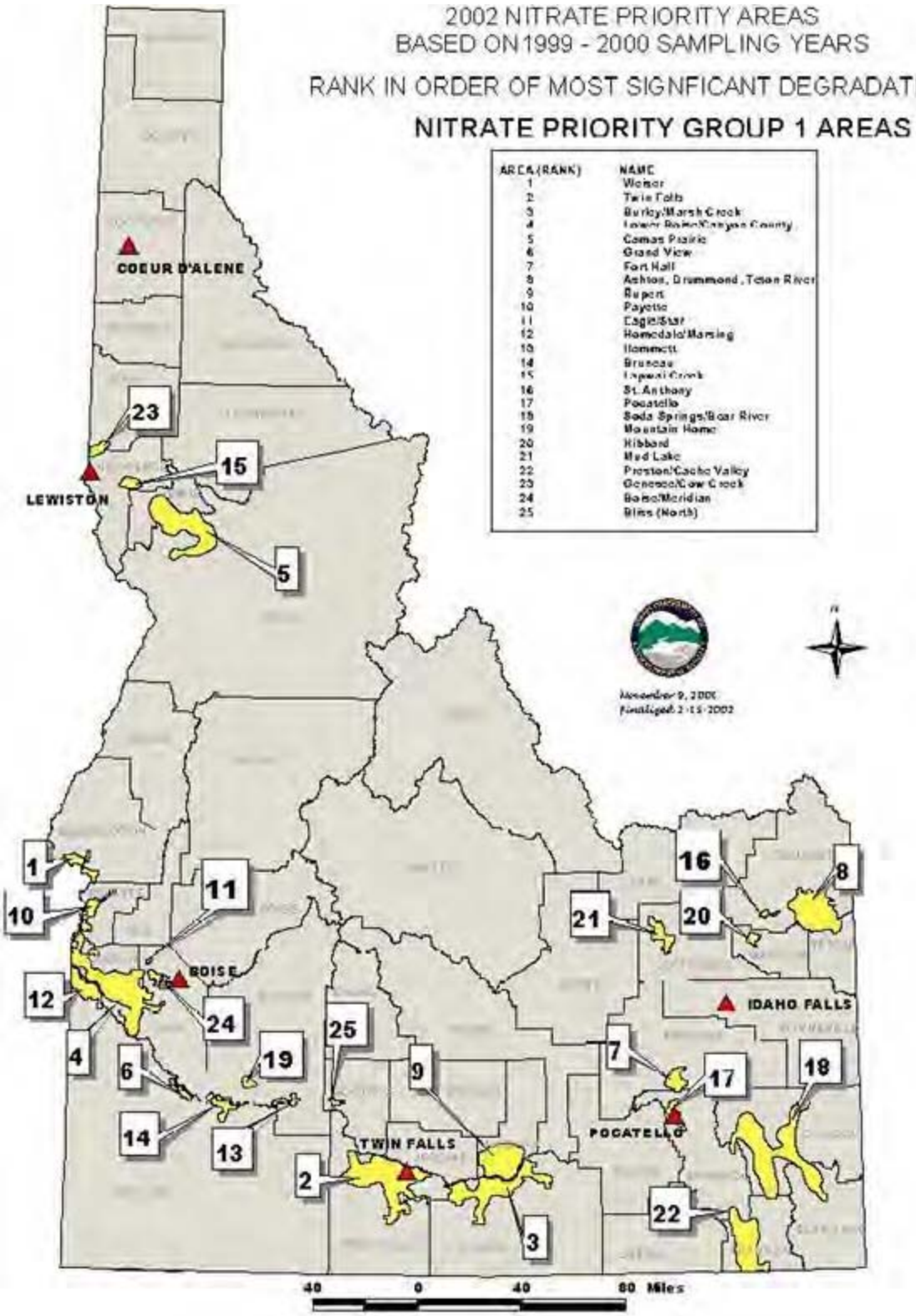

Figure 1. Map of 25 nitrate priority areas in Idaho. (The Minidoka Nitrate Priority Area appears as number 9 on the map.)

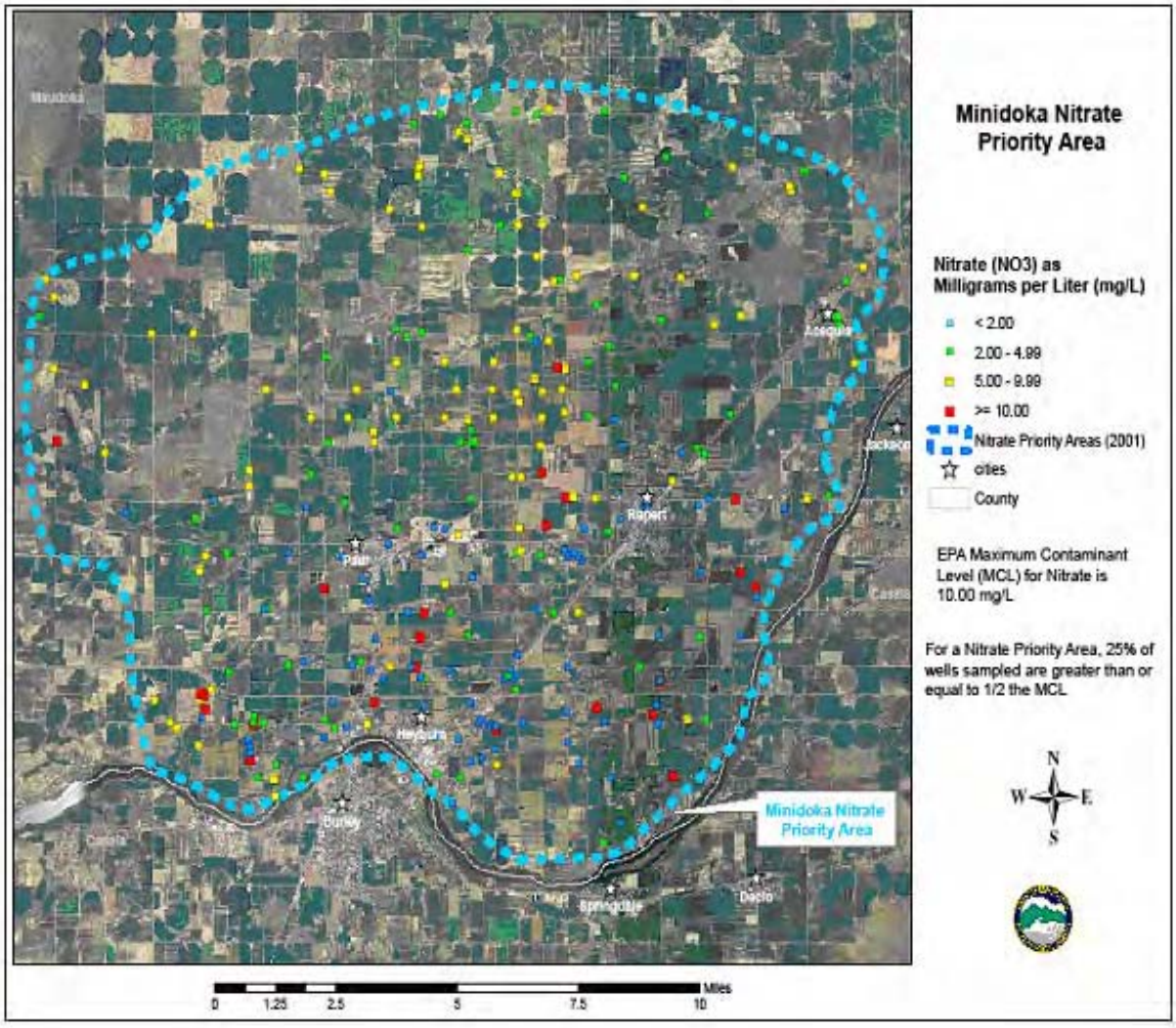

Figure 2. Minidoka Nitrate Priority Area.

Degradation of ground water quality should be a concern for all residents of Minidoka County because nitrate contamination can result in real costs to those not primarily responsible for that degradation. These costs can include the expense of treating ground water to meet state and federal drinking water standards and reductions in real estate values. Additional costs are incurred through the loss of other beneficial uses for surface water, such as fish, wildlife, recreation, and aesthetic values.

Failure to improve ground water quality can result in higher costs to public water systems if treatment becomes necessary to meet safe drinking water standards. These costs would be passed on to the consumer. Additionally, private well owners may need to treat their water if they want to meet those same standards.

Nitrate as a Contaminant

Nitrate[2] is a form of nitrogen. Nitrogen is an element that is an essential nutrient for plant growth; its compounds are vital components of foods and fertilizers. Nitrate comes from a variety of sources, such as precipitation, septic sewer systems, plants, waste from animal feedlots, nitrogen-based fertilizers, and other organic matter that returns nitrate to the soil as it decomposes.

Nitrate coexists with other forms of nitrogen in a complex cycle and can originate from atmospheric deposition, application of commercial fertilizer in agriculture and urban areas, manure, industrial wastewater, municipal wastewater, landfills, decomposing plant and animal tissue, and on-site sewer disposal (i.e., septic systems). In most natural systems, nitrogen is a scarce nutrient efficiently used by plants, which minimizes any losses of nitrate to ground water and surface water.

DEQ, the Idaho Department of Water Resources (IDWR), and the Idaho State Department of Agriculture (ISDA) have determined that nitrate is the most widespread, preventable ground water contaminant in Idaho and that nitrate contamination is increasing in extent and severity. Nitrate levels tend to increase when contaminants such as fertilizer, livestock manure, or septic waste reach a water supply.

Nitrate contamination of ground water is of concern because over 95% of the drinking water consumed in Idaho is supplied by ground water. Strategies that eliminate or minimize nitrate contamination in the environment are critical because ground water is such a vital resource.

Maximum Contaminant Level

The U.S. Environmental Protection Agency (EPA) has established federal drinking water standards, called maximum contaminant levels (MCLs), for many contaminants; the MCL for nitrate is 10 milligrams per liter (mg/L). The Idaho ground water quality standard for nitrate in drinking water is also 10 mg/L. Nitrate concentrations of 2 mg/L or greater generally indicate an anthropogenic (i.e., human-caused) impact to ground water.

People who rely on private wells for their drinking water supply are particularly at risk of exposure to high levels of nitrate. Private well owners are not required to test their water and may not be aware that a problem exists. Public water systems, however, are subject to regular testing by law, and nitrate levels must be below the federal health-based standard of 10 mg/L.

Health Effects

Elevated nitrate levels can pose a health problem for both humans and animals and can be an indicator of other water quality problems. The federal human drinking water standard of 10 mg/L is based on studies assessing the risk of developing methemoglobinemia (also known as blue baby syndrome) in infants as a result of exposure to nitrates. Methemoglobinemia is the inability to absorb oxygen in the blood system. Nitrate levels above the regulatory level have been associated with methemoglobinemia. The condition

[2] In this document, the term "nitrate" refers to the more scientifically correct term "nitrate as nitrogen" or "nitrate-nitrogen," abbreviated as NO_3-N.

is usually associated with newborns and infants up to 6 months of age and occurs when nitrate is converted to nitrite in a child's body. Nitrite reduces oxygen in the child's blood, causing shortness of breath and blueness of skin. This condition can be serious, causing the child's health to deteriorate rapidly over a period of days.

Other populations potentially vulnerable to methemoglobinemia include pregnant women, adults with reduced stomach acidity, adults who lack a hereditary enzyme needed to combat effects of nitrate in their body, and dialysis patients. Several studies are underway to explore the possible link between long-term exposure to elevated nitrate and the incidence of health problems such as non-Hodgkin lymphoma, miscarriages, diuresis, and hemorrhaging of the spleen.

High-nitrate water is generally a health hazard to animals only when used with high-nitrate feed. Short-term use of water with up to 40 mg/L nitrate is generally considered acceptable for animals.

Nitrate in Ground Water

Nitrate is soluble in water and can easily pass through soil to the ground water. Nitrate can persist in ground water for decades and accumulate at high levels as more nitrogen is added to the soil every year and leaches into the ground water. High levels of nitrate in soil, ground water, and drinking water can originate from the application of nitrogen in the form of commercial fertilizer and animal waste, legume crop plowdown, and septic tank failures. Shallow wells, wells in sandy soil, or wells that are improperly constructed or maintained are more likely to have nitrate contamination than deeper wells with protective casing and an effective well seal.

Nitrate is often an indicator of aquifer vulnerability, with the presence of higher concentrations of nitrate in ground water associated with certain land use activities. Whenever nitrogen-containing compounds come into contact with soil, a potential for nitrate leaching into ground water exists. Nitrate is highly soluble and will stay in solution in percolation water after leaving the root zone, until it reaches ground water.

Nitrate Prioritization Process

In March 2000, DEQ established the Policy for Addressing Degraded Ground Water Quality Areas (Policy No. PM00-4, which is available on the DEQ Web site at www.deq.idaho.gov/rules/policies/pm004.cfm). Pursuant to guidance provided in the policy, a statewide list of significantly degraded areas for nitrate was developed, because nitrate is one of the most widespread ground water contaminants in Idaho. (More information is available at www.deq.idaho.gov/water/prog_issues/ground_water/nitrate.cfm#ranking.)

DEQ, with assistance from other state agencies, identified and delineated nitrate-degraded ground water areas across the state using ground water quality monitoring analytical results from various agencies combined with hydrogeologic and land use data. If 25% of the ground water samples in a hydrogeologically similar area were greater than or equal to one-half (5.0 mg/L) the federal drinking water standard for nitrate for public

water systems, the area was delineated as an area of ground water quality degradation and referred to as an NPA.

In 2000, ground water in 25 areas of Idaho met the criteria for classification as degraded by nitrate (Figure 1). These 25 degraded areas were then prioritized using three weighted principal criteria: population, existing water quality, and water quality trends (see http://www.deq.idaho.gov/water/prog_issues/ground_water/nitrate.cfm#ranking for more information). These rankings are used to prioritize the development and implementation of strategies to help reduce nitrate contamination in ground water from land-use activities. The Minidoka NPA (Figure 2) was ranked ninth highest in the state in terms of nitrate contamination in ground water.

Minidoka Nitrate Priority Area Ground Water Quality Management Plan

This plan is aimed at reducing ground water contamination in the Minidoka NPA through the voluntary implementation of best management practices (BMPs). The plan is intended to provide direction and guidance to businesses, operators, landowners, and the public within the Minidoka NPA to protect both ground water and surface water from nitrate contamination.

To address nitrate contamination in the Minidoka NPA, DEQ formed the Minidoka Ground Water Quality Management Advisory Committee to develop and implement a ground water quality management plan that aims to reduce current nitrate levels and prevent future nitrate level increases. The advisory committee members include:

- Minidoka Soil Conservation District (MSCD)
- ISDA
- IDWR
- Idaho Soil Conservation Commission (SCC)
- Natural Resources Conservation Service (NRCS)
- Local residents, producers, landowners, and agribusiness, operating within the delineated Minidoka NPA
- Middle Snake Regional Water Resource Commission
- Minidoka Board of County Commissioners

DEQ and cooperating entities identified land use activities and practices that could potentially affect nitrate concentrations in local ground water, springs, and surface water. In addition to regulations currently in place, implementation activities and practices will be provided in this document. These activities can be summarized as follows:

- implementing nutrient management planning
- implementing irrigation water management
- evaluating effectiveness of existing BMPs related to animal waste materials and providing technical assistance as needed to dairy and confined animal feeding operations (CAFOs) in the Minidoka NPA

Adoption of this plan is voluntary. DEQ will continue to compile and analyze ground water monitoring data collected by all state agencies to allow evaluation of the effectiveness of the plan. Possible changes may be initiated depending upon results.

If ground water quality objectives are not met due to inadequate implementation of BMPs, best practical methods, or other corrective or preventive measures, then regulatory actions as authorized by law may be pursued as set forth in the Ground Water Quality Rule (IDAPA 58.01.11.400.02 and .400.03).

Authorities

Idaho Ground Water Quality Rule

DEQ is designated as the primary agency to coordinate and administer ground water 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).

The Ground Water Quality Rule (IDAPA 58.01.11.400.02 and .400.03) sets forth a number of alternative actions that DEQ may follow when a numerical ground water quality standard has been exceeded, as well as when no standard has been exceeded but significant degradation of ground water has been detected. The ground water quality standard addressed in this plan is the primary (health-based) drinking water standard for nitrate of 10 mg/L nitrate.

Policy for Addressing Degraded Ground Water Quality Areas

One of the purposes of the Policy for Addressing Degraded Ground Water Quality Areas is to set forth a process for DEQ to identify, designate, and delineate areas where ground water quality is significantly degraded as defined by rule (see the Idaho Ground Water Quality Rule at http://adm.idaho.gov/adminrules/rules/idapa58/0111.pdf). Another purpose of the policy is to identify the process for DEQ to develop management strategies with the use of local input for improving ground water quality in high priority areas, based on current NPA categorization and applicable standards. DEQ's main role is facilitation and coordination for the development of the site-specific ground water quality management plans.

Idaho Code

Idaho Code Title 39, Chapter 1 (Environmental Quality – Health) states, "Cities, counties and other political subdivisions of the state shall incorporate the ground water quality protection plan in their programs and are also authorized and encouraged to implement ground water quality protection policies within their respective jurisdictions…" (§39-126).

According to Idaho Code Title 67, Chapter 65 (Local Land Use Planning), when considering amending, repealing, or adopting a comprehensive plan, the local governing board shall consider the effect the proposed amendment, repeal, or adoption of the

comprehensive plan would have on the source, quantity and quality of ground water in the area (§67-6537).

Responsibilities

Table 1 lists the responsibilities of the agencies and entities involved in the Minidoka NPA Ground Water Quality Management Plan.

Table 1. Responsibilities of agencies and entities involved in the Minidoka NPA Ground Water Quality Management Plan.

Task	Agencies/Entities Involved
Project promotion, administrative support, and project management	MSCD, DEQ
Engineering and nutrient management plan development	Idaho SCC, U of I Twin Falls Research and Extension Center, NRCS
Irrigation water management plan development	Idaho SCC, MSCD, U of I Twin Falls Research and Extension Center, NRCS
Monitoring, data management, and reporting	ISDA, DEQ, MSCD, U of I Twin Falls Research and Extension Center
Project management	DEQ, ISDA, Idaho SCC, MSCD
Plan oversight	DEQ
Plan progress and evaluation	All parties

DEQ is the lead agency assisting stakeholders in developing a management plan to address ground water degradation in the Minidoka NPA. Other agencies or groups providing technical support include the following:

- local growers/landowners
- public water systems
- NRCS
- Idaho SCC
- Idaho Association of Soil Conservation Districts
- UICES
- ISDA

The Minidoka Ground Water Quality Planning Team will act as overall coordinator of the Minidoka NPA Ground Water Quality Management Plan, with the input of the Minidoka County Commissioner, local area residents, and government agencies representing a broad range of interests within Minidoka County.

MSCD will take a proactive, advisory role to improve local ground water quality through the adoption of the recommendations in this plan.

SETTING

This section describes the soil, hydrogeology, land use, and water quality of the Minidoka NPA. Potential sources of nitrate in the area are also discussed.

Soil

The topsoil in the Minidoka NPA can be classified into two basic types. The soil north of the Snake River and south of Paul and Rupert is somewhat poorly-drained loamy sands to clay loams on low alluvial terraces. These soils are very deep and are underlain by mainly sand and gravel. The soil north of Paul and Rupert is well-drained sands to silty clay loams on low alluvial terraces. Nearly all of the acreage of both soil types is used for irrigated crops and pasture (Hansen, 1975).

Hydrogeology

Two distinct aquifers exist within the Minidoka NPA: a shallow aquifer and a deep aquifer. The shallow aquifer is a local alluvial aquifer on top of clay layers that separate the aquifer from the deeper regional basalt aquifer. The shallow aquifer occurs beneath a wide strip of irrigated cropland south of the cities of Paul and Rupert, along the Snake River. Well drillers' reports from domestic wells in this area indicate that typical depth to ground water is less than 100 feet below ground surface (bgs) and can be as little as 4 feet bgs in some areas.

The deep aquifer is the regional basalt aquifer that underlies the shallow, perched aquifer and well-drained soils north of Rupert and Acequia on the basalt plains. The basalt aquifer that underlies the topsoil and clay layers is a portion of the Eastern Snake River Plain Aquifer (ESRP Aquifer). The ESRP Aquifer, which is a regional source of water, is primarily a series of vesicular and fractured basalt flows of the Snake River Group and is generally less than 100 feet bgs.Well drillers' reports from this regional aquifer indicate that static water levels are typically between 150 and 300 feet bgs.

Ground water movement of the ESRP Aquifer is generally from the northeast to the southwest. The Snake River area is a discharge point of ground water from the ESRP Aquifer via spring flow and seepage between Milner Dam and King Hill (Rupert, 1997).

Land Use

The Minidoka NPA contains approximately 170,000 acres of irrigated cropland and encompasses the rural communities of Rupert, Paul, Heyburn, and Acequia. The overall population of Minidoka County is approximately 19,230.

The major land use in the area is irrigated agriculture. The main source of irrigation is provided by surface water diverted from the Snake River (Rupert, 1997). Local irrigation systems vary from the typical and historic practice of flood irrigation to more modern techniques of sprinkler irrigation. Major crops in the area include alfalfa, potatoes, sugar beets, wheat, barley, corn, and beans (Mitchell, 1998).

Water Quality

Approximately 3% of Idaho's wells sampled through the Ambient Statewide Ground Water Quality Monitoring Program have nitrate concentrations exceeding the MCL for nitrate. Another 30% of the wells sampled had impacted levels of nitrate between 2 mg/L and 10 mg/L. Data indicates that 44% of approximately 236 sample locations within Minidoka County contain nitrate concentrations greater than 5 mg/L (see the Final Nitrate Priority Area Ranking at http://www.deq.state.id.us/water/data_reports/ground_water/nitrate/final_nitrate_priority_area_ranking.pdf).

Ground water monitoring conducted by ISDA, DEQ, and others between 1997 and 2006 indicates that nitrate has contaminated local ground water resources in the Minidoka NPA. Nitrate and nitrogen isotope test results indicate a commercial fertilizer source for the nitrate contamination. However, other possible sources have been identified, using nitrate isotopic signatures.

Potential Sources of Nitrate

This plan addresses nonpoint source nitrate pollution. A nonpoint pollutant source is a source of contamination with no visible or obvious point from which the contamination originates. Land uses with activities that can contribute nonpoint sources of nitrate include the following:

- irrigated agriculture
- residential land use
- animal feeding operations (AFOs) and dairies
- industrial and municipal wastewater land application

Irrigated Agriculture

Irrigated agriculture is the dominant land use in Minidoka NPA. The major sources of nitrate in agricultural areas are commercial fertilizers, legume plowdown (green manures), crop residue, and organic waste fertilizers (i.e., manure). In agricultural systems, nitrate is added to the soil to increase yield and production of non-legume crops.

Nitrate is highly mobile in the soil profile, and contamination of ground water can occur when the application of nitrogen fertilizer in excess of crop needs is combined with inefficient irrigation practices that allow for leaching of nitrate below the root zone, where it is unavailable to the crop. The leaching of nitrate to ground water is influenced not only by the amount of nitrogen applied but in the form in which it is applied, the timing and method of application, irrigation management practices used, soil type, and the depth to ground water. If sound nutrient and irrigation management practices that maximize plant nutrient uptake are not followed, nitrate can leach into ground water or be washed into surface water.

Legume Crops Used as Plowdown (Green Manure). Nitrogen is released into the soil when legume crops are plowed down. The plowdown of legume crops is

considered a green manure. Legume crops used as green manures include alfalfa, peas, and beans.

Estimates of nitrogen contributions from legume crops may vary greatly. A study by Dr. D. L. Carter, formally with the U. S. Department of Agriculture's Agricultural Research Service, indicated that nitrogen contributions from legumes may be as much as 400 to 500 pounds per acre from alfalfa (Robbins and Carter, et al., 1980). Another study estimated 60 pounds per acre for alfalfa and 40 pounds per acre for peas and beans (Tindall, 1991). Further study of actual nitrogen contributions need to be conducted.

Residential Land Use

Septic systems in both urban and rural settings can also significantly impact ground water quality if septic densities are high or if systems have been improperly designed, installed, or maintained. Nitrogen from domestic waste reaches ground water via drainfields, which are below the crop root zone. This means that little to none of the nitrogen can be removed by plants but is instead available to migrate to ground water.

Other residential or urban activities can be sources of nitrate. Excessive fertilization related to lawn and garden maintenance, over-watering, and small animal pastures or ranchettes can contribute nitrate to ground water. Urban landscaping, such as in parks, golf courses, etc., can also contribute significantly to ground water degradation if improperly managed.

Animal Feeding Operations and Dairies

Sources of nitrate from AFOs include runoff, facility wastewater, and manure. An AFO is generally defined as the holding or confining of animals in buildings, pens, or lots. Regulations for protecting ground water are in place for larger AFOs (more than 200 dairy cows or 1,000 steers) regarding solid and liquid effluents.

Disposal of on-site animal waste (manure) from AFOs is regulated through a memorandum of agreement between EPA, DEQ, and ISDA. Facilities with over 1,000 animals must have an EPA-issued National Pollutant Discharge Elimination System permit as required by federal law if there is discharge from the site. A facility with fewer than 1,000 animals may be required to obtain a permit if the ISDA director determines it necessary. The practice of exporting waste off-site is currently not regulated by ISDA and has been identified as a potential source of nitrate contamination.

Dairies are regulated by ISDA, which has the authority to promulgate and enforce rules for dairy operations. ISDA conducts dairy waste inspections to prevent waste releases and evaluates waste collection, treatment, handling, disposal, and management procedures for compliance with the Clean Water Act and ISDA regulations.

Industrial and Municipal Wastewater Land Application

Wastewater land application facilities generate nutrient-rich process water. Such facilities are among the few sources of nitrate that are regulated. These facilities are required to obtain a wastewater land application permit (WLAP) in order to apply wastewater to

land. DEQ, which is the regulatory authority, requires that applicators apply wastewater to meet crop nutrient needs. Facilities are also required to develop nutrient and irrigation water management plans and water and nutrient budgets. In addition, facilities are required to sample the wastewater, ground water, and soil and crop tissue, as required by their permit.

Facilities that apply wastewater to land must submit performance reports to DEQ and are subject to routine inspections. The total nitrogen applied is based on the nitrogen concentration in the wastewater and the amount of wastewater being applied. The facilities also report the amount of nitrogen removed by cropping the acreage.

MANAGEMENT PLAN

Approach

The Minidoka NPA Ground Water Quality Management Plan is voluntary, based on the premise that the majority of businesses, growers, and property owners in the Minidoka NPA, including dairy and CAFO operators, will be willing to improve and/or modify their management procedures and activities by implementing BMPs to reduce nitrate loading to the ground water. Voluntary implementation of this plan should reduce current nitrate levels in the ground water, provide economic advantages to landowners and growers, avoid costly treatment of public water supplies, and eventually remove the Minidoka NPA from the state nitrate priority list.

If voluntary implementation of this plan results in unsatisfactory progress towards reducing nitrate levels in the ground water, mandatory requirements may be necessary. Regulatory actions as authorized by law may be pursued as set forth in the Ground Water Quality Rule (IDAPA 58.01.11.400.02 and .400.03) if ground water quality objectives are not met due to inadequate implementation of BMPs, best practical methods, or other corrective or preventive measures.

Along with participating entities, state and federal agencies will periodically evaluate the progress and success of this management plan in reducing the nitrate levels in the Minidoka NPA. DEQ will provide oversight of plan implementation and progress.

Goals and Objectives

The Minidoka NPA Ground Water Quality Management Plan has two primary goals: 1) to reduce the levels of nitrate in the area's ground water through education, demonstration, and the voluntary implementation of BMPs, and 2) to protect the well-being of communities and residents that depend on ground water for essential needs.

The primary objective of this management plan is to reduce nitrate loading to the ground water. By accomplishing this objective through education and voluntary implementation of prescribed BMPs, the plan will also promote the following:

- improved surface water quality
- improved water quality of domestic wells and springs
- reduced nutrient and sediment loading of surface waters impacting the Mid-Snake River and its tributaries located within the Minidoka NPA
- reduced surface runoff and topsoil erosion
- improved crop yield
- conservation of irrigation water
- prevention of increased costs to potable water consumers due to additional treatment requirements to meet drinking water quality standards

Strategies for Implementation

DEQ will act as the overall coordinator, in cooperation with other stakeholders, to encourage adoption of this plan and implementation of identified implementation tasks. Table 2 below describes the specific tasks to be performed and identifies the responsible agency or entity and the time frame for task completion.

Table 2. Implementation tasks for the Minidoka NPA Ground Water Quality Management Plan.

Implementation Task	Agencies Involved	Time Frame
Monitoring		
Reevaluate recent monitoring results and adjust boundaries of NPA as needed.	DEQ	2008
Identify monitoring sites and establish a long-term monitoring plan.	DEQ, Planning Team, ISDA	Ongoing
Identify and monitor sites upgradient along eastern boundary of Minidoka County to identify nitrate contributions from outside that boundary.	DEQ, Planning Team, ISDA	2008
Continue to monitor ambient ground water quality.	DEQ, ISDA	Ongoing
Nutrient and Irrigation Management		
Through education and demonstration, promote the development and implementation of nutrient and irrigation management planning by local growers.	SCC, MSCD, NRCS, UICES, ISDA	Ongoing
Through education and demonstration, promote nutrient management planning for third-party applicators of CAFO waste.	SCC, MSCD, NRCS, UICES, ISDA	Ongoing
Provide guidance to growers on crop rotations to minimize deep leaching of nitrate to ground water. This could be accomplished through education and through promotion of current and past demonstration projects.	SCC, MSCD, NRCS, UICES, ISDA	Ongoing
Education		
Provide educational materials and/or seminars to local growers/landowners on the benefits of nutrient and irrigation management planning.	ISDA, MSCD, U of I, NRCS	Ongoing
Promote and provide educational materials on source water/wellhead protection to residents who utilize ground water or springs as their source of culinary water.	ISDA, MSCD, DEQ, SCPHD	Ongoing
Provide information to public well owners on proper well maintenance.	IDWR, MSCD	Ongoing
Provide local residents with information on proper maintenance and upkeep of individual subsurface septic systems.	DEQ, SCPHD	
Hold annual water awareness/water testing event for general public and private well owners.	DEQ, ISDA, MSCD, SCPHD	Ongoing
Establish outreach programs with retailers of home and garden supplies to promote proper application and management of fertilizers. Provide public with Home*a*Syst/Farm*a*Syst Program information.	DEQ, ISDA, MSCD, SCPHD	Ongoing
General		
Work with the Minidoka County Commissioners and other local officials to evaluate the adequacy of local zoning and land use planning initiatives.	DEQ, MSCD	Ongoing
Collaborate with Cassia County Ground Water Quality Management Planning Team, where practicable, in public education and outreach programs.	DEQ, MSCD	2008
Provide commissioners with Rock Creek DVD.	DEQ	2008
Provide copies of final Minidoka NPA Ground Water Quality Management Plan to Minidoka County Commission for approval and adoption.	DEQ	2008
Provide copies to MSCD board members and other local decision makers.	DEQ	2008
Advertize plan in local papers.	DEQ	Ongoing
Make plan available on county Web site.	Minidoka County	2008

Plan Evaluation

The primary goal of this plan is to reduce nitrate contamination of the aquifer underlying the Minidoka NPA so the area can be removed from the statewide nitrate priority list. However, due to the slow nature of ground water movement, it is not anticipated that

quantitative reductions in nitrate levels will occur during the early implementation of this plan. Therefore, qualitative measures will also be established to evaluate the progress and success of the plan in the short term (3-5 years). Once the plan is being implemented, agencies and stakeholders will do the following to evaluate the progress made in reducing nitrate contamination of the ground water:

- meet annually to review implementation activities that have occurred and evaluate available monitoring results
- evaluate effectiveness of the plan and modify as needed

A compilation of findings from federal, state, and local agencies will be made once a year. With the support of stakeholders, MSCD will be the lead entity to compile and provide this information. The first review will be scheduled for fall 2008.

The qualitative evaluation will assess whether the agencies and entities involved promoted the plan recommendations and will include the documentation of activities, practices, and alternatives that have been adopted to reduce nitrate loading to the ground water. The evaluation will also consider whether the protection strategies are still being promoted and what percentage of businesses, operators, and other organizations are participating in the plan.

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.

Animal feeding operation (AFO) – The holding of any number of animals in buildings, pens, or lots.

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.

Constituent – An element or component.

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.

Crop needs – Factors required by a crop in order to grow, such as 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.

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

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

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).

Infiltration rate – The rate at which water infiltrates or 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 – To dissolve nitrogen (or other constituents) in water, potentially enabling these constituents to reach the ground water.

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

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

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

Maximum contaminant level (MCL) – The maximum level at which a contaminant is considered safe for human health as determined by the U.S. Environmental Protection Agency.

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.

Public water system – Serves at least 15 service connections used by year-round residents or regularly serves a population of at least 25 year-round residents.

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

Soil profile – A vertical section of soil delineating the distinct horizontal layers of various soils and geologic formations in a given area.

Waste treatment lagoon – An impoundment made by excavation or earthfill to biologically treat industrial or agricultural waste.

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.

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