STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

601 Pole Line Road, Suite 2 • Twin Falls, Idaho 83301-3035 • (208) 736-2190

Dirk Kempthorne, Governor
C. Stephen Allred, Director

September 19, 2000

Lew Pence, Chairman
Middle Snake Regional Water Resource Commission
122 5th Avenue West
Gooding, ID 83330

Dear Lew:

Thank you for asking me to meet with you and Bob Muffley. I think it is important that we take the time to discuss our mutual groundwater concerns.

As I indicated during our meeting, the Twin Falls Regional Office has very limited resources for groundwater activities. Regional office staff has been working on a groundwater pilot project for the Rock Creek/Salmon Falls aquifer, for the last few months. It is important that we continue with our current level of activity. I believe your proposed planning project will be of great benefit to the area and to the groundwater.

In response to your request for a DEQ representative for your technical advisory committee, Bill Allred will be available to attend your monthly meetings. Due to our limited resources and prior commitments, Bill's participation will be limited to these meetings. He can be reached at 736-2190.

I agree that we should work together to inform the public about our two projects. It is important that the public understand the difference. Perhaps we can meet in the near future to discuss the details. Commissioner Grindstaffs' presence on both committees will certainly help coordinate our activities.

If you have any questions please feel free to contact me at 736-2190.

Sincerely,

Doug Howard
Regional Administrator

DH/pt
cc: Bill Allred, TFRO
Scott Short, DEQ, Boise

**IDAHO STATE DEPARTMENT OF AGRICULTURE**
2270 OLD PENITENTIARY ROAD
BOISE, IDAHO 83712
Telephone: (208) 332-8500
FAX: (208) 334-2170

DIRK KEMPTHORNE
GOVERNOR

PATRICK A. TAKASUGI
DIRECTOR

September 12, 2000

Lew Pence, Chair
Middle Snake Regional
Water Resource Commission
122 5th Ave West
Gooding, ID 83330

Dear Chairman Pence:

Thank you for inviting the Idaho State Department of Agriculture to participate in the development of a ground water protection plan for Cassia, Gooding, Jermone, Lincoln, Minidoka and Twin Falls counties.

I have asked Gary Bahr to serve as our representative to your technical advisory committee. I believe that Gary has worked with your group before, and I am sure that you have found him to be as indispensable on water issues as our department has.

I look forward to hearing about your progress.

Sincerely,

Patrick A. Takasugi
Director
Idaho State Department of Agriculture

pc: Mike Everett, Deputy Director
Gary Bahr, Bureau Chief, Agricultural Resources Division

# United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Water Resources Division
230 Collins Road
Boise, Idaho 83702-4520


Reply to: ID-191

September 7, 2000

Mr. Bob Muffley
Middle Snake Regional
Water Resources Commission
124 5th Avenue West
Gooding, Idaho 83330

Dear Mr. Muffley:

Attached is a revised preliminary proposal for the third phase of the ongoing USGS/Middle Snake Regional Water Resources Commission (MSRWRC) study of ground-water vulnerability to nitrate contamination in the mid-Snake region of south-central Idaho. In our last meeting, we discussed changing the approach and scope of the third phase of the study to include the evaluation of nitrate movement and fate within the region's aquifer system – an issue of interest to the commission and to other resource and planning agencies.

The attached proposal describes a study approach that would combine the results of mid-snake vulnerability modeling with computer ground-water flow and transport modeling tools to begin to evaluate concepts of nitrate movement and fate in mid-Snake aquifers. Existing regional ground-water flow models of the Snake River plain and ground-water chemistry data sets for the mid-snake region (developed, in part, during the USGS Upper Snake River Basin NAWQA studies) would be used to develop a sub-regional, 3-dimensional computer simulation of the mid-Snake region aquifer system. The results of vulnerability modeling would be incorporated into the new flow and transport models to define and test concepts of nitrate loading to the aquifer.

The resulting set of computer-simulation tools, although simplified representations of the actual system, would allow for evaluation of current concepts of nitrate loading, ground-water flow, and nitrate transport; and for preliminary evaluation of future trends in nitrate concentrations resulting from potential changes in land use.

The proposal has been delivered to and is being reviewed by several agencies. I would like to schedule a meeting in the near future to discuss the proposed approach and possibilities for continuing the study in the mid-snake region. Please contact me ( 208 387-1383 or email plambert@usgs.gov) if you have any questions or comments on the proposal. I will be in touch with you to schedule the meeting.

Sincerely,

P. A. M. L

Patrick M. Lambert
Assistant District Chief
For Scientific Investigations

Copy to: Dave Clark, USGS
Derrill Cowing, USGS
Mary Donato, USGS
Mark Hardy, USGS

## Assessment of the Probability of Nitrate Contamination in Ground Water and Changes in the Distribution of Nitrate with Time in the Mid-Snake Region, South-Central Idaho-Phase III – *A preliminary proposal from the U.S. Geological Survey, Boise Idaho*

### Proposal Summary

**PROBLEM:** Ground-water quality is an ongoing concern in southern Idaho because ground water provides a larger proportion of the area's drinking water than ever before. Elevated nitrate concentrations in ground water underlying the Mid-Snake region in south-central Idaho comprising Cassia, Jerome, Gooding, Lincoln, Minidoka, and Twin Falls Counties have been reported in numerous studies.

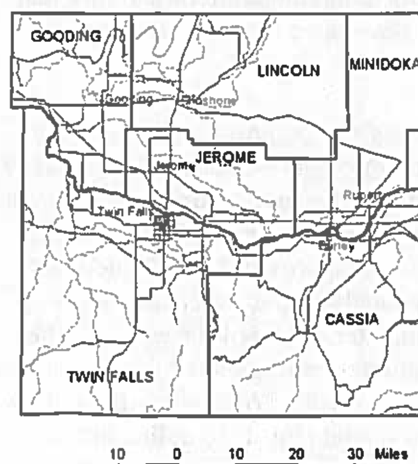
In 1995, with assistance from local, State, and Federal resource agencies, the Middle Snake Regional Water Resources Commission (MSRWRC) issued a plan to address the problem of elevated nitrate concentrations in ground water underlying the six-county area. The USGS has been cooperating with the MSRWRC in a phased study to complete components of the plan designed to evaluate ground-water vulnerability to nitrate contamination and the transport of dissolved nitrate in the area's aquifer system. This proposal describes the objectives, approach, and products of the third phase of the ongoing study.

**OBJECTIVE:** The principal objectives of the third phase of the study are to

**(1) Develop a statistical model that describes the probability of nitrate contamination in ground water underlying the study area, and**

**(2) Develop conceptual[1] and computer models of nitrate loading to the aquifer and nitrate transport within the aquifer.**

The model (and map) of nitrate contamination probability is important to local resource managers and planners for determining areas of highest and lowest probability for nitrate leaching, for guiding future water-quality monitoring activities, and for land-use planning. However, resource managers also need information on the movement and fate of nitrate after it reaches the aquifer system and for understanding what potential changes in nitrate concentrations may take place over time with changes in land- and water-use practices. To begin to address these questions, the results of the probability model will be combined with computer-simulation tools to evaluate concepts of nitrate loading and transport in the aquifer system.




**Location of study area.**

### APPROACH:

<u>*Statistical model and map of the probability of nitrate contamination*</u> - This objective will be met by compiling data on nitrate concentrations in ground water of the study area, making statistical correlations (model) between those nitrate concentrations and land use and geohydrologic data, and then creating a probability map based on those statistical correlations.

[1] A conceptual model, as referred to in this proposal, is a set of assumptions and estimates that defines a simplified representation of a hydrologic system or a component of that system.

# Assessment of the Probability of Nitrate Contamination in Ground Water and Changes in the Distribution of Nitrate with Time in the Mid-Snake Region, South-Central Idaho – Phase III

*A preliminary proposal from the U.S. Geological Survey, Boise, Idaho*

**PROBLEM:** Ground-water quality is an ongoing concern in southern Idaho because ground water provides a larger proportion of the area's drinking water than ever before. Elevated nitrate concentrations in ground water underlying the Mid-Snake region in south-central Idaho comprising Cassia, Jerome, Gooding, Lincoln, Minidoka, and Twin Falls Counties (fig. 1), have been reported in numerous studies (Parliman, and O'Dell, 1987; Young, Parliman, and Jones, 1987; Young; Parliman and Young, 1987; Rupert, 1994; Clark and Ott, 1996; Rupert and others, 1996). In agricultural areas north of the Snake River between Burley and Hagerman, water from 10 percent of the 105 wells (well depths less than 500 ft) sampled during the USGS National Water-Quality Assessment (NAWQA) program (1991-95) contained concentrations of nitrate in excess of 10 milligrams per liter.

In 1995, with assistance from local, State, and Federal resource agencies, the Middle Snake Regional Water Resources Commission (MSRWRC) issued a plan to address the problem of elevated nitrate concentrations in ground water underlying the six-county area. The plan's objectives included evaluating ground-water vulnerability to nitrate contamination and the transport of dissolved nitrate in the area's aquifer system. The conceptual[1], mathematical, and computer models resulting from this work would be used by resource management agencies and local county planning and zoning commissions to make land-use decisions to help address nitrate-contamination and migration problems.

The USGS has been cooperating with the MSRWRC in a phased study to complete the principal objectives of the plan. In phase I of the study, the USGS collected data on nitrate concentrations in ground water in Cassia and Twin Falls Counties to augment the existing Mid-Snake area nitrate data set developed as part of the USGS NAWQA (1993-95) and Idaho Statewide Ground Water Monitoring (1991-97) programs. In phase II, the USGS compiled data defining hydrogeologic characteristics of the area and organized these data in GIS data layers to be used in assessments of aquifer vulnerability and nitrate transport. This proposal describes the objectives, approach, and products of the third phase of the ongoing study.

**OBJECTIVE:** The principal objectives of the third phase of the study are to

**(1) Develop a statistical model that describes the probability of nitrate contamination in ground water underlying the study area, and**

**(2) Develop conceptual and computer models of nitrate loading to the aquifer and nitrate transport within the aquifer.**

The model (and map) of nitrate contamination probability is important to local resource managers and planners for determining areas of highest and lowest probability for nitrate leaching, for guiding future water-quality monitoring activities, and for land-use planning. The probability

[1] A conceptual model, as referred to in this proposal, is a set of assumptions and estimates that defines a simplified representation of a hydrogeologic system. Generally, a conceptual model defines hydrostratigraphic units, water budgets, and flow and transport conditions and sometimes is presented as a pictorial representation of the system, such as a block diagram or cross section.

model is limited, however, to evaluation of the vulnerability of zones of the aquifer on the basis of the environmental characteristics at the surface. The probability model does not explicitly represent the processes that control the movement of nitrate in the subsurface.

Resource managers also need information on the movement and fate of nitrate after it reaches the aquifer system and for understanding what potential changes in nitrate concentrations may take place over time with changes in land- and water-use practices. To begin to address these questions, the results of the probability model will be combined with computer-simulation tools to evaluate concepts of nitrate loading and transport in the aquifer system.

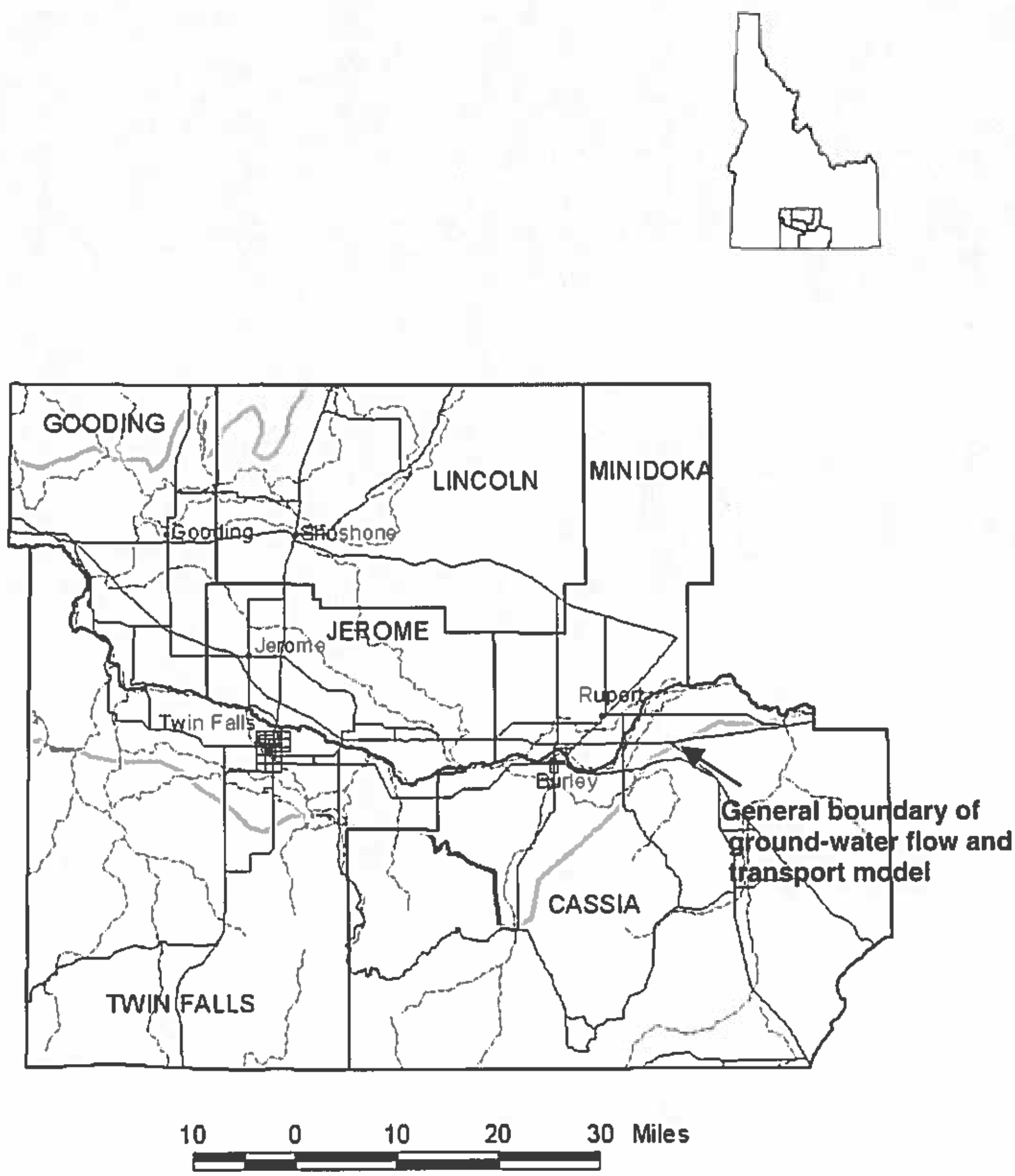



Figure 1. Location of study area

**APPROACH:**

*Statistical model and map of the probability of nitrate contamination* - This objective will be met by compiling data on nitrate concentrations in ground water of the study area, making statistical correlations (model) between those nitrate concentrations and land use and geohydrologic data, and then creating a probability map based on those statistical correlations.

A statistically valid method to calibrate nitrate contamination probability models was developed recently by the NAWQA for the upper Snake River Basin, southeastern Idaho. Resulting maps, produced at approximately 1:100,000 scale, were called probability maps instead of vulnerability maps because they were calibrated with actual ground-water quality data. Phase III of the study will use information and procedures developed as part of the NAWQA Program to produce a finer scale (approximately 1:24,000 scale) probability model and map for the six-county area.

Using a GIS, updated nitrate concentration data will be overlaid with depth-to-ground-water, land-use, nitrogen-input, and soils data layers that were developed in Phase II. Relations between nitrate concentrations and these and other environmental parameters will be quantified using statistical tests such as logistic regression, principal component analysis, and(or) Wilcoxon rank-sum tests.

Probability point ratings will be assigned to depth to ground water, land use, nitrogen input, soils data, and other characteristics on the basis of the statistical test results. All data layers then will be combined, using GIS, and the point ratings will be added together. A nitrate-specific contamination probability map then will be developed from the resulting additive point ratings.

*Conceptual and computer modeling of nitrate loading and movement* – Concepts of nitrate loading to the aquifer, derived during the probability modeling component of the study, and of nitrate transport will be evaluated in a three-dimensional ground-water flow and transport computer model of the aquifer.

The calibrated probability model will indicate the likelihood that selected ranges of nitrate concentration occur in zones of the aquifer as a function of landuse and hydrogeologic characteristics at the surface. An initial conceptual model of nitrate loading to the aquifer will be defined assuming that the "vulnerability zones" delineated in the probability model are indicative of the relative quantity of nitrate available for transport to the aquifer and of the nitrate-conveyance properties for the zones. The conceptual model (represented as a GIS data layer) will, in effect, be overlaid with the flow and transport model (fig. 2) to define nitrate inflow to the simulated aquifer system.

The computer model will be a simplified representation of the aquifer system and will be used to test the accuracy of conceptual models of nitrate loading and transport. A regional, three-dimensional ground-water flow model of the eastern Snake River Plain (ESRP model) (Garabedian, 1992), developed and calibrated during the USGS Regional Aquifer-System Analysis (RASA) study, will be used as a modeling environment for the subregional model of the study area. Flow boundary conditions and initial estimates of aquifer properties for the new model will be derived from the calibrated ESRP model. Data collected during recent studies and previous phases of this study that define ground-water budgets and levels and ground-water nitrate and tritium concentrations will be used to refine the new model and evaluate model calibration. Tritium concentration data, which can be used to assess relative ages of ground water, from about 70 wells will be used to evaluate the accuracy of the model-simulated ground-water flow patterns and velocities.

The scope of computer-model activities will be limited to evaluating conceptual models of nitrate loading and transport, and observed and potential future trends in nitrate concentrations resulting from changes in land use. Modeling activities will not include model calibration to or prediction of nitrate concentrations at individual wells.

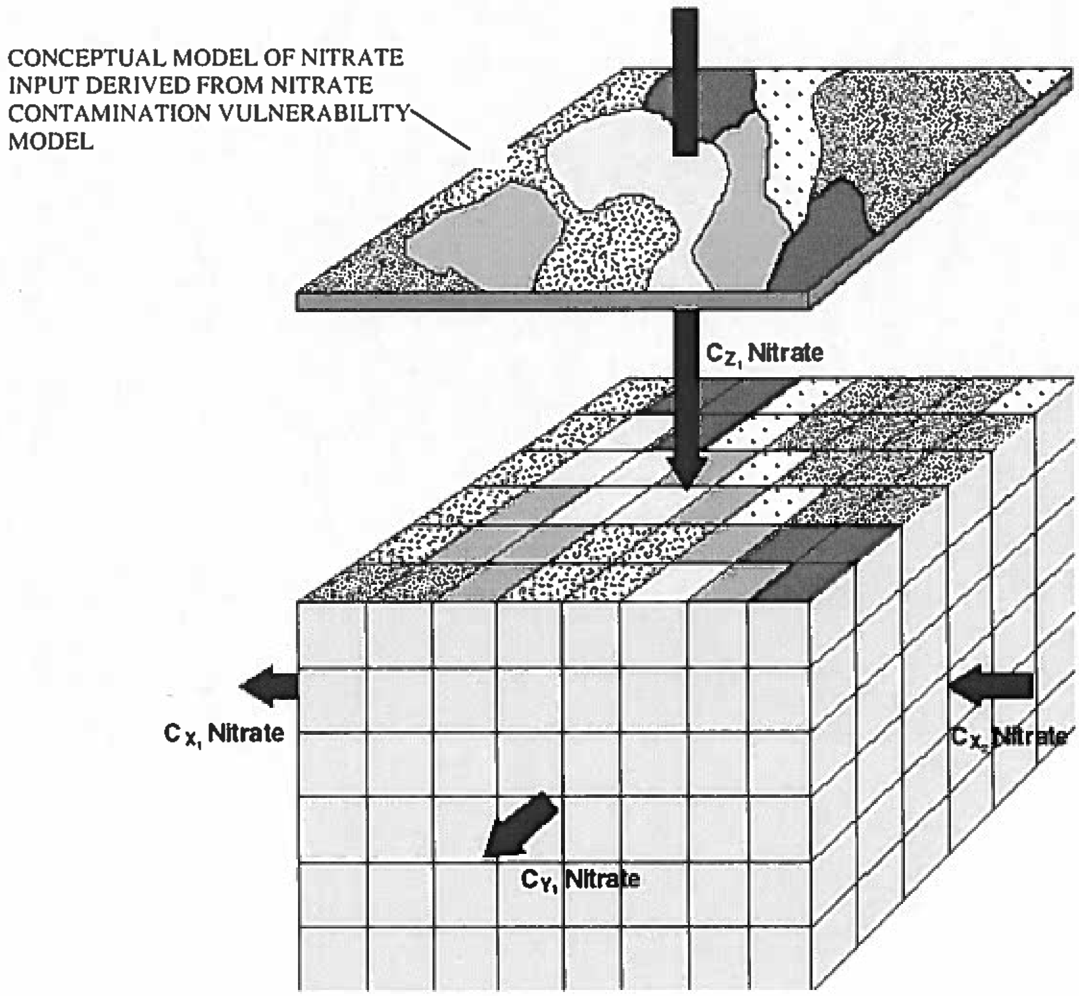



Figure 2. Generalize diagram showing the incorporation of results of nitrate contamination vulnerability modeling in a 3-dimensional computer simulation of ground-water flow and nitrate transport.

**PRODUCTS:** Study products include:

(1) Statistical model and map that describe the probability of nitrate contamination in ground water underlying the study area. A report will be prepared that documents probability-modeling activities.

(2) GIS data layers of the nitrate-specific contamination probability map and associated layers of geohydrologic characteristics. These data are particularly useful for county planning and zoning personnel, who can interactively examine the probability map and associated GIS data for any area of interest using GIS software such as ARC/INFO or ARCVIEW. Selected map products will be made available as GIS data layers and will be served as static graphics from the USGS Idaho District Web Page. In the future, the GIS data set also can be incorporated into an interactive Internet Web page that all members of the public can access.

(3) A ground-water flow and nitrate-transport model of the study area. A report will be prepared documenting the results of modeling activities, the utility of the model as a tool for testing concepts of nitrate loading and transport, and model limitations. The ground-water flow and transport model and associated GIS data layers will be made available from the USGS Idaho District ground-water model archive.

**WORKPLAN:** Possible time periods for specific study tasks are defined in the following table:

| Task | 10-11/00 | 12/00-6/01 | 7-8/01 | 9/01-02/02 |
|---|---|---|---|---|
| Data compilation and analysis | X | | | |
| Development and calibration of probability models | | X | | |
| Development of conceptual and computer flow and transport models | | X | X | |
| Product preparation and reporting | | | X | X |

The schedule for study tasks shown above is one possible scenario; the schedule can be adjusted to account for availability of funds.

Total cost of the project is estimated to be $167,000. Depending on the availability of State/Federal Cooperative Program funds, the USGS can contribute up to one-half the cost of the project.

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**County of Jerome Planning and Zoning**
300 N. Lincoln, Room 201, Jerome, ID 83338
208-324-8811 ext. 143 Fax 208-324-2719

*Arthur R. Brown*
*Administrator*

*Yvette Le Mon*
*Secretary*

August 31, 2000

ON computer

Middle Snake Regional
Water Resource Commission
122 5th Ave. West
Gooding, ID 83330

Dear Bob and Lew:

The Jerome County Planning and Zoning Commission has appointed Del Kohtz, 1135 Valley Road South, Eden, Idaho 83325, telephone number 825-5617, as their representative to your regional planning group.

Sincerely,

Art Brown
Art Brown
Planning and Zoning Administrator

AB:yl

cc: Del Kohtz
cc: BOARD OF COUNTY COMMISSIONER

**MIDDLE SNAKE REGIONAL**
**WATER RESOURCE COMMISSION**
**Lew Pence, Chairman**
**Bob Muffley, Acting Executive Director**
**122 5th Ave. West**
**Gooding, Idaho 83330**
**208-934-4781**
**208-934-5648 fax**

8/23/00

Mr. Doug Howard
Dept. Of Environmental Quality
601 Pole Line Rd. Suite 2
Twin Falls, Idaho 83301

Dear Doug:

I'm writing to thank you for meeting with Gary, Bob and I on such short notice. We know your time is valuable and we appreciate it. I came away from the meeting with, what I believe to be, a better understanding of what you are trying to do with the pilot ground water project in Twin Falls county. It appears, correct me if I'm wrong, that you are trying to devise a plan to deal with a ground water quality problem that has already occurred while my commission is trying to create a regional plan that will help protect us against future ground water problems. These two approaches to problems with groundwater quality compliment each other very well. This commission looks forward to working with your agency on both of these projects.

A possible problem, however, is the public perception of what your agency and my commission are trying to do. The last thing that we want to do is confuse the public by making it appear that we are doing the same thing. I believe, therefore, that it would be mutually beneficial if we make some kind of a joint announcement concerning the two separate and distinct planning processes. To that end, it might be wise if we work on a joint press release which explains the difference between the two projects and assures the public that we will be working together on both. Let me know what you think.

My commission and the county commissioners it represents believe that a well thought out ground water protection plan is critical to the health of our citizens and the continued economic viability of our region and we look forward to working with you to that end. I will be sending you a formal letter asking for participation in our planning effort within the next few weeks. Our original intention was to send letters to the directors of all the agencies we need to work with in our planning effort, but in your case I will send the letter directly to you with a copy to your director. I hope this meets with your approval.

Thanks again and I look forward to hearing from you.

Sincerely

Lew Pence, Chair

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
230 Collins Road
Boise, Idaho 83702-4520

Reply to: ID-191

August 23, 2000

Bob Muffley
Middle Snake Regional
Water Resources Commission
122 5th Avenue West
Gooding, Idaho 83330

Dear Mr. Muffley:

This letter, with the accompanying computer files on disk, is the final project status report summarizing work done by the U.S. Geological Survey for Phase 2 of the proposed project to map the probability of nitrate contamination of ground water in Cassia, Jerome, Gooding, Lincoln, Minidoka, and Twin Falls counties. Phase 2 tasks were (1) to complete the depth to ground water GIS coverage for the 6-county region and (2) to estimate nitrogen input to ground water in the study area.

The following discussion summarizes the methods used and results of Phase 2 of the project. Please note that these data should be considered preliminary because they have not yet undergone official USGS peer review. Upon completion of the probability map (Phase 3), the entire project will be reviewed for scientific content. Please review the information and contact me at (208) 387-1350 or Email: mdonato@usgs.gov if you have any questions.

## Project Goals

The purpose of Phase 2 of this project was to complete the necessary database for developing a statistical model and map showing the probability of contamination of ground water by nitrate for Cassia, Jerome, Gooding, Lincoln, Minidoka, and Twin Falls counties. Phase 1, completed in 1997, provided necessary ground water quality data and depth-to-water information for the study area. Phase 2, the results of which are summarized below, developed GIS layers for depth-to-water and nitrate input, the sole remaining data preparation tasks prior to the actual probability modeling phase (Phase 3).

## Supplemental Depth-to-Ground Water Coverage

A depth-to-water map of parts of Twin Falls and Cassia counties within the Snake River Plain aquifer was made in order to provide data for areas not previously covered by Maupin's (1992) ground water map. Creation of the depth-to-water map used techniques similar to those used by Maupin (1992).

Depth to water was calculated by subtracting the water-table altitudes from land-surface altitudes. Digital elevation models (DEMs) for the appropriate 7.5-minute quadrangles were used to represent the land-surface altitude. The DEMs were combined into one large grid using an edge-matching process within the GRID subroutine of ARC/INFO. The resulting grid maintained the original cell sizes of 30 by 30-meter spacing.

Water level data were acquired from the Ground-Water Site Inventory (GWSI) database, which is maintained on the USGS computers in Boise, Idaho. Initial selection of wells was based on the date of water-level measurement. Wells measured between March and August 1997 were selected to correspond with wells sampled during Phase 1 of this project. Further reselection of the wells was performed to focus on the first occurrence of ground water. Wells 100 feet deep or less were selected and any wells within a one-mile radius of the selected wells were removed from the set. This process continued at 100-foot increments until all of the wells were selected.

Universal kriging was used to estimate a grid of water-table altitudes at the DEM grid intersections from measured water levels for irregularly spaced selected wells. The water-table grid was then subtracted from the land-surface grid to create a grid of depth-to-water values. The resulting depth-to-water grid was then contoured using the ARC/INFO subroutine TIN. Further checking and smoothing of the contours was performed manually using the ArcView software. Depth-to-water categories were created from the contours and shaded to match that of Maupin (1992).

## Nitrogen source layer for the Middle Snake Region

Estimates of nitrogen input to ground water were made for Cassia, Gooding, Jerome, Lincoln, Minidoka, and Twin Falls Counties to create an ArcView GIS shapefile that will be used as one of the many data layers to produce a ground-water vulnerability map for the region. The methods used to estimate nitrogen input were similar to those used by Rupert (1996). Five major sources of nitrogen were considered: fertilizer, cattle manure (dairy and beef), septic systems, atmospheric deposition (precipitation), and legume crops. The method used here differed from Rupert's method in that only nitrogen input was estimated. No losses, such as those due to volatilization, crop uptake, or denitrification, were considered. It is impossible to know, for example, whether crops harvested in a particular county were removed from the area or remained in the same county they were grown. Furthermore, certain losses, such as denitrification, would have been applied "across the board"; thus the relative input of nitrogen from place to place would have changed little. For these reasons, the GIS coverage could be called a "source" coverage, since it considers only the gross input part of the nitrogen budget.

This input-only coverage is a good starting point for future probability studies and can be modified later to reflect losses if desired.

Data for most categories, including cattle inventories and crop acreages, were taken from 1998 sources. Exceptions include fertilizer sales data, which were only available for 1997, and population household estimates, which were adjusted to approximate 1998 data.

Nitrogen input was "assigned" in a way that reflected what was inferred to be the actual spatial distribution of nitrogen source whenever possible. The Bureau of Reclamation GIS land-use coverage provided the basis for this distribution. For example, nitrogen input from fertilizer was "assigned" only to land classified as agricultural (dry farm, sprinkler- or gravity-irrigated land), whereas nitrogen from septic systems was assigned only to residential or commercial land. Nevertheless, county-level estimates were necessary for most categories. The result is that artificial discontinuities in total nitrogen input, which exactly coincide with county boundaries, appear on the map.

The data table that is associated with the ArcView shapefile includes columns (fields) that contain values representing the amount of nitrogen, in lb/ac, assigned for each of the major nitrogen sources and a column representing the total amount of nitrogen for each polygon in the shapefile. Excel spreadsheets that document the details of the calculations for each input category are also provided. The methods used to calculate and assign nitrogen input values are described below.

<u>Fertilizer</u>

Estimates of nitrogen fertilizer use for the six counties in the study area were made using a method similar to that used by Battaglin and Goolsby (1995). The ratio of the expenditures for commercial fertilizer in the county to the expenditures for commercial fertilizer in the state was multiplied by the number of pounds of fertilizer applied in the entire state to obtain the number of pounds applied in each county, as follows:

$$\frac{\$\ \textit{spent in county}}{\$\ \textit{spent in state}} \times \textit{lbs N applied in state} = \textit{lbs N applied in county}$$

The calculations are based on state and county fertilizer sales figures taken from the 1997 U.S. Department of Agriculture Census of Agriculture. Current data for nitrogen applied in fertilizer by state are difficult to obtain. The figure used in this calculation, 223,349 tons of N, represents the 1997 fertilizer year (July 1, 1996 through June 30, 1997) and was obtained from The Fertilizer Institute at their website:

*http://www.tfi.org/factfig2.htm.*

Details of the computation are given in table 1. The fertilizer quantities then were divided by the total number of agricultural acres (from the GIS coverage) in each county to obtain the number of pounds of fertilizer applied per acre (table 2). The resulting county-level nitrogen quantities for the 6 counties in the study area are reasonable when compared with those reported for 1991 by Battaglin and Goolsby (1995).

An alternate approach for estimating nitrogen fertilizer use was used as an independent check of the fertilizer sales method. This approach is based on the assumption that growers apply the recommended amounts of nitrogen to their crops to achieve a given yield. County-level crop data, including acreage planted and yields for major crops, were obtained from the 1998 Idaho Agricultural Statistics report. Recommended nitrogen application rates were obtained from fertilizer guides published by the University of Idaho Agricultural Extension Service and from other sources. Fertilizer use was estimated by multiplying the recommended per-acre rates of fertilizer application by the number of acres of crop planted in the county. This method accounts only for nitrogen fertilizer applied to the following crops: barley, sugar beets, potatoes, dry beans, oats, spring and winter wheat, and corn. It is assumed that no fertilizer is applied to alfalfa.

For most counties, the method based on fertilizer sales expenditures gives higher estimates of nitrogen fertilizer use than does the method based on crop data. The difference varies from approximately 10 percent (for Cassia County) to approximately 40 percent (for Jerome County). For Lincoln and Minidoka Counties, the estimate based on fertilizer sales expenditures is slightly lower than the estimate based on crop data. This is expected, because the crop-based estimate includes only the major crops mentioned above and assumes that growers apply only the recommended amounts and no more. Because the fertilizer sales method is widely used, and because the crop application method relies on questionable assumptions, the fertilizer sales method was preferred for the final calculations.

County-level nitrogen totals from fertilizer were assigned to land classified as agricultural (either dry-farm, gravity-irrigated or sprinkler-irrigated land) and to residential land, based on land-use maps by the Bureau of Reclamation; no nitrogen from fertilizer was considered to be applied on land types designated as rangeland or commercial land. Because it was not possible to identify areas where specific crops were grown, all agricultural land was treated as a single type. If detailed crop maps were available, it might be possible to adjust fertilizer amounts based on specific crops, at least for a specific year. The total number of pounds of fertilizer used in each county was divided by the number of agricultural and residential acres in the county to obtain the average number of pounds per acre applied to that land. These figures ranged from less than 70 lb/ac to approximately 140 lb/ac per year (table 2).

<u>Legume crops</u>

Crops belonging to the legume family such as clovers, alfalfa, and beans establish a symbiotic relationship with microbes that reside in nodules on the roots of the host plants and can fix atmospheric N. For this study, nitrogen input from legumes was estimated using alfalfa and dry bean crop data by county from Idaho State Department of Agriculture (ISDA) for 1998. The nitrogen fixation rates were taken from Goolsby and others (1999): 194.5 lb/ac for alfalfa and 53.7 lb/ac for dry beans.

In some cases fertilizer may be applied to dry bean crops if the previous crop was corn or grain (CIS#378). Furthermore, some crops may be harvested and removed while others are tilled under at the end of the growing season. Because these factors are unknown, this estimate considers only the N-fixation portion of the legume nitrogen input, and does not account for how much nitrogen the crop uses for growth or whether or not the crop is tilled under or removed at the end of the growing season. The estimated total amount of nitrogen added by legume crops ranged from 135 lb/ac to 193 lb/ac. See table 3 for details.

<u>Cattle manure</u>

Little current information is available on the spatial distribution of cattle in the study area. Nitrogen input was weighted to specific areas on the basis of known dairy locations and a number representing the average number of dairy cattle at each facility. These data were provided by ISDA for 429 dairies in the study area, probably a fraction of the total number of dairies (Danielle Bruno, ISDA, pers. commun., 2000). Using the point shapefile provided by ISDA, a map showing the density of dairy cattle was produced in ArcView using the Spatial Analyst extension. From this, a contour map showing the average density of dairy cattle per sq km, in intervals of 50 animals, from 1 to 450, was generated. This allowed a range of nitrogen input values, in lb/ac, to be assigned spatially, based on the estimated number of animals per acre. It was assumed that dairy cattle produce 0.45 lb N/day per animal (Lander and others, 1998). The following formula was used to calculate the number of pounds of nitrogen per acre derived annually from dairy cattle:

*D x 0.45 lb N/animal x 365 days/yr x 0.004 sq km/acre = lb N/acre,*

where D = number of animals/sq km ("cowcontur" field in shapefile). Values obtained using this formula ranged from 0 to 296 lb per acre. The GIS coverage of the contour map showing the density of dairy cattle was merged with the land-use GIS coverage to produce the final map, but the original contour map is included here as a separate shapefile (daricontur.shp and associated data files).

Nitrogen input from beef cattle was treated differently. Because information on the spatial distribution of beef cattle was not available except at the county level, it was assumed that all beef cattle were located on agricultural land, although this necessary simplification clearly does not account for cattle on rangeland. Nitrogen from this source was assigned to agricultural land, by county.

The number of beef cattle in each county, obtained from the Idaho Agricultural Statistics Service (1998), was multiplied by the average daily amount of total nitrogen in feces and urine produced by each animal (0.305 lb/animal/day). The calculations and results are given in table 4. The county-based average values range between 14 and 63 lb/acre.

<u>Atmospheric Deposition</u>

Precipitation contains small but measurable amounts of nitrogen. The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) is a nationwide network of precipitation monitoring sites where data on the chemistry of precipitation are collected for monitoring of geographical and temporal long-term trends. Nitrogen concentration data from this network were combined with long-term average precipitation data to compute the annual amount of nitrogen input by precipitation at any point in the study area.

Data for average annual concentrations of nitrate and ammonia in precipitation for 1990 through 1998 for site ID03 (Craters of the Moon National Monument, the closest site to the study area) were downloaded from the NADP/NTN website (http://nadp.sws.uiuc.edu/nadpdata/). Total nitrogen was calculated as the sum of nitrogen as ammonia and nitrogen as nitrate. The average total nitrogen concentration for 1990-98 was 0.90 mg/L.

The GIS coverage showing thirty-year average precipitation in the study area was the basis for the calculation of average annual nitrogen deposition by precipitation. Average precipitation ranges from less than 5 in/yr (less than 0.127 m) to 40 in/yr (1.02 m) (Molnau, 1995). A precipitation-weighted mean deposition in kg/ha was calculated for each rainfall zone by multiplying the average annual precipitation in cm by 0.90 mg/L and dividing by 10. This number was then converted to lb/ac. Values obtained range from approximately 1 to 6 lb nitrogen per acre. Dry deposition of nitrogen was not accounted for in this calculation, but doing so would not have significantly changed the overall results.

<u>Domestic Septic Systems</u>

Total nitrogen input by county from domestic septic systems was estimated by multiplying the average amount of total nitrogen generated per person by the average number of persons per household and the number of households using domestic septic systems in each county.

$S = P \times H \times Y \times 365\ days$

where

S = total nitrogen input from domestic septic systems, in kg

P = total nitrogen produced daily per person, in kg (0.006 kg/day to 0.017 kg/day, from U.S. Environmental Protection Agency)

H = average number of persons per household (from U.S. Census Bureau), and

Y = number of houses using domestic septic systems in each county (from U.S. Census Bureau).

Current data for the number of households in each county were not available, but estimates for 1998 were made based on 1990 Census data and 1998 updated population estimates. Estimates ranged from 13 to 29 lb/ac nitrogen per year. See table 5 for details. The exact distribution of septic systems in the study area is not well known. Therefore, it was assumed that nitrogen input from domestic septic systems occurs chiefly in areas designated as residential or commercial lands, according to Bureau of Reclamation land-use maps.

## Conclusions

Phase 2 of the project now has been completed. All the necessary data for developing a ground water probability map are now in place, and we are prepared to proceed with Phase 3, developing a nitrate ground water probability map for the six-county region.

Sincerely,

Mary M. Donato
Geologist

Enclosures

Table 1. 1997 expenditures on commercial fertilizer, by county

| County | x $1000 | fraction of state $ | 1997 total N for county (short tons) | 1991 USGS data est. sales in tons Battaglin and Goolsby, 1994 |
|---|---|---|---|---|
| Cassia | 21,383 | 0.087 | 19,458 | 13,264 |
| Gooding | 5,017 | 0.020 | 4,565 | 3,633 |
| Jerome | 10,563 | 0.043 | 9,612 | 5,437 |
| Lincoln | 3,693 | 0.015 | 3,361 | 1,230 |
| Minidoka | 16,339 | 0.067 | 14,868 | 8,531 |
| Twin Falls | 16,097 | 0.066 | 14,648 | 9,344 |
| 6-county total | 73,092 | 0.298 | 66,513 | 41,440 |

State total $ 245,440

State total N (short tons) 223,349
from TFI (The Fertilizer Institute)

sources: USDA 1997 Census of Agriculture
TFI: http://www.tfi.org

Table 2. Nitrogen applied annually in fertilizer, by county

| | Agricultural and Residential acres from GIS | N Fertilizer (tons) from Table 1 | N Fertilizer lb/agric.acre |
|---|---|---|---|
| Cassia | 299,865 | 19,458 | 130 |
| Gooding | 137,093 | 4,565 | 67 |
| Jerome | 190,437 | 9,612 | 101 |
| Lincoln | 94,788 | 3,360 | 71 |
| Minidoka | 213,104 | 14,868 | 140 |
| TwinFalls | 324,581 | 14,648 | 90 |

Sources:
Bureau of Reclamation land use coverage
Idaho Agricultural Statistics, 1998

Table 3. Nitrogen annually fixed by legumes, by county

| | N fixed* by alfalfa | N fixed by dry beans | Total N (lb) legumes | Total acres in legumes | Total legume lbs/ac |
|---|---|---|---|---|---|
| Cassia | 11,028,150 | 174,930 | 11,203,080 | 61,600 | 182 |
| Gooding | 7,682,750 | 60,690 | 7,743,440 | 41,200 | 188 |
| Jerome | 8,149,550 | 474,810 | 8,624,360 | 55,200 | 156 |
| Lincoln | 3,812,200 | 7,140 | 3,819,340 | 19,800 | 193 |
| Minidoka | 5,543,250 | 282,030 | 5,825,280 | 36,400 | 160 |
| TwinFalls | 13,887,300 | 1,535,100 | 15,422,400 | 114,400 | 135 |

Sources:
Goolsby and others (1999)
Idaho Agricultural Statistics, 1998

*194.5 lb/ac for alfalfa and 53.7 lb/ac for dry beans.

Table 4. Annual nitrogen input from beef cattle, by county

**1998**

| | Cows that have calved | | | Calves, bulls, steers, and heifers | "Beef cattle" ("All" minus dairy) | N from beef (lbs) | Ag land from GIS cov | Beef cattle N lb/acre |
|---|---|---|---|---|---|---|---|---|
| | All cattle and calves | Beef | Dairy | | | | | |
| Cassia | 140,500 | 26,500 | 13,500 | 100,500 | 127,000 | 14,138,275 | 296,484 | 48 |
| Gooding | 140,000 | 15,500 | 65,000 | 59,500 | 75,000 | 8,349,375 | 133,170 | 63 |
| Jerome | 133,500 | 9,000 | 64,500 | 60,000 | 69,000 | 7,681,425 | 186,992 | 41 |
| Lincoln | 34,500 | 7,000 | 6,800 | 20,700 | 27,700 | 3,083,703 | 93,704 | 33 |
| Minidok: | 33,500 | 5,000 | 7,900 | 20,600 | 25,600 | 2,849,920 | 207,628 | 14 |
| TwinFall | 125,500 | 28,000 | 33,500 | 64,000 | 92,000 | 10,241,900 | 313,484 | 33 |

0.305 lb N/day/animal

Sources:
Lander and others (1998)
Idaho Agricultural Statistics (1998)

Table 5. Annual nitrogen input from domestic septic systems, by county

| | 1990 Population | 1990 Households | 1990 person/hsehold | 1990 housing units | 1990 Septic sys | 1998 pop | Fraction septic sys 1990 | # hsehlds in 1998 based on 1990 pph | #hsehlds with sep sys in 1998 (estimate) |
|---|---|---|---|---|---|---|---|---|---|
| CASSIA | 19,532 | 6,373 | 3.06 | 7,212 | 3,545 | 21,573 | 0.49 | 7,039 | 3,460 |
| GOODING | 11,633 | 4,320 | 2.69 | 4,800 | 2,346 | 13,743 | 0.49 | 5,104 | 2,494 |
| JEROME | 15,138 | 5,325 | 2.84 | 5,886 | 2,756 | 18,110 | 0.47 | 6,370 | 2,983 |
| LINCOLN | 3,308 | 1,191 | 2.78 | 1,386 | 628 | 3,839 | 0.45 | 1,382 | 626 |
| MINIDOKA | 19,361 | 6,472 | 2.99 | 7,044 | 3,126 | 20,284 | 0.44 | 6,781 | 3,009 |
| TWIN FALLS | 53,580 | 19,737 | 2.71 | 21,158 | 6,355 | 62,970 | 0.30 | 23,196 | 6,967 |

| | Annual N 6 g/per/day low estimate kg | Annual N 17g/per/day high estimate kg | Annual N average(kg) | Annual Nitrogen low estimate lb | Annual Nitrogen high estimate lb | average (lbs) |
|---|---|---|---|---|---|---|
| CASSIA | 23,223 | 65,798 | 44,510 | 51,090 | 144,756 | 97,923 |
| GOODING | 14,710 | 41,678 | 28,194 | 32,362 | 91,692 | 62,027 |
| JEROME | 18,570 | 52,616 | 35,593 | 40,855 | 115,756 | 78,305 |
| LINCOLN | 3,809 | 10,793 | 7,301 | 8,381 | 23,745 | 16,063 |
| MINIDOKA | 19,714 | 55,855 | 37,785 | 43,370 | 122,882 | 83,126 |
| TWIN FALLS | 41,421 | 117,359 | 79,390 | 91,126 | 258,190 | 174,658 |

| | BOR acres comm/res | ave lbs | avelb/ac |
|---|---|---|---|
| CASSIA | 3,379 | 98,089 | **29** |
| GOODING | 3,924 | 62,186 | **16** |
| JEROME | 3,446 | 78,601 | **23** |
| LINCOLN | 1,244 | 15,953 | **13** |
| MINIDOKA | 5,197 | 82,418 | **16** |
| TWIN FALLS | 11,101 | 174,449 | **16** |

Sources:
U.S Census Bureau, County Profiles
U.S. Environmental Protection Agency, Pub. 625180012, Onsite Wastewater Treatment and Disposal Systems, Table 4-3, Characteristics of residential wastewater.

## References Cited

Alexander, Richard B. and Smith, Richard A., 1990, County-Level Estimates of Nitrogen and Phosphorus Fertilizer Use in the United States, 1945 to 1985: USGS Open-File Report 90-130.

Battaglin, W.A., and Goolsby, D.A., 1995, Spatial data in geographic information system format on agricultural chemical use, land use, and cropping practices in the United States: U.S. Geological Survey Water-Resources Investigations Report 94-4176, 87 p. Accessed on the worldwide web at http://water.usgs.gov/lookup/getspatial?nit91

Goolsby, D.A., Battaglin, W.A., Lawrence, G.B., Artz, R.S., Aulenbach, B.T., Hooper, R.P., Keeney, D.R., and Stensland, G.J., 1999, Flux and sources of nutrients in the Mississippi-Atchafalaya River Basin: Topic 3 Report submitted to the White House Office of Science and Technology Policy Committee on Environment and Natural Resources Hypoxia Work Group. Accessed on the worldwide web at http://wwwrcolka.cr.usgs.gov/midconherb/hypoxia.html

Lander, Charles H., David Moffitt, and Klaus Alt, 1998, Nutrients available from livestock manure relative to crop growth requirements: U.S. Department of Agriculture, Natural Resources Conservation Service, Resource Assessment and Strategic Planning Working Paper 98-1. Accessed on the worldwide web at http://www.nhq.nrcs.usda.gov/land/pubs/nlweb.html

Maupin, Molly A., 1992, Depth to water in the eastern Snake River Plain and surrounding tributary valleys, southeastern Idaho, calculated using water levels from 1980 to 1988: U.S. Geological Survey Water-Resources Investigations Report 90-4193.

Molnau, Myron, 1995, Mean annual precipitation. 1961-1990, Idaho: Moscow, University of Idaho, Agricultural Engineering Department, State Climate Office, scale 1:1,000000.

Rupert, M.G., 1996, Major sources of nitrogen input and loss in the upper Snake River Basin, Idaho and western Wyoming, 1990: U.S. Geological Survey Water-Resources Investigations Report 96-4008.

**MIDDLE SNAKE REGIONAL**
**WATER RESOURCE COMMISSION**
**Bob Muffley, Acting Executive Director**
**122 5th Ave. West**
**Gooding, Idaho 83330**
**208-934-4781**
**208-934-5648 fax**

TO: All County Commissioners

FROM: Lew Pence, Chair

SUBJECT: Amount to be budgeted per county for budget year 2000 - 2001 and changes to by-laws

Attached is a copy of the budget approved by the Commission for the budget year 2000-2001. The budget has been read and approved by members of the executive Committee, but because there was no quorum, they were unable to vote on the matter. Attached is a ballet for your county to vote on the issue and return to me as soon as possible. If three or more counties vote no on the budget we will need to call an Executive Committee meeting to hash out the issue.

There is a small increase in this years budget because we are starting the planning group which will be responsible for writing the groundwater protection plan. It is assumed that instead of sending material to 20 people each month we will be sending to as many as 60. This makes for a dramatic increase to the stamps and supply portion of the budget. It was doubled. The next item on the budged that was dramatically increase over last year is the mileage reimbursement. It was decided by the Commission and some the attending members of the Executive Committee that, since we are asking people from throughout the 6 county area to attend the planning meetings as part of the Core Planning Group the Commission should pay mileage for these individuals. Other budget items remain much the same except Attorney Fees. This item was reduced to $500.00 because advice may or may not be needed in the coming year.

The second issue that is attached to this letter is a change in the bylaws of the organization which also needs to be voted on by the member counties. Change #1 is the most dramatic change that you are being asked to approve, but probably the most needed one. The purpose of this change is to require that each county appoint one member to the commission instead of the original two members. This is being proposed for several reasons. The first reason is that 90% of the time only one member per county is attending. The current bylaws state that if a member has more then two un-excused absences that they are dismissed and a new member appointed by the county. This rule has not been followed since 6 of our members are coming sometimes, but usually not at all. They still cost the counties a lot of money in postage and supplies, not to mention the time of the Executive Director. The second reason is that we believe it will be much easier for County Commissioners to find one person in their county who will dedicate him or herself to the mission. This is proven by the excellent attendance of at least one member from each of the counties.

The second change is actual[illegible] housekeeping item. The last two sent[illegible]es of paragraph 4 was inserted because Twin Falls County had participated in the developing the plan, but did not become a member county at that time. Twin Falls has since become a member county and these lines no longer apply.

Amendments 1-3 are also housekeeping items. When Cassia, Minidoka and Twin Falls Counties joined the Commission as member counties these amendments should have been inserted in the bylaws and were not. We are not sure of the dates that these counties passed the ordinances which adopted the plan and made them members so I ask that, after you vote on these items, you write in the dates for your respective counties and return them in the enclosed envelope along with your ballot.

Its a pleasure to serve the counties as the new chairman of this commission and I look forward to working with you in the future. Please contact out Executive Director or myself if you have any questions or comments. My phone number is 208-934-5302.

Sincerely

Lew Pence, Chair

Formed by a joint powers agreement between Cassia, Gooding, Jerome, Lincoln, Minidoka and Twin Falls counties in south central Idaho concerned agencies with test results from randomly taken soil samples.

4. Based on the results of the periodic soil samples a crop rotation and fertilizing plan should be approved by the Idaho Department of Agriculture and the Department of Environmental Quality. Legume crops such as hay, beans and peas can actually add nutrients to the soil.

I hope this information helps you in your decision making process. This information and more can be found on the Arc/View system of the Idaho Department of Water Resources. Please let me know if you have any questions.

**County of Jerome Planning and Zoning**
208-324-8811 ext. 143 Fax 208-324-2719
300 N. Lincoln, Room 201, JEROME, IDAHO 83338

Arthur R. Brown
Administrator

Yvette Le Mon
Secretary

**FAX MESSAGE**

Date: 3-7-2000

To: BOB MUFFLEY

Fax #: 934-5648

From: ART BROWN

Number of pages including cover: 3

434 5648

**Subject:** FW: Mid-Snake RWRC Hardware/Software
**Date:** Thu, 24 Feb 2000 15:55:24 -0700
**From:** "Britton, Ben" <bbritton@idwr.state.id.us>
**To:** "'abrown@co.jerome.id.us'" <abrown@co.jerome.id.us>
**CC:** "Castelin, Paul" <PCASTELI@idwr.state.id.us>

Art;

I work for Paul Castelin at IDWR. He asked me to contact you concerning assisting the MSRWRC in purchasing a workstation and ArcView software. I need some additional info before we put together the final workstation configuration. I understand the workstation will be installed in your office. Will it be attached to the network? If so, we need to add a network card to the configuration Paul sent you. If you do not need the modem, we should remove that from the configuration. I do not know anything about what your group does. We may need to tailor the configuration. I would like to discuss the details. Please e-mail me or call me at 327-5447.

Paul wants me to go through the process of ordering the equipment online from Micron. I have not done that before, but our purchasing group has. I use Micron's configuration tool quite often. I would recommend configuring the system as you want it, saving the quote (it will be saved on Micron's server) and then calling Micron at the "800 number" listed on the configuration web-page. Because of the size of ArcView, I would partitioning the disk drive so that the "C" drive is 4 GB. I have not seen ArcView v4.0 running, but I imagine that it requires a lot of memory and hard disk.

I will get the cost of ArcView, how to order it and if you can wait for version 4.0 -- it should be available soon.

Ben 3.2.

Ben R. Britton
Idaho Department of Water Resources
Boise, Idaho 83706
(208) 327-5447
bbritton@idwr.state.id.us

16 GB DRIVE

left msg @ 9:30 3-2-2000

Null a 4 9:19

upgrade WINDOW NT

Set up for dial ups for the office pro.

internet file transfer protocol

FTP store & transfer data!



03/01/2000 5:33 PM

# Recommended GIS Workstation Configuration

## Micron Millennia Max Pentium III, 600 MHz

| Item | Description | Price |
|---|---|---|
| 224845 | Base Configuration | $1,399.00 |
| 248530 | 600B MHz Intel Pentium III processor | - |
| 306072 | 256MB 133MHz SDRAM-1 DIMM | $369.00 |
| 225147 | 20GB ATA-66 hard drive (7200 RPM) | $49.00 |
| 254584 | 40X var. speed IDE CD-ROM drive | - |
| 300725 | 8X4X32 var. speed Recordable/Rewritable CD-ROM with software | $199.00 |
| 225235 | 1.44MB 3.5in floppy drive - 280176 16MB NVIDIA Riva TNT2 AGP card | - |
| 280222 | 19in Micron 900LX display (17.9in viewable, .26mm dp) | $179.00 |
| 246004 | 128 Voice PCI Wavetable Onboard Sound w/Advent AV009 Speakers | - |
| 225586 | Standard speakers | - |
| 225227 | 56K 3 COM Data/Fax Controller Modem | $31.00 |
| 225083 | Customer Selects No Network Card | - |
| 225339 | Customer selects no Office Connect | - |
| 225080 | NMB Multifunction Keyboard | - |
| 225233 | Microsoft Intellimouse | - |
| 225253 | Mid-size Tower | - |
| 253091 | Microsoft Windows 98 | - |
| 225130 | Microsoft Office 2000 SB | - |
| 225106 | Norton AntiVirus | - |
| 305844 | Intuit Turbo Tax | - |
| 270519 | Customer Selects No Micron University | - |
| 258469 | Micron Internet Service 90 day free trial | - |
| 225099 | Customer Selects No Zip | - |
| 225257 | 5/3 year limited parts warranty with 1 year onsite service | - |
| 225268 | Customer Selects No Additional Warranty/Service | - |
| | **Total Price** | **$2,226.00** |

Additions

| | |
|---|---|
| Upgrade from Microsoft Windows 98 to Windows NT | $100 |
| Upgrade from Microsoft Office SB to Office Pro (adds Powerpoint and Access) | $200 |
| ArcView 3.2 (upgrade price is $395) | $895 |
| HP ScanJet 6300Cse scanner | $399 |
| HP DeskJet 970 Cse color inkjet printer | $399 |
| HP DesignJet 750C plotter if they intend to do E-size plots (street price $5,500) | $5893 |

**Total cost for the workstation, including plotter $10,112**
**Total cost for the workstation, excluding plotter $4,219**

In lieu of buying several HP 750C plotters, a single plotter could be shared by all users and smaller printers could be purchased for each of the workstations. This arrangement is not ideal because it would require sending large files from those users who do not have a plotter to the one that does. This will involve a great deal of personnel time and connection time. The HP 750C plotter is recommended. The HP 970 printer is shown only to provide pricing information.

Note: The price of the HP 750C Plotter is the list price, excluding shipping. This plotter requires several hundred dollars worth of supplies per year.

# MIDDLE SNAKE REGIONAL WATER RESOURCE COMMISSION

**Bob Muffley, Acting Executive Director**
**122 5th Ave. West**
**Gooding, Idaho 83330**
**Phone: 208-934-4781 Fax: 208-934-5648**


## FAX COVER SHEET

**TO: Rick**

**FROM: Bob**

**RE: ARK/view set up**

**DATE: 3/8/00**

**This FAX has a total of ___3___ pages including this cover sheet. If you do not receive all the pages, please call at the office number shown above.**

**MESSAGE:**

# MIDDLE SNAKE REGIONAL WATER RESOURCE COMMISSION

**Bob Muffley, Acting Executive Director**
**122 5th Ave. West**
**Gooding, Idaho 83330**
**208-934-4781**
**208-934-5648 fax**


Interior Columbia Basin
Ecosystem Management Project
304 North 8th Street, Room 250
Boise, Idaho 83702

To The Leading Edge Staff:

I am writing to notify you of a change of Address for the Middle Snake Regional Water Resource Commission. Please send your publication, The Leading Edge, to the new address shown above. Thanks.

Sincerely

Bob J. Muffley
Acting Executive Director

# State of Idaho

## Department of Administration

DIRK KEMPTHORNE
Governor
PAMELA I. AHRENS
Director

650 West State Street (83702)
P.O. Box 83720
BOISE, ID 83720-0003
Telephone (208) 332-1824 or FAX (208) 334-2307
http://www.state.id.us/adm


February 28, 2000

Bob Muffley, Acting Executive Director
Mid-Snake Regional Water Resources Commission
Muffley Realty and Insurance
122 5th Ave. W
Gooding, ID 83330

Dear Bob,

I appreciated the chance to attend the recent meeting of planning and zoning administrators in Twin Falls on February 15, 2000. I found it to be a valuable opportunity to meet key players involved in land use policy development in the region.

As the statewide GIS coordinator, I look forward to working with your group to identify issues related to GIS implementation at the local and regional government levels. Please feel free to contact me with any questions on GIS in Idaho.

Thank you for the informative meeting.

Cordially,

Liza Fox
State GIS Coordinator

be a rewrite on this

February 19, 1999

To: Jeff KenKnight
U.S. Environmental Protection Agency
1200 6th Avenue (OW – 137)
Seattle, WA 98101

Re: Funding Request and Project Description
EPA – Funded Water Source Initiatives

Dear Mr. KenKnight;

On behalf of the Middle Snake Regional Water Resource Commission, it is my pleasure to submit the attached project description and funding request for your consideration. We are confident that you will find it to be a project that meets your funding criteria, but also an exciting opportunity to assist a six-county regional organization in a proactive and innovative process for the protection of our groundwater and regional aquifer system. This is truly a unique effort and a model demonstration of how groundwater protection *should* be implemented.

The Middle Snake Regional Water Resource Commission is anxious to continue this project. We are committed to this project as part of our overall three phase groundwater protection strategy and demonstrate our commitment in two ways. First, by our commitment of staff and qualified volunteer labor for project management. Second, by our commitment of budgeted funds and in-kind contributions totaling nearly 50% of the overall project costs. Furthermore, we have a proven record of support for this effort, illustrated in our funding, management and completion of Phase I. We now need your assistance to complete Phase II and further enhance our collaborative effort for true regional groundwater management.

Following your review of this information, please contact either of us at your convenience if you have questions or need further information. Also, letters of support for Phase II and our overall regional groundwater protection strategy are on file and will be sent to you upon your request. Thank you for your consideration of this important effort.

Sincerely,

B. Roy Prescott, Jerome County Commissioner
Executive Committee Chair
Middle Snake Regional Water Resource Commission

Dr. Richard Allen, Chairman / Project Manager
Middle Snake Regional Water Resource Commission

1-208-324-4531 Fax Number

**Jerome Veterinary Hospital,P.A.**
**1025 North Lincoln**
**Jerome,Id. 83338**

# Fax

| | | | |
|---|---|---|---|
| **To:** | Bob | **From:** | Dr. Allen |
| **Fax:** | 934-5648 | **Pages:** | 2 |
| **Phone:** | 934-4781 | **Date:** | 02/12/00 |
| **Re:** | | **CC:** | |

☐ **Urgent** ☑ **For Review** X **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

• **Comments** – Bob, here is Config setup - let me know – Agenda dependent → need to start getting dates/attendee's list plus. cost if out of commission. – Rest of agenda for plan. who to include plus letters.

Rich

# Recommended GIS Workstation Configuration

## Micron Millennia Max Pentium III, 600 MHz

| Item | Description | Price |
|---|---|---|
| 224845 | Base Configuration | $1,399.00 |
| 248530 | 600B MHz Intel Pentium III processor | - |
| 306072 | 256MB 133MHz SDRAM-1 DIMM | $369.00 |
| 225147 | 20GB ATA-66 hard drive (7200 RPM) | $49.00 |
| 254584 | 40X var. speed IDE CD-ROM drive | - |
| 300725 | 8X4X32 var. speed Recordable/Rewritable CD-ROM with software | $199.00 |
| 225235 | 1.44MB 3.5in floppy drive - 280176 16MB NVIDIA Riva TNT2 AGP card | - |
| 280222 | 19in Micron 900LX display (17.9in viewable, .26mm dp) | $179.00 |
| 246004 | 128 Voice PCI Wavetable Onboard Sound w/Advent AV009 Speakers | - |
| 225586 | Standard speakers | - |
| 225227 | 56K 3 COM Data/Fax Controller Modem | $31.00 |
| 225083 | Customer Selects No Network Card | - |
| 225339 | Customer selects no Office Connect | - |
| 225080 | NMB Multifunction Keyboard | - |
| 225233 | Microsoft Intellimouse | - |
| 225253 | Mid-size Tower | - |
| 253091 | Microsoft Windows 98 | - |
| 225130 | Microsoft Office 2000 SB | - |
| 225106 | Norton AntiVirus | - |
| 305844 | Intuit Turbo Tax | - |
| 270519 | Customer Selects No Micron University | - |
| 258469 | Micron Internet Service 90 day free trial | - |
| 225099 | Customer Selects No Zip | - |
| 225257 | 5/3 year limited parts warranty with 1 year onsite service | - |
| 225268 | Customer Selects No Additional Warranty/Service | - |
| | **Total Price** | **$2,226.00** |

| Additions | |
|---|---|
| Upgrade from Microsoft Windows 98 to Windows NT | $100 |
| Upgrade from Microsoft Office SB to Office Pro (adds Powerpoint and Access) | $200 |
| ArcView 3.2 (upgrade price is $395) | $895 |
| HP ScanJet 6300Cse scanner | $399 |
| HP DeskJet 970 Cse color inkjet printer | $399 |
| HP DesignJet 750C plotter if they intend to do E-size plots (street price $5,500) | $5893 |

**Total cost for the workstation, including plotter $10,112**
**Total cost for the workstation, excluding plotter $4,219**

In lieu of buying several HP 750C plotters, a single plotter could be shared by all users and smaller printers could be purchased for each of the workstations. This arrangement is not ideal because it would require sending large files from those users who do not have a plotter to the one that does. This will involve a great deal of personnel time and connection time. The HP 750C plotter is recommended. The HP 970 printer is shown only to provide pricing information.

Note: The price of the HP 750C Plotter is the list price, excluding shipping. This plotter requires several hundred dollars worth of supplies per year.

| Post-it® Fax Note 7671 | Date 2/11 # of pages 1 |
|---|---|
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