

# WRIA 54 SUPPLEMENTAL WATER QUALITY ASSESSMENT PHASE II – QAPP DEVELOPMENT

## INTRODUCTION

This scope of work describes development of Quality Assurance Project Plans (QAPPs) for two monitoring studies:

- Nine Mile Area Non-Point Source Monitoring Study; and
- Paleochannel Water Quality Monitoring Study

Developing QAPPs for these two monitoring studies will be conducted under **Task 5** of the WRIA 54 Supplemental Water Quality **Department of Ecology grant no. G0800004**.

The WRIA 54 Planning Unit has undertaken an assessment of water quality issues and concerns in WRIA 54 as part of its Phase 2 data analysis. The results of this assessment indicate that many of the water quality issues and concerns in WRIA 54 are currently being addressed through a separate program or process. These include:

- State of Washington TMDL (Water Cleanup Plans) for the mainstem Spokane River, Little Spokane River, and Latah Creek;
- Environmental Protection Agency (EPA) cleanup programs for the Midnite Mine, Sherwood Mine, Dawn Mine, and West Plains Missile Site;
- Federal Energy Regulatory Commission (FERC) relicensing for Avista hydroelectric facilities on the Spokane River.
- Bonneville Power Administration (BPA) water quality modeling for the Spokane Arm of Lake Roosevelt
- Local efforts to upgrade wastewater treatment, including water reclamation and reuse.

Non-point source water quality concerns have not historically been the focus of evaluation, except in localized portions of the WRIA, such as Chamokane Creek (Stevens County Conservation District, 2000). Water quality impacts from urbanizing land uses, agricultural practices, and other sources have not been evaluated, nor are they currently being monitored so as to enable future evaluation of impacts.

Prior to initiating a monitoring study, Ecology requires development and approval of a Quality Assurance Project Plan (QAPP) that describes the monitoring study in detail. The QAPP elements described below, will result in a documented and approved monitoring program that can be implemented over the coming years. The Paleochannel and Nine Mile Water Quality Monitoring Studies will be implemented according to the study plans developed in these QAPPs.

Specific monitoring objectives for the two study areas will be developed as part of the QAPP, but will include or consider the following:

- Status and trends monitoring
- Core ambient monitoring

- Rotating monitoring components that may include source tracing
- Effectiveness monitoring (such as for water quality BMPs)

## **TASK 5.1 PALEOCHANNEL WATER QUALITY MONITORING STUDY**

### **General**

The potential for water quality impacts in the geologic features known as the paleochannels on the West Plains west of the City of Spokane requires evaluation. The paleochannels are ancestral drainages filled by glaciofluvial (flood) deposits during the most recent ice age; geologically they form a minimum of three (named Airport, Airway Heights, and Deep Creek Paleochannels) relatively linear sand/gravel deposits nested within a primarily hard-rock basalt floor. Because paleochannel sediments have a significantly higher vertical permeability and storage capacity than the surrounding basalt rock, they are naturally of interest for water supply or aquifer storage and recovery, as well as for disposal/infiltration of stormwater or reclaimed water. Studies to date have focused on:

- Mapping the extent of the paleochannels (SAIC, 1992; Deobald and Buchanan, 1995; Budinger & Associates, Inc., 2001; CH2M Hill, 2001; and GeoEngineers, 2002, 2003, and 2007).
- Determining their infiltrative capacity, permeability, and other aquifer characteristics to evaluate groundwater flow conditions (GeoEngineers 2002, 2003, and 2007).
- Detailed study of aquifer geometry and properties within specific sites, such as the planned city of Airway Heights Water Reclamation Plant (GeoEngineers 2007).
- Groundwater quality and potential nitrate sources to city of Airway Heights Wells 1 and 4 (GeoEngineers, 2003).

Few water quality studies have been conducted on the paleochannels. This presents a major data gap in the water quality information for WRIA 54; without an understanding about the water quality of groundwater and springs associated with the paleochannels, it will be impossible to comprehensively evaluate the potential impacts of numerous stormwater, wastewater, and water supply projects already under consideration and development. In addition, the impacts of urbanizing land use in the region surrounding the paleochannels is not understood.

### **Scope of Work**

The proposed scope of work to develop the QAPP for the Paleochannel Water Quality Monitoring Study consists of the following components:

#### ***Subtask 5.1.1 Development/Compilation of Background Information***

1. Compile readily-available existing information regarding:
  - Paleochannel aquifer geometry;

- Paleochannel aquifer composition and hydraulic properties;
  - Paleochannel aquifer groundwater quality;
  - Existing paleochannel aquifer water balance analyses and components, including recharge and discharge locations and volumes.
2. Compile an inventory of water supply and groundwater monitoring wells completed within paleochannel aquifer sediments.
  3. Perform a hydrogeologic reconnaissance of the study area to identify a) well locations and b) locations of any springs that could be reflective of paleochannel aquifer discharge.
  4. Map well and spring locations within a Geographic Information System (GIS) database.
  5. Acquire current land use mapping from Spokane County to consider in siting sample stations.

***Subtask 5.1.2 Identify Data Gaps/Develop Objectives***

1. Identify data gaps that limit current understanding of the factors that influence groundwater quality with paleochannel aquifers and potential impacts of groundwater quality degradation.
2. Develop objectives for Paleochannel Water Quality Monitoring QAPP

***Subtask 5.1.3 Develop Draft and Final QAPP***

Based on compiled information, data gaps, reconnaissance and analyses, develop a QAPP for submittal to the Washington State Department of Ecology (Ecology) with the elements presented in the following section.

***QAPP Elements***

The following elements would be incorporated into the QAPP developed for the Paleochannel Water Quality Monitoring Study.

- Background and summary of existing data for paleochannel aquifers, including the following:
  - Aquifer geometry
  - Geologic composition – type of material, thickness, etc.
  - Hydraulic characteristics
    - Aquifer parameters – water levels, flow directions, transmissivity, hydraulic conductivity, storativity. Fill in data gaps under this category
    - Aquifer recharge, including relationship with adjacent basalt aquifers
    - Aquifer discharge, including relationship with down-gradient surface water bodies such as Deep Creek, Coulee Creek, and the Spokane River

- Groundwater quality data
- Description of goals and objectives of the investigation/monitoring program (developed in collaboration with WRIA 54 water quality work group). Potential objectives could include one or more of the following:
  - Design subsurface exploration, testing, and analysis program to mitigate identified data gaps.
  - Establish baseline groundwater quality over a one-year monitoring period
  - Establish long-term monitoring program to evaluate deviation from background concentrations
  - Identify groundwater quality impacts associated with specific contaminant sources
  - Evaluate potential impact of paleochannel aquifer discharge on surface water quality
- Identify monitoring types and locations (sampling design)
  - Select paleochannel aquifers for evaluation
  - Select existing water supply and/or monitoring wells for sampling.
  - Identify locations where monitoring wells should be installed, if appropriate.
  - Select springs for flow and/or water quality monitoring
  - Monitoring frequency and schedule
  - Analytes
  - Provide sampling options for a range of funding levels
- Data quality objectives
  - Measurement quality objectives - bias, precision, accuracy
  - Data quality objectives – how accurate data need to be to make correct decisions
- Field procedures
  - Groundwater sampling methodology
  - Spring flow measurement and sampling methodology
  - Protocols for other data collection techniques
  - Documentation and records
  - Data quality assessment
  - Equipment preparation
  - Safety considerations

- Laboratory procedures
  - Analytical methods
- Quality control
  - Field duplicates
  - Lab duplicates
  - Field blank and blind reference samples
  - Performance evaluation samples
- Data management procedures
- Data review, verification, and validation
- Data reporting and data sharing
- Organization and schedule
  - Project organization
  - Key individuals
  - Project schedule
  - Budget and funding

A draft QAPP will be developed and provided for review (electronic and two hard copies). Following a designated review period, comments will be compiled and a comment response summary prepared. The final QAPP will be prepared and delivered to Spokane County (electronic and two hard copies).

## **SUBTASK 5.2 NINE MILE AREA NON-POINT SOURCE MONITORING STUDY**

### **General**

This project would focus on the impacts of non-point sources of pollution along the shorelines of Lake Spokane.

Previous WRIA 54 studies have identified development along both sides of Lake Spokane (Suncrest, Nine Mile) as areas of concern for watershed planning purposes. The proposed monitoring program will likely involve data collection using aerial and on-ground techniques to assess the current and potential future impacts of non-point sources on Lake Spokane water and the near-shore lake beds.

### **Scope of Work**

The proposed scope of work to develop the QAPP for the Nine Mile Area Non-Point Source Monitoring Study consists of the following components:

#### ***Subtask 5.2.1 Development/Compilation of Background Information***

1. Conduct a landscape analysis using existing GIS coverages to identify possible nonpoint source contributing areas such as a) developments and residences that

discharge to septic tanks within the study area, b) present and historic agricultural areas within the study area that could represent non-point contaminant sources, and c) areas where landscaping chemicals (fertilizers, herbicides, and pesticides) may contribute to non-point source pollution, and d) other potential non-point sources.

2. Compile readily-available existing information regarding surface water and groundwater within the study area:
  - Tributary streamflow and water quality data
  - Wetland inventory data
  - Aquifer characteristics and groundwater quality data.

### ***Subtask 5.2.2 Identify Data Gaps/Develop Objectives***

1. Identify data gaps that limit current understanding for extent of the impact from non-point contaminant sources within the study area to surface and ground water quality.
2. Work with the WRIA 54 water quality group to determine the study area boundaries and specific objectives for the Nine Mile Non-Point Source Monitoring QAPP.

### ***Subtask 5.2.3 Develop Draft and Final QAPP***

Based on compiled information, data gaps, reconnaissance and analyses, develop a sampling and analysis plan (QAPP) for submittal to Ecology with the elements presented in the following section.

#### ***QAPP Elements***

The following elements would be incorporated into the QAPP developed for the Nine Mile Area Non-Point Source Monitoring Study.

- Background and summary of existing data related to surface water, groundwater, and possible non-point source pollution in the study area, including the following:
  - Results of landscape analysis
  - Tributary streamflow and water quality data
  - Wetland inventory data
  - Description of relevant hydrogeology, including groundwater quality data;
- Description of problem statement and objectives for monitoring program (developed in collaboration with WRIA 54 water quality work group). Potential objectives could include one or more of the following:
  - Evaluate potential impact of non-point sources of nutrients on surface water quality within Lake Spokane

- Evaluate potential impact of stormwater runoff within the study area on surface water quality within Lake Spokane
- Establish baseline water quality and a long-term monitoring program to evaluate deviation from background concentrations
- Determine the source for any elevated levels of non-point source pollutants identified through this or other monitoring programs.
- Evaluate the effectiveness of water quality BMPs in protecting downstream water quality
- Include an educational component, such as a volunteer monitoring program
- Identify monitoring types and locations (sampling design)
  - Based on objectives, identify appropriate monitoring approaches and methods. This may include remote sensing techniques, combined with on-the-ground sampling for calibration of spectral patterns. Options will be developed to accommodate variable funding levels for implementation and to attract funding under available grant programs.
  - Sample sites will be identified
  - Monitoring frequency and schedule will be developed
  - Specific analytes will be recommended
- Data quality objectives
  - Measurement quality objectives - bias, precision, accuracy
  - Data quality objectives – how accurate data need to be to make correct decisions
- Field procedures
  - Groundwater sampling methodology
  - Surface water flow measurement and sampling methodology
  - Protocols for other types of monitoring
  - Documentation and records
  - Data quality assessment
  - Equipment preparation
  - Safety considerations
- Laboratory procedures
  - Analytical methods
- Quality control

- Field duplicates
- Lab duplicates
- Field blank and blind reference samples
- Performance evaluation samples
- Data Management Procedures
- Data review, verification, and validation
- Data reporting and data sharing
- Organization and Schedule
  - Project organization
  - Key individuals
  - Project schedule
  - Budget and funding

A draft QAPP will be developed and provided for review (electronic and two hard copies). Following a designated review period, comments will be compiled and a comment response summary prepared. The final QAPP will be prepared and delivered to Spokane County (electronic and two hard copies).

## **DELIVERABLES AND SCHEDULE**

Compilation of Background Information:	February 28, 2008
Draft Paleochannel Water Quality Monitoring QAPP:	April 30, 2008
Draft Nine Mile Non-Point Source Monitoring QAPP:	April 30, 2008
Final Paleochannel Water Quality Monitoring QAPP:	June 30, 2008
Final Nine Mile Non-Point Source Monitoring QAPP:	June 30, 2008

This schedule is based on a start date of January 2, 2008.

## **REFERENCES**

- Budinger & Associates, Inc., 2001, Results of seismic refraction survey, paleo-channel investigation, Airway Heights, WA: Report by Budinger & Associates, Inc., Spokane, Wash. for URS Consultants, Inc., Spokane, Wash., April 27, various pages.
- CH2M Hill, 2003, Craig Road Landfill, Fairchild Airforce Base, 2001 fourth quarter and annual report, optimization, operations, and maintenance: Report by CH2M Hill, Spokane, Wash. for the Air Force Center for Environmental Excellence, Environmental Restoration Division, Brooks City-Base, Texas, January, various pages.
- Deobald, W.B. and J.P. Buchanan, 1995, Hydrogeology of the West Plains Area of Spokane County, Washington: Report by Deobald, W.B. and J.P. Buchanan for the Spokane County Water Quality Management Program, Spokane, Wash., May, various pages.
- GeoEngineers, Inc., 2002, Report, Hydrogeologic Study, Pacific Northwest Technology Park, Spokane, Washington: Report by GeoEngineers, Inc., Spokane, Wash., for Vandervert Construction, Inc., Spokane, Wash, January 10, various pages.

GeoEngineers, Inc., 2003, Hydrogeologic Evaluation, City of Airway Heights, Airway Heights, Washington : Report by GeoEngineers, Inc., Spokane, Washington for the city of Airway Heights, Washington, August 20, various pages.

GeoEngineers, Inc., 2007, Report-Revision 2, Hydrogeologic Evaluation, Proposed Water Reclamation Plant, City of Airway Heights, Airway Heights, Washington : Report by GeoEngineers, Inc., Spokane, Washington for the city of Airway Heights, Washington, September 26, various pages.

Science Applications International Corporation (SAIC), 1992, Installation Restoration Program (IRP), Remedial Investigation Report, Craig Road Landfill, Fairchild AFB, Washington: Prepared for Headquarters Strategic Air Command, Offutt Air Force Base, Nebraska and the USAF, Air Force Center for Environmental Excellence, Environmental Restoration Division, Brooks Air Force Base, Texas.