Executive Summary

The members of Spokane Aquifer Joint Board (SAJB) currently operate one hundred and four wells/well-fields which draw groundwater from the Spokane Aquifer for their potable water supply which they serve to the citizens living in the Spokane area but outside the city limits. Because of the relatively shallow depth to groundwater and the absence of low permeability layers that could prevent contamination from entering the groundwater, the SAJB's groundwater supply is highly vulnerable to a variety of contamination threats. In order to proactively reduce the potential dangers to the drinking water supply, the SAJB developed a wellhead protection program.

This report describes the work performed under the SAJB's wellhead protection plan for their program. It begins with the technical characterization and assessment of the hydrogeologic setting of the Spokane Aquifer that provides the basis for the proposed wellhead protection areas. Once established, the wellhead protection areas serve as the foundation for the program, defining the areas for the contaminant source inventory, risk assessment, contingency and management planning, public education and possible groundwater protection ordinances.

The report, in three volumes, contains eight chapters (and 24 appendices that provide detailed information) as briefly described below:

- **Chapter 1** introduces the SAJB and describes the background and regulatory framework that guided the work depicted in this report.
- **Chapter 2** describes the extensive data collection efforts incorporated to better understand the aquifer's characteristics for the technical assessment and to provide a basis for the groundwater modeling.
- **Chapter 3** presents the methods and results of the groundwater modeling, defines the capture zones, and proposed wellhead protection areas for the SAJB's existing well/well-fields.
- **Chapter 4** presents the various public educational and public involvement methods adopted by the board.
- **Chapter 5** presents the basis for the risk assessment factors used to risk rank the potential contaminant source inventory.
- **Chapter 6** discusses the basis and the results of the inventory of known and potential contamination sources.
- **Chapter 7** presents the technical report about the contingency planning process.
- **Chapter 8** presents the management planning methods and processes selected and implemented by the SAJB.

Data Resources Information

Delineating wellhead protection areas in large and complex hydrogeologic environments like the Spokane Aquifer requires the use of sophisticated methods such as numerical computer modeling. Before numerical modeling can be performed, accurate conceptualization of the hydrogeologic setting must be developed. Although much study has been performed within the Spokane Aquifer, additional characterization was required to support the development of the numerical model.

Extensive review of previous aquifer investigations provided the basis for determining where additional data was required. Field data collection included the development of an aquifer wide water level network, fifteen new monitoring well installations, water level monitoring, geophysical testing, and aquifer flow testing. As a result of the data collection efforts, new information was discovered. Earlier studies discovered that a second (lower unit) aquifer exists from Magnesium Road north to the Little Spokane River, therefore, additional study was put into this area to ascertain some of the properties of this little-used ground water resource. Studies in the Spokane Valley were used to refine the existing hydrogeologic conceptual model. In other areas studied the new data serves as a base line with which to develop a preliminary conceptual model.

Wellhead Protection Area Delineations

Groundwater modeling yields a more accurate Wellhead Protection Area (WHPA) delineation than other available methods since they incorporate and accommodate all known variables in aquifer properties and dynamics. A previously constructed three-dimensional numerical model was fed the latest information gathered during the data collection process of this program. With the newly calibrated numerical model, estimated groundwater capture zones using particle-tracking procedures were conducted for special times-of-travel. These particle tracking path line plots were then used to develop special wellhead protection areas.

Special Wellhead Protection Areas (SWHPAs) have been delineated for each water utility using the water rights pumping scenario. For each SAJB water utility, the SWHPA represents the groundwater capture zone for the full well field. For some SAJB water utilities, their well fields are in close proximity to, or are located within, the well/well-fields of other SAJB members. Consequently, some SWHPAs overlap each other. For several wells, the overlaps consist of a capture zone for one well partially overlapping the capture zone for one (or a small number of) wells for the identified neighboring utility. In most instances, the duplicated area is substantially less than half of the total area of either WHP. For overlaps that are noted in the table as being slight, the overlap is for only one well for each purveyor, and the overlapped area is less than ten percent of the capture zone for each of the overlapping wells.

Public Education/Involvement

Public education and involvement became one of the first tasks that the Spokane Aquifer Joint Board focused its energies toward. Realizing that public recognition and approval

would be major elements of implementation for this program, the group gave itself an identity by designing a logo and using the slogan "Local Water Utilities United for Safe Drinking Water". SAJB members elected to begin the public education process early in this program.

Members also chose, individually and as a group, to exhibit and distribute information at public functions, such as, the 8th Annual Environmental Form -"Expo 97", and the 1997 Spokane County Fair. A slide presentation was developed, and presented to local groups like the Sierra Club, Lion's Club, and League of Women Voters. Newsletters were published under the SAJB identity and distributed to public libraries, major businesses, groups, and persons who expressed interest in the program. Press releases, media information packets, and a public information video were developed, and used for television, radio, and newspaper interviews, public and business meetings, WHP training, and school programs. Contaminant source inventory letters of notification were used to solicit focus group members and to inform the businesses and facilities notified of their location in a WHPA about their water supply.

Wellhead Risk Ranking and Assessment

Once the pollution source inventory was developed, the lists of sources were ranked on the available information as to their potential threat to groundwater pollution. The ranking code ranges from 1 to 4, with four being a high risk or known groundwater contaminant problem.

Contaminant Source Inventory

Using a variety of information sources, a potential contaminant source inventory was conducted to identify sites that contain potential pollution sources. The pollution source inventory contains over 8,000 records of potential contaminant sites within the aquifer sensitive area. As required, all potential contaminant sources in the special wellhead protection areas and the associated aquifer wide protection area were notified. Additionally, regulatory agencies with jurisdiction over each contaminant source were mailed listings of potential contaminant sources within local WHPA boundaries.

Contingency Plan Technical Report

Contingency plans consist of a sequence of planned actions that may be taken if a groundwater threatening accident occurs or changes in groundwater quality are observed in a monitoring well, production well, or wellhead protection area. Different actions are taken depending on the type of event and its proximity to a production well.

As part of the complete program, each purveyor developed individual contingency plans. The individual plans were integrated into an overall plan that is outlined in Chapter 7 of this report. The overall plan includes general emergency response action plans and flow charts, communication priorities, and a phone list. As such, the overall wellhead protection contingency plan acts as a standardized plan for all SAJB members to be used for emergency operations.

Management Plan

The majority of SAJB members do not possess the authority to control business and development through regulations and zoning ordinances. Further, the public involvement process strongly rejected "new" regulations in addition to the aquifer protection measures already in place. Therefore, much of the SAJB's management strategy relies on public education. The SAJB must also work closely with businesses and homeowners to ensure mitigation or elimination of their potential to contaminate the groundwater. Additional regulations and groundwater protection policies to reduce the potential for future contamination incidents can only be put into place by working effectively with local land use authorities.

The implementation schedule and financing for the SAJB's wellhead protection management plan is based upon member participation and cooperation. However, the SAJB will request a change to the special/conditional use permit process and policy changes for drywells (stormwater disposal system) in addition to providing an educational and awareness campaign, neighborhood household hazardous waste removal, proactive business assistance and chemical use reduction, and maintaining an ongoing contaminant source inventory database.

The cooperative contingency plan outlined in Chapter 7, acts as a contingency management plan for all members of the SAJB in the event of an imminent or actual contamination threat to the groundwater.